



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

COPY

FEB 19 2007

OFFICE OF
AIR AND RADIATION

Dr. David Moody, Manager
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, NM 88221-3090

Dear Dr. Moody:

This letter provides the results of the U.S. Environmental Protection Agency's (EPA) baseline inspection of the remote-handled (RH) transuranic (TRU) waste characterization program implemented by the Central Characterization Project (CCP) at the Los Alamos National Laboratory (LANL) (Inspection Number EPA-LANL-RH-CCP-05.07-08).

On May 8-10 2007, the EPA conducted a baseline inspection of LANL-CCP's RH TRU waste characterization program to assess the characterization of RH TRU waste in accordance with EPA regulations (40 CFR 194.8(b)(3), 40 CFR 194.8(c) and 40 CFR 194.24). During the inspection, EPA assessed the technical adequacy of the characterization performed through acceptable knowledge (AK) and radiological characterization (RC). EPA's inspection team identified two concerns, one in each evaluation area, RC and AK. The Department of Energy's (DOE) Carlsbad Field Office (CBFO) adequately responded to EPA's concerns and there are no open issues resulting from this inspection.

In accordance with 40 CFR 194.8, EPA issued a *Federal Register* notice on August 22 2007, announcing EPA's proposed approval of the RH TRU waste characterization program at LANL-CCP. This *Federal Register* notice also opened a 45-day public comment period on our proposed approval and announced the availability of the inspection report (Air Docket No: A-98-49; II-A4-89). EPA received one set of public comments and a set of late comments from the same commenter on the proposed LANL-CCP inspection report. In the enclosed inspection report, Section 9 and Attachment B discuss the public comments and EPA's responses.

Approval Summary

The EPA determined that the records documenting LANL-CCP's RH WC program represented activities that were technically adequate. EPA, therefore, is approving the LANL-CCP RH WC program limited to the sixteen RH TRU canisters in LANL RH Waste Stream No. LA-MHD03-002 evaluated during this baseline inspection that is described and documented in this report. This approval includes the following:

| | | | |
|----------|---------|-------------|-------------------------|
| UNIQUE # | DOE D/C | DATE REC'D | ADDRESSEES |
| | | FEB 25 2008 | See list on the back |

0800394

| | | |
|----------------|-----------------|--|
| D. MOODY ✓ | A. HOLLAND ✓ | J. JOHNSON |
| V. DAUB ✓ | M. NAVARRETTE ✓ | C. GABBURY / J. R. STROBLE ✓ |
| R. NELSON ✓ | D. MIEHLS | J. PLUM |
| K. WATSON | L. CHISM | V. WALDRAM/P. GILBERT ✓ |
| N. CASTANEDA ✓ | D. GALBRAITH | A. PANGLE - CTAC ✓ |
| C. FESMIRE ✓ | G. BASABILVAZO | WIPP OPE. REC. - 486-06 ✓ |
| S. CASEY | R. PATTERSON | A. CHAVEZ / R. CHAVEZ ✓ L. PASTORELLO GSA 109 ✓ |

- (1) The AK process for sixteen canisters of RH retrievably-stored TRU debris in the waste stream designated LANL RH Waste Stream No. LA-MHD03-002.
- (2) The RC process using dose-to-fissile gram, dose-to-curie (DTC), curie-to-dose and modeling-derived scaling factors for assigning radionuclide values to sixteen canisters of RH retrievably-stored TRU debris in one waste stream, designated as LANL RH Waste Stream No. LA-MHD03-002 and documented in CCP-AK-LANL-501, Revision 0 and detailed in this report.

This letter and the final inspection report have been placed in the EPA docket (Air Docket No. A-98-49, II-A4-96) and posted on the EPA website at www.epa.gov/radiation/wipp.

Since no additional WC activities will occur relative to the sixteen canisters of RH debris waste that are the subject of this approval, changes to the WC activities evaluated during the baseline inspection are not expected to occur. Accordingly, the report that accompanies this letter does not list any Tier 1 (T1) or Tier 2 (T2) designations relative to this waste and waste characterization components covered by this approval. Approval of any future or other past RH WC activities at LANL-CCP will require a new EPA baseline inspection.

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

Sincerely,



Juan Reyes, Director
Radiation Protection Division

Enclosures

cc: Electronic Distribution
Frank Marcinowski, DOE HQ
Vernon Daub, CBFO
Ava Holland, CBFO
Courtland Fesmire, CBFO
J.R. Stroble, CBFO
Martin Navarrete, CBFO
Dennis Michls, CBFO
Brian Littleton, EPA
Steve Zappe, NMED
Allison Pangle, CTAC
Wayne Ledford, CTAC

DOCKET NO: A-98-49, II-A4-96

WASTE CHARACTERIZATION INSPECTION REPORT

**EPA BASELINE INSPECTION NO. EPA-LANL-CCP-RH-5.07-8
OF THE CENTRAL CHARACTERIZATION PROJECT
REMOTE-HANDLED TRANSURANIC WASTE CHARACTERIZATION
PROGRAM AT THE LOS ALAMOS NATIONAL LABORATORY
May 8 - 10, 2007**

**U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
Center for Federal Regulations
1200 Pennsylvania Avenue, NW
Washington, DC 20460**

February 2008

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ATTACHMENTS

- Attachment A.1 EPA Inspection Issue Tracking Form, EPA Issue No.
LANL-CCP-RH-AK-07-001C
- Attachment A.2 EPA Inspection Issue Tracking Form, EPA Issue No.
LANL-CCP-RH-RC-07-002C
- Attachment B EPA's Response to Public Comments

1.0 EXECUTIVE SUMMARY

In accordance with 40 CFR 194.8(b), the U.S. Environmental Protection Agency (EPA or the Agency) conducted Baseline Inspection No. EPA-LANL-CCP-RH-05.07-8 (original inspection number was EPA-LANL-CCP-RH-07.03-8) of the Central Characterization Project's (CCP) waste characterization (WC) program for remote-handled (RH) transuranic (TRU) waste at the U.S. Department of Energy's (DOE) Los Alamos National Laboratory (LANL) located in Los Alamos, New Mexico. EPA conducted a baseline inspection of the site's program to characterize RH TRU wastes proposed for disposal in the Waste Isolation Pilot Plant (WIPP). This inspection took place in a commercial office complex in Albuquerque, New Mexico, on May 8-10, 2007.

On August 22, 2007, EPA issued a Federal Register (FR) notice (Vol. 72, No. 162, pp. 47023-47026) announcing the proposed approval of the RH waste characterization program implemented at LANL by CCP. The FR notice opened a 45-day comment period to solicit public comment on the proposed approval of LANL-CCP's RH WC program and the LANL Baseline Inspection Report (EPA Air Docket A-98-49, II-A4-89) that ended October 9, 2007. EPA received one set of public comments. [See EPA Docket ID No. EPA-HQ-OAR-2007-0643-0003]. The comments have been included verbatim in Attachment B to this report along with EPA's responses. EPA requested CBFO/CCP to provide information to include in the response for some public comments. CBFO/CCP provided this information in a memorandum, which has been docketed as a supporting document along with the EPA letter approving LANL-CCP's RH WC program and sixteen LANL RH canisters for WIPP disposal. (See EPA Docket ID No. EPA-HQ-OAR-2007-0643-0006 and 0007). We also have included the CBFO/CCP responses to comments (see Attachment B of this report), where applicable. The text of the report that proposed the LANL RH approval was changed in response to the comments received and the information provided by CBFO/CCP, where appropriate.

In the course of responding to the October 8, 2007 public comments, EPA received information from CBFO/CCP at EPA's request that was used in preparing the response to some public comments. A second set of comments from the same commenter was received on November 8, 2007 (See EPA Docket ID No. EPA-HQ-OAR-2007-0643-0008). These comments have been included verbatim as late comments in Attachment B. Upon closer examination EPA determined that these new comments did not warrant additional consideration because they were restatements of the original comments. However, in few instances a response to the late comment has been included as clarification to address restatement of the original comment by the commenter.

EPA must verify compliance with 40 CFR 194.24 before waste may be disposed of at the WIPP, as specified in Condition 3 of the Agency's certification of the WIPP's compliance with disposal regulations for TRU radioactive waste (63 *Federal Register* 27354 and 27405, May 18, 1998). EPA Baseline Inspection No. EPA-LANL-CCP-RH-05.07-8 was performed in accordance with the provisions of 40 CFR 194.8(b), as issued in a July 16, 2004, FR notice (Vol. 69, No. 136, pp. 42571-42583). The purpose of the LANL-CCP RH WC inspection was to evaluate the adequacy of the site's WC programs for sixteen canisters in a single RH debris waste stream for disposal at the WIPP. The sixteen canisters of RH debris in this waste stream were generated from the examination of fuel pins at the LANL Chemical, Metallurgical Research (CMR) facility

from 1970 through 1984. From 1986 to the early 1990s, wastes derived from these fuel pins were loaded into 364 1½-gallon steel cans that were welded shut. These 364 cans were later assembled into twelve canisters and four other canisters were assembled with bulk-loaded debris from the same activities. The WC activity examined during the inspection was acceptable knowledge (AK) for these sixteen canisters of RH retrievably-stored TRU debris (S5000) waste, including their radiological characterization (RC). LANL-CCP has assured EPA that these sixteen sealed canisters will be disposed of “as is” at WIPP and will not be repackaged with any other RH debris waste.

The EPA inspection team determined that the records documenting LANL-CCP’s RH WC program represented activities that were technically adequate. EPA, therefore, is approving the LANL-CCP RH WC program for the sixteen RH TRU canisters in LANL RH Waste Stream No. LA-MHD03-002 evaluated during this baseline inspection that is described and documented in this report. The approval includes the following:

- (1) The AK process for sixteen canisters of RH retrievably-stored TRU debris in the waste stream designated LANL RH Waste Stream No. LA-MHD03-002.
- (2) The RC process using dose-to-fissile gram, dose-to-curie (DTC), curie-to-dose and modeling-derived scaling factors for assigning radionuclide values to sixteen canisters of RH retrievably-stored TRU debris in one waste stream, designated as LANL RH Waste Stream No. LA-MHD03-002 and documented in CCP-AK-LANL-501, Revision 0 and detailed in this report.

This inspection was different from previous RH baseline inspections as well as the previous contact-handled (CH) baseline inspections. Generally, EPA’s RH and CH baseline inspections evaluate a site’s WC program for technical adequacy and, when approved, the TRU site would continue to use the approved program components to characterize additional wastes on an ongoing basis. However, the characterization activities within the scope of this inspection had occurred at LANL from 1986 through the 1990s and were completed prior to this inspection. This inspection’s sole focus was to evaluate the records that had been assembled to document WC activities, including recently performed modeling, interpretation, and further calculations based on previously generated RH measurement data for LANL RH debris Waste Stream No. LA-MHD03-002. There will be no further WC activities relative to this waste, and this approval is directed to a discrete set of containers within this LANL RH debris waste stream, as supported by the documentation the EPA inspection team evaluated during this inspection. Note that this is a retrospective approval of LANL RH debris waste characterization activities. LANL-CCP cannot characterize any additional RH waste in the future based on this baseline approval. Since no additional WC activities will occur relative to the sixteen canisters of RH debris waste subject to this approval, changes to the WC activities evaluated during the baseline inspection are not expected to occur. Accordingly, this report does not list any Tier 1 (T1) or Tier 2 (T2) designations relative to this waste and waste characterization components covered by this approval. Approval of any future or other past RH WC activities at LANL-CCP would require a new EPA baseline inspection.

2.0 PURPOSE OF INSPECTION

On May 18, 1998, EPA certified that the WIPP will comply with the radioactive waste disposal regulations in 40 CFR Part 191. In this certification, EPA also included Condition 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 in 40 CFR 194.8 requires DOE to (1) provide EPA with information on AK¹ for waste streams proposed for disposal at the WIPP, and (2) implement a system of controls used to confirm that the total amount of each waste component that will be emplaced in the WIPP will not exceed limits identified in the WIPP Compliance Certification Application (CCA).

Under the changes to 40 CFR 194.8 promulgated in the July 16, 2004, FR notice, EPA must perform a baseline inspection of a TRU waste generator site’s WC program. The purpose of the baseline inspection is to approve the site’s WC program based on the demonstration that the program’s components, with applicable conditions and limitations, can adequately characterize TRU wastes and comply with the regulatory requirements imposed on TRU wastes destined for disposal at the WIPP. An EPA inspection team conducts an on-site inspection to verify that the site’s system of controls is technically adequate and properly implemented. Specifically, EPA’s inspection team verifies compliance with 40 CFR 194.24(c)(4), which states the following:

Any compliance application shall: . . . Provide information which demonstrates that a system of controls has been and will continue to be implemented to confirm that the total amount of each waste component that will be emplaced in the disposal system will not exceed the upper limiting value or fall below the lower limiting value described in the introductory text of paragraph of this section.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 the baseline inspection is to implement the requirements of 40 CFR 194 by assessing whether DOE sites that characterize TRU waste prior to disposal at the WIPP are capable of characterizing and tracking the waste. EPA may also conduct follow-up inspections to address issues remaining from the baseline inspection or to seek further clarification/discussion related to WC processes evaluated during a baseline inspection. By approving the WC systems and processes at LANL-CCP that were applied to the sixteen canisters of retrievably-stored RH debris waste, EPA confirms that the Agency has evaluated the

¹ As of the FR notice of July 16, 2004, EPA has replaced the term *process knowledge* with *acceptable knowledge*. Acceptable knowledge refers to any information about the process used to generate waste, material inputs to the process, and the time period during which the wastes were generated, as well as data resulting from the analysis of waste conducted prior to or separate from the waste certification process authorized by an EPA certification decision to show compliance with Condition 3 of the certification decision.

² The introductory text of 40 CFR 194.24(c) states, “For each waste component identified and assessed pursuant to [40 CFR 194.24(b)], the Department shall specify the limiting value (expressed as an upper or lower limit of mass, volume, curies, concentration, etc.), and the associated uncertainty (i.e., margin of error) for each limiting value, of the total inventory of such waste proposed for disposal in the disposal system.”

capabilities of systems and processes implemented by the site to accomplish two tasks: (1) the identification and measurement of waste components [such as plutonium (Pu)] that must be tracked for compliance,³ and (2) the confirmation that the waste in any given container has been properly identified as belonging to the group of approved waste streams.

Based on the adequacies of the WC processes demonstrated during the baseline inspection, including all conditions and limitations, EPA usually specifies which subsequent WC program changes or modifications must undergo further EPA inspection or approval under 40 CFR 194.24. This is accomplished by assigning a tier level to each aspect of the characterization program, i.e., T1 and T2 activities, as discussed above. However, the nature of the WC activities at LANL-CCP is such that no additional characterization activities will take place, making an assignment of T1 or T2 changes irrelevant. Accordingly, no formal tiering is assigned to the LANL-CCP RH WC program as a result of this baseline based on the information included in this inspection report. As stated previously, EPA's proposed approval is limited to the sixteen sealed canisters whose characterization is documented in the records evaluated during the inspection as detailed in this report. The rule applying to this baseline inspection can be found in the FR (Vol. 69, No. 136, pp. 42571-42583, July 16, 2004). EPA does not expect to conduct additional LANL-CCP RH waste inspections specific to this waste stream in the future. EPA, however, will perform a new baseline inspection and approval of a LANL-CCP RH waste characterization program implemented to characterize any RH waste other than the debris waste stream discussed in this report under the authority of 40 CFR 194.8.

3.0 PURPOSE OF THIS REPORT

This report documents the basis for EPA's approval decision and explains the results of Baseline Inspection No. EPA-LANL-CCP-RH-5.07-8 in terms of findings or concerns. Specifically, this report does the following:

- Describes the characterization systems that are covered by this approval
- Delineates a specific set of RH wastes that are approved
- Provides objective evidence of the approval basis for all WC systems and/or waste containers
- Identifies all relevant limitations and or conditions for each WC system and/or waste container
- Provides objective evidence of outstanding findings or concerns in the form of documentation, as applicable

³ The potential contents of a single waste stream or group of waste streams determine which processes can adequately characterize the waste. For example, if AK suggests that the waste form is heterogeneous, the site should select the matrix-appropriate radiological characterization technique to obtain adequate radionuclide measurements. Visual Examination (VE) serves to confirm and quantify waste components, such as cellulose, rubbers, plastics, and metals. Once the nature of the waste has been confirmed, characterization techniques quantify selected radionuclides in the waste. In some cases, a TRU waste generator site may be able to characterize a range of heterogeneous waste streams or only a few. A site's stated limits on the applicability of proposed WC processes govern the scope of EPA's inspection.

- Describes any tests or demonstrations completed during the course of the inspection and their relevance to EPA's approval decision

This report references the documents that the EPA inspection team members reviewed in support of the technical determination. To see or obtain copies of any items identified in this report, write to the following address:

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

EPA's final approval decision regarding the LANL-CCP WC program is conveyed to DOE separately by letter. This information is also available on EPA's Web site at <http://www.epa.gov/radiation/WIPP>, in accordance with 40 CFR 194.8(b)(3).

4.0 SCOPE OF INSPECTION

The scope of Baseline Inspection No. EPA-LANL-CCP-RH-5.07-8 included the technical adequacy of the WC systems used by LANL-CCP to characterize sixteen canisters of RH TRU wastes in LANL RH Waste Stream No. LA-MHD03-002. In the case of these wastes, AK provides the basis for all radiological and physical waste characterization, including: the identification and quantification of the 10 WIPP-tracked radionuclides (^{241}Am , ^{137}Cs , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{242}Pu , ^{90}Sr , ^{233}U , ^{234}U , and ^{238}U). Accordingly, the inspection's scope consisted of reviewing records of WC activities that had been performed from 1986 through the 1990s, supplemented by data interpretation and manipulation, and the development and application of conceptual models that were performed more recently related to WC.

During an inspection, EPA does not approve characterization data; that function is the sole responsibility of the site being evaluated during the inspection, in this case LANL-CCP. EPA evaluated records that documented the technical aspects of the WC processes implemented by LANL to characterize sixteen canisters of RH retrievably-stored debris waste that were conducted from 1986 through the 1990s. These records included more recent compilations of older information, as well as newer interpretations of, and additional calculations to, older measurement data. The evaluation consisted of interviewing personnel and inspecting records related to the WC processes within the inspection's scope. An important aspect of this evaluation is the objective evidence that documents the effectiveness of the WC processes. Objective evidence typically takes the form of Batch Data Reports (BDRs) for radiological characterization and AK accuracy reports. EPA typically selects samples of each of these items based on the number and variety of items that were completed and available for inspecting each WC process, consistent with standard sampling techniques. However, because the WC activities for these LANL RH wastes are not ongoing, BDRs were not prepared. Accordingly, EPA evaluated records associated with the characterization of all sixteen canisters, i.e., conducted a one hundred percent examination. Waste characterization information that is the equivalent of what is typically contained in BDRs was provided within specific LANL-CCP reports, as discussed in Section 8 of this report. Based on an evaluation of the WC processes documented in

the LANL RH records, EPA determined the technical adequacy of the WC processes within the inspection's scope.

5.0 INSPECTION-RELATED DEFINITIONS

During the course of an inspection, EPA inspectors may encounter items or activities that require further inquiry for their potential to adversely affect WC and/or isolation within the repository. The two main categories relevant to WC inspections are identified below:

Finding: A determination that a specific item or activity does not conform to 40 CFR 194.24(c)(4). A finding requires a response from 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. (Concerns not requiring a response do not have to be addressed prior to program approval.)

6.0 PERSONNEL

6.1 EPA Inspection Team

The members of the EPA WC inspection team are identified in Table 1.

Table 1. EPA Inspection Team Members

| Inspection Team Member | Position | Affiliation |
|------------------------|------------------------|-----------------------------|
| Ms. Rajani Joglekar | Inspection Team Leader | U.S. EPA ORIA |
| Mr. Ed Feltcorn | Inspector | U.S. EPA ORIA |
| Ms. Connie Walker | Inspector | S. Cohen & Associates, Inc. |
| Mr. Patrick Kelly | Inspector | S. Cohen & Associates, Inc. |

6.2 Personnel Contacted

EPA and its support personnel conducted interviews with LANL-CCP personnel in several disciplines. The personnel contacted consisted of representatives of the TRU WC staff, and they are listed in Table 2, along with their affiliation and technical area.

Table 2. Personnel Contacted During Inspection

| Personnel | Affiliation | Area of Expertise |
|---------------|-------------|----------------------------------|
| Jene Vance | CCP | AK/DTC; Scaling Factors |
| Larry Porter | CCP | AK, SPM; Scaling Factors-MS Data |
| Steve Schafer | CCP | AK, AK Expert |
| Kevin Peters | CCP | AK, AK Expert |
| Mark Doherty | CCP/WTS | DTC & Scaling Factors-MS Data |

7.0 PERFORMANCE OF THE INSPECTION

Site Background and History

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

Inspection Process Overview

EPA Inspection No. EPA-LANL-CCP-RH-05.07-8 had the scope described in Section 4.0, above, for the purpose of determining the site's compliance with 40 CFR 194.24. The inspection was conducted in the following steps:

- (1) Obtaining and reviewing site procedures, reports, and other technical information related to RH WC activities used to characterize these wastes at LANL from 1986 through the 1990s in advance of the inspection
- (2) Preparing technical questions specific to the various aspects of AK prior to the inspection based on the activities cited in the previous bullet, as appropriate
- (3) Interacting with CBFO and LANL-CCP personnel to arrange inspection logistics
- (4) Evaluating LANL-CCP's implementation of WC processes for adequacy and demonstrating compliance with 40 CFR 194.24 requirements, as evidenced by the records of the waste characterization activities conducted at LANL from 1986 through the 1990s
- (5) Conducting the baseline inspection in Albuquerque to verify the technical adequacy or qualifications of RH WC personnel, procedures, processes, and equipment as evidenced by the records of the waste characterization activities conducted at LANL from 1986 through the 1990s
- (6) Recording all concerns on EPA Inspection Issue Tracking Forms, which were completed and provided to CBFO and LANL-CCP personnel as they were generated (see Attachment A for copies of these forms)
- (7) Communicating all pertinent information with CBFO and LANL-CCP personnel, as appropriate
- (8) Pursuing resolution of all identified issues prior to completion of the inspection and after the inspection, as appropriate
- (9) Conducting entrance, exit, and daily briefings for CBFO and LANL-CCP management personnel, as appropriate
- (10) Preparing the draft inspection report
- (11) Responding to the public comments receiving during the comment period and pre

8.0 TECHNICAL EVALUATION

The focus of this inspection was to evaluate AK documentation that was verified using radiological characterization and peer-reviewed information for physical content and prohibited item identification. EPA examined the AK process and associated information to determine whether the LANL-CCP RH program for characterizing waste stream LA-MHD03-002 demonstrated compliance with the requirements of 40 CFR 194.8. Due to the approach taken by LANL-CCP, all waste characterization activities relative to the sixteen canisters of this waste stream fall under the general heading of AK. In this report, AK is divided into five sections:

- 8.1, Acceptable Knowledge Overview and Process Analysis
- 8.2, Radiological Characterization
- 8.3, Physical Form and Prohibited Item Characterization
- 8.4, Mass Spectrometry to Support ORIGEN2.2
- 8.5, Attainment of Data Quality Objectives.

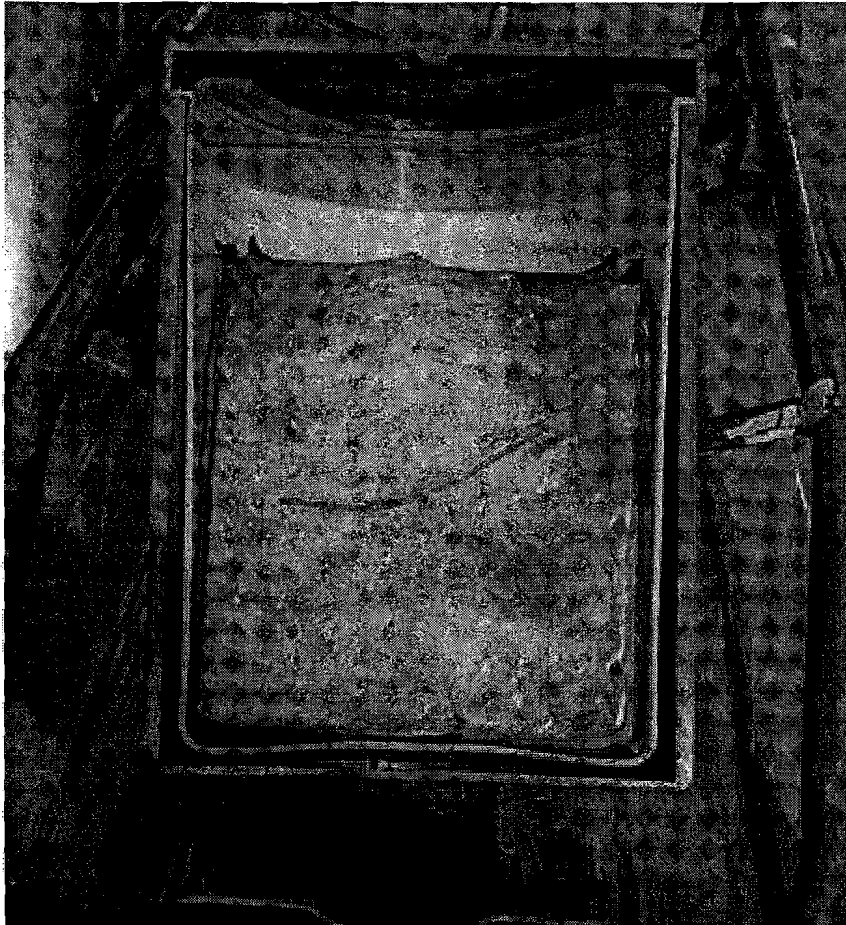
This report format differs from the format that EPA generally uses where there are multiple sections named for each WC process, i.e., AK, Non Destructive Assay (NDA), Non Destructive Examination (NDE), and WIPP Waste Information System (WWIS) that can be found in other EPA baseline inspection reports.

Waste Containers

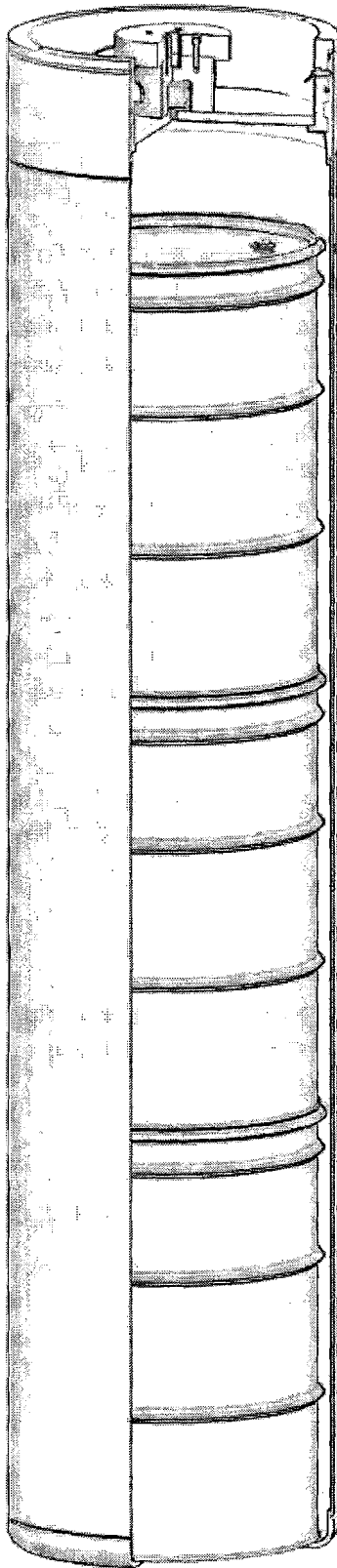
The terminology regarding waste containers used in this report can be confusing, in large part because there were several types of containers used. In all cases, the waste container became part of the waste matrix except for the RH canister that ultimately is loaded into the 72B RH shipping cask. For purposes of clarification, the terms used in this report are defined as follows:

- *Paint Can* refers to a 1-gallon metal can into which the RH waste items were placed.
- *Alpha Can* refers to a polypropylene can with a press-fit lid made specifically for LANL to contain the *paint can*.
- *Can* refers to a 1½-gallon steel can ¼ inch thick with a filtered vent that is welded shut.
- *Drum* refers to a 55-gallon (208 liter) drum as is commonly used for CH TRU wastes.
- *Canister* refers to the 0.89-m³ volume RH canister, the payload container that will be emplaced in the WIPP.

Figure 1 presents a cut-away view of the first three cans listed above, i.e., a paint can inside an alpha can inside a 1½-gallon steel can that has been welded shut. Figure 2 presents the assembly of the RH canister containing up to three drums, each of which contains 12 welded-shut cans. In this report, each of these terms is used deliberately, i.e., to designate the specific container as described above.



**Figure 1. Cut-away View of a Paint Can Inside an Alpha Can
Inside a 1/2-Gallon Steel Can that Has Been Welded Shut**



Canister section removed for illustration purposes

Figure 2. Removable Lid RH Canister with three 55-Gallon Drum Payload

Waste Origin and Generation

The RH debris that makes up this waste stream was generated from approximately 1,610 fuel pins that were examined in the LANL CMR facility over the course of the fuel examination program from 1970 through 1984. All fuel pins were from the fast breeder reactor program and most of them were irradiated in the Experimental Breeder Reactor II (EBR-II) and consisted primarily of uranium and plutonium mixed oxide or carbide fuel with some thorium fuel pins. In the early 1990s, these fuel pin-related RH TRU debris wastes were loaded into a total of 768 paint cans, 404 of which were placed in the underground storage shafts at Technical Area 54 (TA-54), area G at LANL. Each of the remaining 364 cans was subsequently placed inside a 1½-gallon steel can and each can was welded shut. These 364 1½-gallon steel cans were then assayed individually at LANL using a Passive-Active Neutron (PAN) assay system inside a hot cell within the CMR that was modified to accommodate the radiological constraints of such a measurement. The PAN system was calibrated and performed both active and passive determinations as a function of each can's contents and the operator's judgment. Records for the PAN's calibration, routine performance checks and all assays that were generated by LANL from 1986 through the 1990s were retrieved by LANL-CCP. These 1½-gallon cans were loaded into 55-gallon (208 liter) drums (12 cans per drum) and the drums were transferred to a total of twelve RH canisters, with each canister containing up to three drums. Additionally, another four canisters contain bulk-loaded items such as discarded equipment and contaminated hardware associated with the fuel examination program conducted within the CMR hot cell. The four bulk-loaded canisters were not assayed using the PAN system. In 1992, these sixteen canisters were transferred to underground storage shafts at TA-54 where they currently reside. As stated previously, the scope of this inspection was the sixteen canisters of RH debris wastes described in this report.

Waste Characterization Overview

AK provides the basis for all radiological and physical waste characterization information for the RH canisters in this waste stream. As part of the inspection, EPA reviewed the following with respect to the use of AK for WC:

- Waste stream definition and identification, including radiological content
- Identification of TRU versus non-TRU wastes, i.e., high-level waste and spent nuclear fuel
- Identification and quantification of the waste's radionuclide content, including uncertainty
- Material parameters
- Assignment of Waste Matrix Codes (WMC)
- Role of AK in the characterization methodology,
- Compilation of AK documentation and assembly of required information
- Adequacy of WCPIP AK process implementation and AK Summary Report
- AK data traceability for all drums and containers used in the process from data assembly through confirmatory modeling

- AK source document sufficiency
- Waste Characterization Program Implementation Plan (WCPIP) interpretation with respect to AK qualification
- Confirmatory Test Plan (CTP) preparation and plan adequacy
- Characterization Reconciliation Report (CRR) preparation and report adequacy
- Correlation and Surrogate Summary Form (CSSF) and CH-RH correlation
- Personnel training
- AK discrepancy resolution
- AK accuracy
- Implementation of load management
- Identification of the method for determining data quality objectives (DQOs) including those to be attained by AK qualification

Note that DOE is responsible for determining and defending the defense waste status of waste proposed for EPA approval and disposal in WIPP.

The text that follows identifies the objective evidence that the EPA inspection team reviewed in conducting this inspection. Because the characterization process is based on AK records and the various methods used to verify AK exclusive of confirmatory testing, the entire audit was based solely on reviewing documents of activities that had been completed prior to the inspection. Observations of procedural implementation could not be made because all characterization activities had been completed prior to the time of the inspection. All of the 16 canisters within this limited waste stream have been sealed, and no further testing or characterization of the waste will be performed.

Radiological AK information available for this waste stream includes PAN assay data for individual cans of RH wastes and external exposure rate (dose rate) measurements that were taken at the time of packaging for all drums. The determination of several DQOs is achieved through use of isotopic distributions and AK-derived scaling factors applied to the PAN data for appropriate canisters. The DTC, Curie-to-Dose, and Dose-to-Fissile Gram techniques were used for canisters containing bulk-loaded or direct-loaded drums. For both DTC and PAN data, radionuclide-specific scaling factors were derived through the application of ORIGEN2.2 modeling, using input that was based on fuel pins that contributed to the radionuclide content of the waste stream. The data for individual fuel pins were used as input to the ORIGEN2.2 code, but mass spectrometry (MS) data from destructive assay are available for about one quarter of the fuel pins tested within the CMR facility. The MS data were used to confirm or validate the fuel pin results derived with ORIGEN2.2. Quality Assurance documentation for the PAN software used in 1990 and 1991 was not available. Confirmatory testing was performed by recreating the PAN active and passive mode calculations in Excel and verifying one hundred percent of the calculations using the original raw PAN data as input.

Documents Reviewed

The list of documents provided below in conjunction with those listed in Section 8.4 comprise all documents related to the LANL-CCP RH radiological characterization program that were evaluated to support this inspection. Several of the documents were provided to EPA following the Albuquerque inspection.

- CCP-PO-001 Revision 13, CCP Transuranic Waste Characterization Quality Assurance Project Plan, Effective Date November 16, 2006
- CCP-PO-002, Revision 18, CCP Transuranic Waste Certification Plan, Effective Date November 16, 2006
- Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, Revision 0, date TBD
- Remote-Handled TRU Waste Characterization Program Implementation Plan, Revision 0D
- CCP-AK-LANL-500, CCP Acceptable Knowledge Summary Report for 16 Canisters of Remote-Handled Transuranic Debris Waste from Los Alamos National Laboratory Chemistry and Metallurgy Research Facility, Waste Stream: LA-MHD03.002, Revision 0 and Revision 2
- CCP-AK-LANL-501, CCP Remote-Handled Transuranic Radiological Characterization Technical Report for Remote-Handled Transuranic Debris Waste from Los Alamos National Laboratory, Revision 0
- CCP-AK-LANL-502, CCP RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test Plan for LANL RH Waste Stream: LA-MHD03-002, Revision 0 and Revision 1
- CP-AK-INL-503, CCP Los Alamos National Laboratory Quality Assurance Equivalency Report and Procedure Matrix for Remote-Handled Transuranic Debris Waste, Revision 3
- CCP-TP-504, CCP Los Alamos National Laboratory Qualification of Passive-Active Neutron Assay System Software, Revision 0
- CCP-TP-506, CCP Preparation of the Remote-Handled Transuranic Waste Acceptable Knowledge Characterization Reconciliation Report, Revision 2
- CRR, LANL Waste Stream LA-MHD03.002, Attachment 5 and related required documents, May 1, 2007
- Draft Waste Stream Profile Form, Waste Stream LA-MHD03.002, May 2007 prepared for Audit Purposes Only
- CBFO MP 10.5, Revision 6 Management Procedure for the Performance of Peer Review, effective date July 25, 2005 expires July 25, 2007
- C002, Analysis of CMR RH Hot Cell Waste Inventory, N/A, April 25, 2003
- C015, Interview Report with LANL Staff Cognizant of Wing 9 Operations, N/A, June 12, 2003

- C016, QC Check of Spreadsheet Can Weights to CMR RH Hot Cell Logbook No. 23741, N/A, June 12, 2003
- C017, Quality Control Check of Waste Description Records to CMR RH Hot Cell Logbook, N/A, May 23, 2003
- C300, Waste Material Parameter Evaluation for Waste Stream LA-MHD03.002, August 7, 2006
- C301, Radiological Evaluation for Waste Stream LA-MHD03.002, N/A, February 9, 2007
- C303, Weights of RH TRU Cans, N/A, March 10, 2003
- C306, Record of Communication, Interview with Toby Romero, Clarification of Wing 9, Hot Cell Compaction of RH Waste, January 17, 2007
- C307, Record of Communication, Interview with Toby Romero, Clarification of Wing 9, Miscellaneous Waste Management Questions, N/A, February 14, 2007
- C309, Record of Communication: RTR SME Review of RH RTR Tape of Twelve (12) Waste Barrels (B01-B012), N/A, March 7, 2007
- DR001, Discrepancy Resolution for Potential PCB Fluorescent Light Ballasts, N/A, May 1, 2003
- DR002, Compacted Waste Discrepancy Report, N/A, February 6, 2007
- DR003, Waste Loading and Packaging Verification Discrepancy Report, N/A, February 6, 2007
- DR005, Sealed Transfer Cans Greater than 4 Liters in Direct Loaded Drums, N/A, April 19, 2007
- DR006, Canister Weight and Waste Packaging Discrepancies, November 7, 2007
- M001, Data Necessary for Post-Irradiation Examination of Fuel Elements at LASL - LASL No. 79-399 (incomplete sequence), TWCP 25926, P2010- 1489, July15, 1970 through April 9, 1974
- M002, Data Necessary for Post-Irradiation Examination of Fuel Elements at LASL - LASL No. 400-699 (incomplete sequence), TWCP-25930, P2010-1493, April 9, 1974 through October 30, 1976
- M003, Data Necessary for Post-Irradiation Examination of Fuel Elements at LASL - LASL # 700-999 (incomplete sequence), TWCP-25924, P2010-1487, October 30, 1976 through February 14, 1977
- M004, Data Necessary for Post-Irradiation Examination of Fuel Elements at LASL - LASL # 1000-1299 (incomplete sequence), TWCP-25928, P2010-1491, April 24, 1978 through July 13, 1979
- M005, Data Necessary for Post-Irradiation Examination of Fuel Elements at LASL - LASL # 1300-1744 (incomplete sequence), TWCP-25922, P2010-1485, August 20, 1979 through April 1984

- M006, CMR Wing 9 RH TRU Canisters (16) Loading Summary, TWCP-25921, P2010-1484, February 13, 2003
- M007, LASL Mass Spectroscopy Burn-Up Results for Irradiated Fuel, TWCP-25927, P2010-1490, May 14, 1984
- M008, Remote-Handled (RH) Waste Assay Results and Supporting Memoranda, TWCP-25929, P2010-1492, 1990 through 1991
- M129, LANL RH Waste Cans - Passive Data, N/A, 1990-1991
- M130, LANL RH Waste Cans - Active Data, N/A, 1990-1991
- M162, RTR Video Tape of Twelve (12) RH Barrels (B01-B12), N/A, November 9, 1992
- P039, Standard Operating Procedures for Disposing of Wastes From Wing 9 Hot Cells, CMB-14-C5, February 9, 1973
- P067, Drum Loading and Handling Procedure, SOP-MST5-W9-036, Revision 0, March 15, 1993
- P068, WIPP Canister Loading and Welding Procedure, SOP-MST5-W9-037, Revision 0, March 15, 1993
- P081, Preliminary Examination of Pins Or Capsules, 401-DE-14-3, Revision 8, July 26, 1985
- P121, Securing and Disposing of Waste from Wing 9 of the CMR Building, 401-DE-14-66, R1QA-MST-5-W9-1, Revision 0, May 5, 1989, January 9, 1992
- P122, Personnel Training and Certification, 401-DE-14-70, Revision 2, March 15, 1990
- P123, Attachment # 7 to the Los Alamos TRU Waste Certification Plan for the Processing of Contact-Handled and Remote-Handled TRU Solids from the Hot Cell Operations, TRU-MST14-CPA-07, R0TRU-MST-5-CPA-07, Revision 2, September 18, 1987, November 12, 1992
- P133, Emergency Plan Wing 9 CMR Building, EP-MST-5-W9-1, Revision 0, December 10, 1990
- P146, CMR Basis for Interim Operations, March 1992
- P147, A Passive-Active Neutron Device for Assaying Remote-Handled Transuranic Waste, LA-UR-89-3736, November 1989
- P149, Description of the PAN Assay System for Remote Handled Waste, LA-UR-91-125, December 15, 1990
- P207, Los Alamos TRU Waste Certification Plan For Newly Generated TRU Waste, Attachment 3, For the Processing of Certifiable Combustible and Noncombustible TRU Waste in MST Division, TRU-MST12-CPA-03, Revision 0, July 7, 1987
- P222, Determination of the Isotopic Compositions of Uranium and Plutonium, ANC-DE-1-MS-3, Revision 2, August 8, 1973
- P231, Radiological Characterization of LANL RH TRU Packaged in 16 WIPP Canisters, P2010-1584, June 16, 2003

- P301, Characterization and Inspection of the 16 WIPP Canisters in Shafts 236-243 and 246-253 at TA-54, Area G, LA-UR-06-4467, June 2006
- P302, Historical Emplacement Data Review for Remote-Handled and Contact-Handled Transuranic Waste at Los Alamos National Laboratory, N/A, January 12, 2005
- P505, Peer Review, Remote Handled Waste Visual Examination Data Verification Peer Review Report, N/A, April 9, 2007 (note that this includes procedures, plans, qualification information, data sheets and numerous supporting references; see Peer Review TOC)
- U069, CMR Laboratory Notebook No. 23744 for Hot Cell Work, N/A, November 20, 1987 through February 12, 1993
- U070, CMR Laboratory Notebook No. 23741, N/A, November 20, 1987 through June 2, 1995
- U076, Waste Description Records, N/A, N/A
- U111, TRU Waste Storage Records for SN# LA03, N/A, N/A
- U112, TRU Waste Storage Records for SN# LA04, N/A, N/A
- U113, TRU Waste Storage Records for SN# LA05, N/A, N/A
- U114, TRU Waste Storage Records for SN# LA06, N/A, N/A
- U115, TRU Waste Storage Records for SN# LA07, N/A, N/A
- U116, TRU Waste Storage Records for SN# LA08, N/A, N/A
- U117, TRU Waste Storage Records for SN# LA09, N/A, N/A
- U118, TRU Waste Storage Records for SN# LA10, N/A, N/A
- U119, TRU Waste Storage Records for SN# LA11, N/A, N/A
- U120, TRU Waste Storage Records for SN# LA12, N/A, N/A
- U121, TRU Waste Storage Records for SN# LA13, N/A, N/A
- U122, TRU Waste Storage Records for SN# LA14, N/A, N/A
- U123, TRU Waste Storage Records for SN# LA15, N/A, N/A
- U124, TRU Waste Storage Records for SN# LA16, N/A, N/A
- U125, TRU Waste Storage Records for SN# LA17, N/A, N/A
- U126, TRU Waste Storage Records for SN# LA18, N/A, N/A
- Calculation Package LANL-RH-03, Pu & U Isotope Relationships in Fuel, Revision 0
- Calculation Package LANL-RH-11, Dose-to-Curie for Steel Cans for Cs-137 and Co-60, Revision 0
- Calculation Package LANL-RH-17, Scaling Factor Development, Revision 0
- Calculation Package LANL-RH-20, Steel Waste Can Contents Estimates, Revision 0
- Calculation Package LANL-RH-23, Bulk-Loaded Characterization, Revision 1

- Calculation Package LANL-RH-24, Canister Characterization, Revision 1
- Calculation Package LANL-RH-25, Uncertainty Analysis of Canisters with 364 Cans, Revision 0
- Calculation Package LANL-RH-33, Active PAN Data Validation, Revision not specified
- Calculation Package LANL-RH-34, Passive PAN Data Validation, Revision not specified
- Calculation Package LANL-RH-35, Waste Can PAN Data Validation, Revision not specified
- Calculation Package LANL-RH-36, Evaluation of Early PAN Data, Revision 0
- CCP-TP-005 Revision 18, Attachment 3, Acceptable Knowledge Source Document Summary, Waste Stream Number LA-MHD03.002
- LA-UR-91-125, Description of the PAN Assay System for Remote-Handled Waste, K. L. Coop and R.J. Estep

8.1 Acceptable Knowledge Process Overview and Analysis

- (1) Waste stream definition was examined for LANL RH Waste Stream LA-MHD03.002.

The WCPIP defines waste stream as “waste material generated from a single process or activity, or as waste with similar physical, chemical, and radiological properties.” Waste stream LA-MHD03-002 is a debris waste stream consisting of sixteen canisters that were generated in the CMR Wing 9 Hot Cell Facility at LANL from 1986 through 1991. This is the only waste stream within the scope of the inspection.

At the time of EPA’s inspection, EPA tracked several elements of the AK Summary (CCP-AK-LANL-500) and supporting references to ensure that all fuel pin testing performed in the CMR Wing 9 Hot Cells was related to the specific fuel pins of interest. Historic AK radiological data were examined to ensure that the waste stream definition was adequate, as was information pertaining to physical waste form and waste generating processes and procedures. EPA found that several elements of the AK Summary and a source document implied that the radiological content of the stream was broader than or different from what was used in modeling, implying that fuel pin testing was not the only activity performed in the Wing 9 Hot Cells. For example, historic LANL AK data showed the isotopic ratio for some containers to have uranium-plutonium ratios other than the 4:1, a ratio specified as being generally representative of the fuel pin (and hence waste) isotopic ratio. Language in the AK Summary suggested the existence of a CH waste stream from CMR Wing 9 that could serve as a surrogate, and, if present, should be addressed in a Surrogate Summary Form because it could contribute radiological characterization data to further define the waste stream. The EPA inspection team established that LANL-CCP had identified a CH waste stream from the CMR Building Wing 9 Hot Cell in the 2004 Transuranic Waste Baseline Inventory Report (TWBIR). However, LANL-CCP representatives indicated that they were unable to locate any of the drums identified as being part of this stream. LANL-CCP representatives also stated that these drums would have been generated from activities other than the decontamination and decommissioning (D&D). Since D&D was the main activity that generated waste stream, if any of these drums are discovered they would not be considered a true CH surrogate waste stream. EPA determined that, at this

time, there is no evidence to indicate that anything but fuel pin testing occurred in the hot cells, so only the fuel pin material would contribute to the isotopic mix within waste. However, additional documents were required to clarify the difference between what EPA considered the waste stream as presented in the TWBIR and LANL-CCP's understanding of the waste's origin. This was discussed with AK personnel during the inspection and EPA included it on an EPA Inspection Issue Tracking Form (See Attachment A.1 of this report for a copy of this form). It is discussed below.

EPA Concern No. LANL-RH-AK-07-001: Four issues were identified during the course of the inspection related to the effectiveness of the available documentation related to supporting an adequate waste stream content identification performed by LANL-CCP AK personnel. These four issues were combined on a single EPA Inspection Issue Tracking Form, and two of the issues are discussed below, and the remaining two issues are discussed in Sections (7) and (9), respectively. The first two issues are as follows:

- 1) Reference C301 addresses assembly and interpretation of LANL radionuclide information. The document includes LANL summary information pertaining to $^{235}\text{U}/^{239}\text{Pu}$ ratios that are incorrect based upon a review of the supporting can data. A summary statement indicating the error and noting that the data do not jeopardize the waste stream's identification has been added to Reference C301.
- 2) CCP-AK-500 has been modified through Freeze File changes (i.e., they will be edited when CCP-AK-500 is updated) that modify the text to clarify that there is no surrogate CH waste stream from CMR. A clarification of the accuracy of the LANL radiological data included in the AK Summary (C301) pertaining to incorrect or poorly supported $^{235}\text{U}/^{239}\text{Pu}$ ratios has been added. Additionally, a Freeze File change has been submitted that changes Section 5.4.3 to indicate the predominant radionuclides in fuel types that ultimately occur in waste in addition to the general composition of waste relative to the 10 EPA WIPP-tracked radionuclides based on historic LANL AK data.

Resolution: In response to EPA's concern (1), LANL-CCP revised Reference C301 as follows:

Documentation describing the method LANL used to incorporate the PAN assay data is not available, and the reason significant variation exist in the LANL reported ratio of Pu-239 to U-235 could not be determined, due to lack of a documented method for the LANL estimations of radionuclides. The U-235/Pu-239 ratio of 4:1 reported in canisters LA03-LA06 and LA16-LA18 is consistent with container estimates in source document M006, and the ratio of 4:1 is also consistent with the PAN assay description in source document P149. The $^{235}\text{U}/^{239}\text{Pu}$ ratio of 0.0025 reported in canisters LA07-LA15 is not consistent with any other source documentation reviewed. Additionally, generator estimates of ^{239}Pu and ^{235}U contents of the 1.5-gallon cans in LA07-LA15 provided in source document M006 generally show no correlation of lesser relative amounts of ^{235}U in these cans.

In response to EPA's concern (2), LANL-CCP revised the AK Summary to state:

As described in Section 4.1, the predominant fuel type examined in Wing 9 consisted of mixed oxide fuels originating from the LMFBR program. LANL assigned a nominal U-235 to Pu-239 ratio of 4:1 for these isotopes. In addition to LANL radiological properties, mass spectroscopy measurements were made for burn-up determinations on the fuel pins examined throughout the period of hot cell operations to estimate the isotopic composition for the waste materials generated. Typically the data includes results identifying isotope populations including U-233, U-234, U-235, U-236, U-238, Pu-238, Pu-239, Pu-240, Pu-241, and Pu-242. Although LANL did not utilize the mass spectroscopy data for reporting radiological properties in the RH waste materials, CCP has incorporated this information for determining the radiological composition of waste stream LA-MHD03.002 as described in Section 5.4.3.2.

Status of Concern: Based on the information examined, the EPA inspection team determined that the waste stream's designation had been appropriately assigned with respect to its radionuclide-related characteristics. This concern is also addressed under (4), below. EPA considers aspects (1) and (2) of this concern to be closed.

The EPA inspection team evaluated the physical and radiological compositions of the waste with respect to waste stream definition to ensure it was appropriate. This is summarized as follows: LANL-CCP assessed the physical characteristics of the waste generated in the cells to assign a waste matrix code to the material generated. The wastes consist of general hot cell debris generated through the testing process, as well as larger pieces of waste created during D&D activities. Historic Waste Description Forms and Log Books (U076, U069) documented the physical contents of the cans within 55-gallon drums and the direct-loaded 55-gallon drums. EPA examined Reference C300, which summarized the cans' contents as presented in the historic forms. It is noted that the individual cans contain an array of debris material, as well as solidified particulates. Canister LA15 containing Drums 37, 38, and 39, contains relatively significant quantities of solidified liquids by weight. However, data presented in Reference C300 indicate that the overall weight percent within the canister is approximately 54% debris and 46% solidified liquids. The volume percent, which determines the solid or debris status of the canister, indicates that the canister contained 50% solids and 50% debris, thus warranting further examination by LANL-CCP. LANL-CCP AK personnel recalculated the volumetric quantities in each can (summed to obtain drum and canister volume percents), assuming that the one-gallon alpha cans and 1.5-gallon cans surrounding the waste were part of the waste stream, and not the outer containers for the waste. LANL-CCP AK personnel also indicated that they had performed calculations to determine the percent solid fill in each can, and had determined that the cans were approximately 50% full, which directly reduced the calculated volume, assuming 100% fill in each can with the identified material (e.g., solid or debris). Therefore, while individual cans/drums may be considered S3000, the canister as a whole contains greater than 50% debris and fits within the specifications for this waste stream. LANL-CCP prepared Reference C312 that documents their calculation processes.

The EPA inspection team reviewed data pertaining to the radionuclide content of the waste drums that had been evaluated by LANL to ensure that the waste stream had been appropriately bundled and that the radiological characteristics were traceable to specific activities. These data were used by LANL primarily for waste management in the underground storage shafts at

TA-54, Area G. LANL-CCP AK personnel retrieved information from the SWOON (Stored Waste Operations Oracle Network) database as well as LANL-prepared documents [e.g., M006, Transuranic Waste Storage Records (TWSRs)] to understand the general radionuclide composition of the wastes. The individual can or fuel pin PAN measurements, measured external dose rates, and MS data were used by the LANL-CCP radiological characterization team to develop a model in support of radiological characterization that is discussed in Section 8.2. The available LANL AK radiological data beyond base measurements were not used by LANL-CCP. Rather, LANL-CCP performed their own calculations, the results of which were used as the values of record for characterizing these wastes. There was no comparison of the older LANL AK and the CCP-derived radiological components. However, EPA noted that reference C301 that summarized the LANL information identified different $^{235}\text{U}/^{239}\text{Pu}$ ratios for canisters LA07 through LA15, when compared to the expected ratios in canisters LA03 through LA06 and LA16 through LA18. To better illustrate the cause of this difference to the EPA inspection team and to ensure that it did not indicate the presence of multiple waste streams, LANL-CCP AK personnel reexamined references, source data sheets, and other information during the course of the inspection and showed that the waste stream in question is not composed of multiple waste streams. This analysis showed that the $^{235}\text{U}/^{239}\text{Pu}$ ratios of approximately 4:1 for canisters LA03 through LA06 and LA16 through LA18 appeared to be best supported by the AK record, and this ratio agreed within an order of magnitude with the values derived for the canisters through the radiological characterization described in Section 8.2. When individual can data for canisters LA07 through LA15 were examined, their values were relatively close to the 4:1 $^{235}\text{U}/^{239}\text{Pu}$ ratio that had been identified for other canisters. This indicated that secondary data manipulation by LANL apparently imparted the erroneous $^{235}\text{U}/^{239}\text{Pu}$ ratios to canisters LA07 through LA15, and that the waste stream generally appears to have a $^{235}\text{U}/^{239}\text{Pu}$ ratio of 4:1 based on the can-based AK data. EPA noted that there are individual cans that do not exhibit this ratio (e.g., thorium fuel pin related cans), so this ratio applies to the waste stream in general and may not be reflected in the measurements for individual cans.

To evaluate whether the waste stream was appropriately assigned from a radiological perspective, EPA examined process information associated with Wing 9 CMR activities to verify that the only activities that occurred within the CMR hot cells were related to fuel pin testing. The available data that were reviewed did not indicate the presence of other activities in the hot cells. Fuel pin testing dates indicate that the fuel pins used by LANL-CCP to derive scaling factors were all managed in the CMR Hot Cells during the 1970s and mid-1980s prior to initiation of D&D activities. Note that while the hot cells were used through a given time period, LANL-CCP personnel stated that the process of waste packaging did not occur sequentially throughout the hot cells' use, so there is no apparent correlation between waste cans/drums and time periods. The EPA inspection team concluded that the assignment of all containers to a single waste stream was technically justified.

- (2) The identification of these wastes as TRU versus spent nuclear fuel (SNF), high-level waste (HLW) and low-level waste (LLW) was examined.

CCP-AK-LANL-500 states that the waste "does not contain separation or reprocessing of constituent elements from reactor fuel and the waste stream does not contain the irradiated fuel elements withdrawn from a reactor." LANL-CCP personnel stated that HLW, by definition, is not included in this waste stream. LLW is not relevant to this discussion.

(3) Sufficiency of the AK summary and implementation of AK as required in Attachment A of the WCPIP were evaluated.

Attachment A of the WCPIP specifies that the following be included in AK summaries:

- Executive summary
- Waste stream identification summary
- AK data and information description
- Program information
- Waste stream information
- Qualification of AK information
- Container-specific information

Attachment A of the WCPIP mandates that the data collection and analysis process should be similar to the process that is used for CH wastes. Both the content of the AK summary and sufficiency of AK implementation were assessed, and overall, the AK Summary adequately addressed all of the required elements. EPA issued a single concern that included issues regarding content of the AK Summary, indicating that some changes were required to clarify the waste stream content, see AK (1), above.

(4) Data traceability was examined.

Data traceability was assessed to understand the hierarchy of information that was ultimately used by AK personnel to identify the physical and radiological parameters associated with this waste stream. Note that this evaluation included the AK data sources, but did not include the actual data used as part of the radiological characterization (e.g., fuel pin data radiological composition was examined under the radiological analysis). LANL-CCP personnel provided the following information regarding traceability of radiological data:

The PAN assay data (M008) have a one page signed sheet for each can with the fissile grams result and standard deviation. These results are also on the summary spreadsheet for each can (M006). The dose measurements, both contact and 1 meter, are in logbooks (M069, U070). These dose measurements are also in the summary spreadsheet (M006)... The rest of the data is in the TSWRs for each canister (U111 – U126). Each TWSR has one datasheet for each canister (“Calculation for RH-TRU Canisters”) that shows the calculated values for each LANL reported radionuclide (... examples from U113, U117, and U126). LANL took the values from this datasheet and entered them on page one of the TWSR (... examples from U113, U117, and U126) and also in the SWOON database (screen shots in C301). [Therefore]... the SWOON database only confirms that these are the actual values used by LANL for storage.... Note that the Mass Spec. data (M007) was not used by LANL and had no bearing on the LANL reported values.

As indicated above, MS measurements for approximately 400 of the individual waste cans within the waste stream are documented in Reference M007. TSWRs present the 1-meter dose rate

measurements for each waste can. Reference M006 documents that the ^{235}U and ^{239}Pu contents of each can were summed to produce a canister total, and the canister totals are recorded on TWSRs (see Waste Containers, above, for a discussion of waste cans versus canisters).

Physical form waste descriptions were obtained from Logbooks (U069) and waste description records (WDRs) (U076), both created on a per-can basis. LANL-CCP personnel provided the following input, verifying the hierarchy observed by EPA with regard to physical form information:

The description for waste contents in the cans was documented in the logbooks (e.g. U069) and also on the Waste Description Record forms (U076). The can-to-drum-to-canister loading is summarized in M006 with information compiled from the TWSRs (Transuranic Waste Storage Records) (U111-U126). Examples of logbook pages (U069) and Waste Description Record forms (U076) were provided during the inspection for can #207 and direct loaded drum B08. Attached are excerpts from U123, including an example TWSRs for canister LA18, showing the specific placement for each can in each drum in the canister.

The fuel pins' radionuclide composition is essentially the radionuclide content of the wastes in the sixteen canisters of Waste Stream No. LA-MHD03.002. Accordingly, the degree to which the radionuclides assigned to the waste were traceable to the fuel pins that were managed in Wing 9 during the waste-generating time period was assessed. The EPA inspection team also wanted to ensure that the fuel pin data were in agreement with the general process information within the AK Summary. The available data for each fuel pin includes: the Fuel Element Summary Sheet for ANL fuel pins prepared by LANL-CCP; weight, radiological, and other data from the origination site; safeguards and materials management report data; individual fuel pin burn up calculations; and fuel composition by AG⁴ or fuel pin number.

Note that the traceability evaluation typically performed for CH inspections includes measurements of waste containers (drums or Standard Waste Boxes [SWBs]) that will be made subsequent to the inspection. However, in the case of this LANL RH waste stream, subsequent measurements will not take place and traceability was evaluated to understand the origin and hierarchy of radionuclide and physical data associated with each canister. Since LANL-CCP personnel did not use the summarized AK radionuclide information presented on the LANL TWSRs and other LANL documents to check the results of their radiological characterization, LANL-CCP did not perform a detailed analysis of the data other than what was required to ensure that the waste stream identification was appropriate.

(5) Sufficiency of AK support documents and related document tracking was evaluated.

An AK Source Document Reference List was prepared using unique identifiers for the different document types following the format used by LANL-CCP for CH wastes. The listing is based on CCP-TP-005 Revision 18, Attachment 4. The listing is complete, and is easy to understand because it follows the same format used for CH waste streams. Several AK support documents

⁴ An AG number is an identifier assigned to fuel pins at the Alpha-Gamma Hot Cell Facility at Argonne National Laboratory-West at the Idaho National Laboratory.

were referenced in the text and the references examined to date address the element or issue that is referenced with the AK summary, although applicability does vary. Note that EPA only examines support documentation specific to the technical element referenced in the AK summary that caused that support reference to be selected for examination.

(6) Interpretation of WCPIP was evaluated with respect to contents of the Certification Plan, the Confirmatory Test Plan, and the proposed characterization process.

EPA's RH WCPIP framework approval letter indicated that sites must generate a Certification Plan (CP) that explains how RH waste characterization will take place at each site, as well as a CTP. As a result of previous RH inspections, EPA concurred with CBFO that combining the CP and CTP in a single document (CCP-AK-502) that completely described the proposed characterization process satisfies the intent of EPA's requirement.

(7) Content and technical adequacy of the Confirmatory Test Plan was evaluated.

The WCPIP requires a description of the following items to be included in the CTP:

- The waste stream or waste stream lots to which the plan applies
- The confirmatory testing proposed, including the percentage of waste containers that will be subject to confirmatory testing
- The waste characterization DQOs and Quality Assurance Objectives (QAOs) that will be satisfied with the data being qualified
- The DQOs and QAOs that will not be confirmed with the data being qualified and an explanation of how compliance with those DQOs and QAOs will be demonstrated
- How the tested subpopulation will be representative of the waste stream or waste stream lot

As required above, the waste stream and the approach used to characterize it are also described in the CTP. Characterization is based solely on AK, without "confirmatory testing" such as NDA, although AK was qualified through a demonstration of an equivalent QA program⁵.

Sufficient QA documentation could not be located to support the LANL PAN software and LANL-CCP chose to verify the PAN software separately using "confirmatory modeling" as described in CCP-AK-LANL-504. ORIGEN2.2 modeling was confirmed via "confirmatory measurement" using MS data that LANL-CCP states was obtained under an equivalent QA program, and the MS data was used to "establish the quality of the input information and to gauge the ability of the model to estimate the isotopic abundances for the waste stream." LANL-CCP also noted that the DTC process used to determine radiological composition of direct-loaded drums in canisters required some modification from the process presented in Attachments B and C of the WCPIP, a deviation that is allowed as an alternative "confirmatory testing method." As the above implies, the characterization process used by LANL-CCP was complex, but the description within the CTP provided a basic understanding of the overall characterization

⁵ The determination of QA equivalency for any aspect of the LANL RH WC program is not a part of this technical inspection.

approach. The CTP addresses DQOs and QAOs and the CTP also specifies that the waste stream population includes a total of sixteen canisters, so there are no subpopulations or lots to consider.

LANL-CCP elected to convene a peer review panel to assess the usability of the physical form information for WC purposes. The EPA inspection team had three minor concerns with the CTP regarding clarification of the Peer Review Panel's role and other items that were largely editorial in nature. All issues that were identified during the course of the inspection were addressed through revisions of specific documents or oral commitments to make freeze file changes and LANL-CCP assured EPA that they will revise specific documents or make freeze file changes to complete agreed upon changes to record what was discussed and how it was resolved. CCP-AK-502 has been revised to correct typographical errors pertaining to inclusion of peer review references, and other minor changes.

EPA Concern No. LANL-RH-AK-07-001: The third of the four issues identified on this concern form [see AK (1), above] centered on the fact that CCP-AK-502 contained typographical errors pertaining to the inclusion of references from the VE Peer Review Panel and other minor errors.

Resolution: CCP-AK-502 has been revised and changes have been made to specific sections of CCP-AK-LANL-502 as follows:

- Section 4.3: "Survey measurements will be taken using survey methods and procedures as required by the Site Health Physics Program using approved and controlled Site procedures."
- Section 4.4: "The actual container-specific [radiological] results are documented in CCP-AK-LANL-501."
- Section 4.6: "This is discussed in CCP-AK-LANL-500. A peer review will be conducted to verify the AK information is of sufficient quality to be used to meet physical form DQOs and associated QAOs."

These changes were reviewed by EPA during the inspection and were found to satisfactorily address this concern.

Status of Concern: EPA considers this issue to be closed.

(8) Content and technical adequacy of the Characterization Reconciliation Report was evaluated.

EPA evaluated CCP-TP-506, CCP Preparation of the Remote-Handled Transuranic Waste Acceptable Knowledge Characterization Reconciliation Report, Revision 1, to determine whether this document reflected the assembly of information required in the WCPIP. Additionally, EPA evaluated the CRR to see whether this report reflected requirements of CCP-TP-506, to ensure that the CRR addressed required elements as specified in the WCPIP, including:

- Specification of applicable site and waste stream
- A listing of each DQO
- Data from the AK record that addresses each DQO
- AK source document references that support/provide the data
- A listing of AK record discrepancy resolutions, if any, relevant to each DQO
- Documentation, including specific references, of how the AK data for each DQO were qualified, such as batch data reports, corroborative data, proceedings of a peer review, etc.
- Real Time Radiography (RTR) and/or VE summary to document that liquids greater than 1 percent are absent from the waste and to confirm AK concerning the physical properties of the waste
- A summary presentation of radiological measurement data used to meet the DQOs and to confirm AK
- A complete AK summary
- A complete listing of all container identification numbers used to generate the WSPF, cross-referenced to each batch data report
- A listing of AK discrepancies generated by an AK qualification process and the corresponding resolutions
- Signature of the Site Project Manager (SPM)

The sample the EPA inspection team examined included all of the above requirements. As had been observed previously for the RH WC programs at INL and ANL-E (see Docket Nos. A-98-49, II-A4-72 and A-98-49, II-A4-73, respectively), the CRR DQO worksheet (Attachment 3 of CCP-TP-506) for this LANL RH waste stream did not similarly include a listing of the 10 WIPP-tracked radionuclides as part of the DQO assessment process. These radionuclides must be specified, quantified, and assessed as part of the CRR. In the past, site personnel declined to address these because the WCPIP does not specifically require their inclusion. However, EPA's rule does specify de facto limits for the ten WIPP-tracked radionuclides that are based on modeled quantities. At INL and ANLE, these were addressed in tiering, an option that is not available for LANL-CCP. If LANL-CCP revises the CRR, revision would include the identification and quantification of the EPA's WIPP-tracked radionuclides.

(9) Use of a Correlation and Surrogate Summary Form was evaluated.

Completion of a Correlation and Surrogate Summary Form is required when AK information from a related CH waste stream is used in the RH waste characterization process. Revision 2 of the AK Summary implies that there is a surrogate CH waste stream that was generated in Wing 9 hot cells [see (1), above]. LANL-CCP personnel clarified that there is no surrogate CH waste stream analogous to the RH stream, for which actual NDA data may be available. EPA requested a revision to the AK Summary to clarify that there is no analogous CH waste stream.

EPA Concern No. LANL-RH-AK-07-001: The fourth issue that was tracked on this EPA Inspection Issue Tracking Form [see Sections (1) and (7), above] was the statement in CCL-AK-500 regarding the existence of a CH waste stream that originated within the LANL CMR facility that was a surrogate for the RH Waste Stream LA-MHD03.002.

Resolution: LANL-CCP committed to revising CCP-AK-LANL-500 using Freeze File changes. While EPA did not mandate which revision of CCP-AK-LANL-500 would address this issue, EPA expects that the next version (Revision 4) of CCP-AK-LANL-500 will include this change.

Status of Concern: EPA considers this issue closed.

(10) Personnel training was evaluated.

Training records for AKEs Kevin Peters, Steve Schafer, and Sherri Nance were examined as a random sample of those involved with the LANL-CCP AK program. Training for each was evaluated with respect to: the RH TRU WCPIP; the nonconformance and corrective action processes; the AK procedure presented in Attachment A of the WCPIP; the site-specific contents of the subject waste stream(s); and determination of radiological contents of individual waste containers. Each person demonstrated training in the first four areas. With respect to determination of radiological contents of each waste container, no formal training was noted. However, EPA has observed Steve Shafer and Kevin Peters at several audits, and both have demonstrated proficiency with regard to assembly and interpretation of radionuclide data commensurate with the expertise needed for these tasks. Where detailed radionuclide analysis and expertise are required, Mr. Jene Vance performed those tasks. Mr. Vance's training record was examined since he assembled and assessed AK data that was used to derive the scaling factors. Although Mr. Vance did not show direct training with respect to this area, his resume showed considerable expertise suitable to demonstrating proficiency. In summary, all AKEs and the radiological Subject Matter Experts (SMEs) demonstrated the necessary level of knowledge in the area of radiological assessment through on-the-job-training (OJT).

(11) The relationship of fuel pin content, burn up, and MS data was examined and the general isotopic composition was assessed.

LANL-CCP estimates that the fuel pin examination conducted at the Wing 9 hot cells of the CMR facility at LANL from the early 1970s to 1986 received and processed 1610 fuel pins from several sources and that 1,473 of these had post-irradiation examination. Additionally, mass spectrometry was performed on over 500 fuel pins, although the records for 400 of them were retrieved for use on this project. LANL-CCP makes the basic assumption that material from all fuel pins may be present in every waste container. As was observed previously, INL-CCP based the analyses presented in AK-INL-CCP-501 upon this assumption, and built the remainder of the analysis on fuel pin commonalities. Other sites such as INL and ANLE generated wastes by lots, some of which were created during the fuel pin examination process and required assessment for association with specific pin sets. However, the LANL CMR Wing 9 RH wastes were all generated after the fuel pin examination process took place, so an association of waste cans with specific fuel pin compositions cannot be ascertained. LANL-CCP's assumption that all pins contributed to the isotopic composition of the waste is reasonable.

(12) Discrepancy Resolution (DR) Forms were examined.

Because measurement data were not collected for this waste stream and all characterization is based on AK, Non Conformance Reports (NCRs) were not created. Instead, issues identified were AK-AK in nature, so discrepancy resolution (DR) forms were created. DR Nos. DR001 through DR005 were provided within the CRR. The forms provided detailed AK-AK discrepancies dealing with PCBs, waste compaction, lack of dual signatures for drum B08, chemical content of waste, and the presence of sealed containers having a volume greater than 4 liters. This information suggests that LANL-CCP can adequately prepare DRs to document nonconforming items or containers, as well as the types of discrepancies presented for review. During the inspection in Albuquerque, EPA was not provided a specific example of an AK-AK discrepancy resolution involving radiological composition of waste, but the $^{235}\text{U}/^{239}\text{Pu}$ ratio issue discussed above that was associated with the identification of an erroneous ratio for canisters LA07 through LA15 reported by LANL would fall under this category. EPA expects that the erroneous ratios for certain waste containers will be identified as an AK-AK discrepancy in the AK record and will be added to the record.

(13) A waste stream profile form was examined.

An example Waste Stream Profile Form (WSPF) was examined for Waste Stream No. LA-MHD03.002. The form included the required items as presented in the WCPIP, Attachment 4; the CRR and RH AK summary are also required for submission to CBFO to allow assessment of the WSPF. EPA understands that this form was abbreviated because it was provided for inspection purposes only, and EPA expects that the completed form will include all required AK data, checklists and other information, as applicable. See comments above pertaining to CRR and AK Summary for additional information.

(14) AK accuracy was assessed.

The WCPIP requires determination of AK Accuracy in three areas: reassignment of the waste to a different Summary Category Group (SCG); reassignment of the waste to a different waste stream; and stream-specific assessment of radiological parameter accuracy. In the case of Waste Stream No. LA-MHD03.002, all characterization was based on AK alone, so an accuracy determination based on comparing measurement data and AK is not appropriate. LANL-CCP elected to include a discussion of AK Accuracy in the CTP. In this document, LANL-CCP cites comparisons of the confirmatory modeling/MS results and historic PAN data, fuel characteristics, and packaging records, all of which indicate that the AK record is accurate for the purposes of the determination of the canisters' TRU status, RH status, and TRU radionuclide activity plus uncertainty. The DQOs for physical form and liquid content were met through records that were subsequently subjected to and approved by a peer review panel. EPA agrees that it is difficult to derive an AK Accuracy assessment when AK serves as the sole characterization basis.

(15) Load management was assessed.

The possibility that containers have TRU concentrations of less than 100 nCi/g was evaluated. None of the canisters were determined to have TRU concentrations less than 100 nCi/g, although one container (No. LA04) had a value of 120 ± 40 nCi/g. The other fifteen canisters have TRU concentrations ranging from 175 ± 65 nCi/g (No. LA05) to $20,400 \pm 3,320$ nCi/g (No. LA08). In this context, load management refers to the loading of TRU and non-TRU (i.e., less than 100 nCi of TRU alpha activity per gram of waste) CH waste containers in a ten-drum overpack (TDOP) for the purpose of meeting the TRU alpha activity definition. This practice has been practiced at other DOE TRU sites. The use of load management is not expected for these sixteen canisters of RH TRU wastes at LANL-CCP.

All aspects of the LANL-CCP documentation in support of LANL RH Waste Stream Number LA-MHD03.002 are technically adequate.

8.2 Radiological Characterization

EPA evaluated the method by which the required radiological constituents for each waste container were determined. The nature of RH TRU wastes presents considerable difficulty with respect to obtaining meaningful measurement data, as is routinely done with CH TRU. Apart from the obvious concerns regarding personnel working in external radiation fields in excess of 200 mrem/hr, RH TRU waste containers typically contain concentrations of energetic photon emitters, i.e., ^{137}Cs and/or ^{60}Co that prevent a meaningful isotopic determination in the same manner as is done for CH TRU wastes.

Overview of LANL Radiological Characterization Program

The overall approach to radiological characterization used for the LANL wastes has several elements in common with the RH characterization approaches EPA observed in the INL-CCP and ANLE-CCP RH programs. These programs were evaluated during EPA inspection Nos. EPA-INL-CCP-RH-6.06-8 and EPA-ANL-CCP-RH-9.06-8 of the CCP's RH programs implemented at INL and ANLE, respectively (see Docket Nos. A-98-49, II-A4-72 and A-98-49, II-A4-73). During these two RH inspections, the EPA inspection team evaluated the conceptual bases of several aspects of the characterization approach, including:

- Development of DTC relationships as a function of waste density using MNCP5 based on ^{137}Cs
- Derivation of radionuclide scaling factors using ORIGEN2.2
- Evaluation of MS data to derive adjustment factors to be applied to the scaling factors derived using ORIGEN2.2 results

These characterization techniques were evaluated in detail during the previous RH inspections cited earlier, and the reader is directed to the baseline inspection reports for these activities for a thorough evaluation of their technical aspects. The radiological characterization process for RH TRU wastes at LANL used some of these techniques with LANL-specific variations.

LANL-CCP's approach consists of two components, one for the twelve canisters with historical PAN measurements and one for the four bulk-loaded canisters. These are summarized below and described in detail in the section that follows:

Twelve Canisters with PAN Measurements:

Using historical information regarding the fuels pins' ^{235}U content, ^{240}Pu enrichment, U/Pu ratio and burn-up in conjunction with the appropriate reactor cross-sections and neutron spectra, multiple runs of ORIGEN2.2 were made for a population of 400 fuel pins. This population was representative of the fuel pins that generated the wastes that were loaded in the 364 cans. Based on the ORIGEN2.2 analyses, radionuclide-specific scaling factors were developed for the radionuclide of interest. These results were then compared to the MS data for the same fuel pins and *correction or adjustment factors* were derived for ^{233}U , ^{234}U , ^{235}U , ^{238}U , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Pu and ^{242}Pu . These adjustment factors were then applied to the ORIGEN2.2 analyses that were made for the 400 fuel pins, and the total quantities for each radionuclide were summed and used to develop a ratio of each radionuclide (including ^{60}Co) to the fuel pins' total fissile gram content, i.e., a Fissile Gram-to-Curie scaling factor. These scaling factors were used to derive the content of all reported radionuclides except ^{60}Co , which was addressed separately as described below. The radionuclides with shorter half-lives (^{241}Pu , ^{137}Cs and ^{90}Sr) were decay corrected to an assumed shipping date of June 1, 2006. Using MicroShield®, a Curie-to-Dose scaling factor for ^{137}Cs was determined for hypothetical one curie ^{137}Cs and ^{60}Co sources in one-gallon cans as a function of density. This was used to determine the ^{137}Cs contribution to each can's measured dose rate, assuming that the two main components of the measured dose rate were ^{137}Cs and ^{60}Co . Subtracting the ^{137}Cs dose rate from the can's total yields the ^{60}Co dose rate, which is then converted to an activity in curies using the Fissile Gram-to-Curie scaling factors described above. This process is illustrated in Figure 3, below.

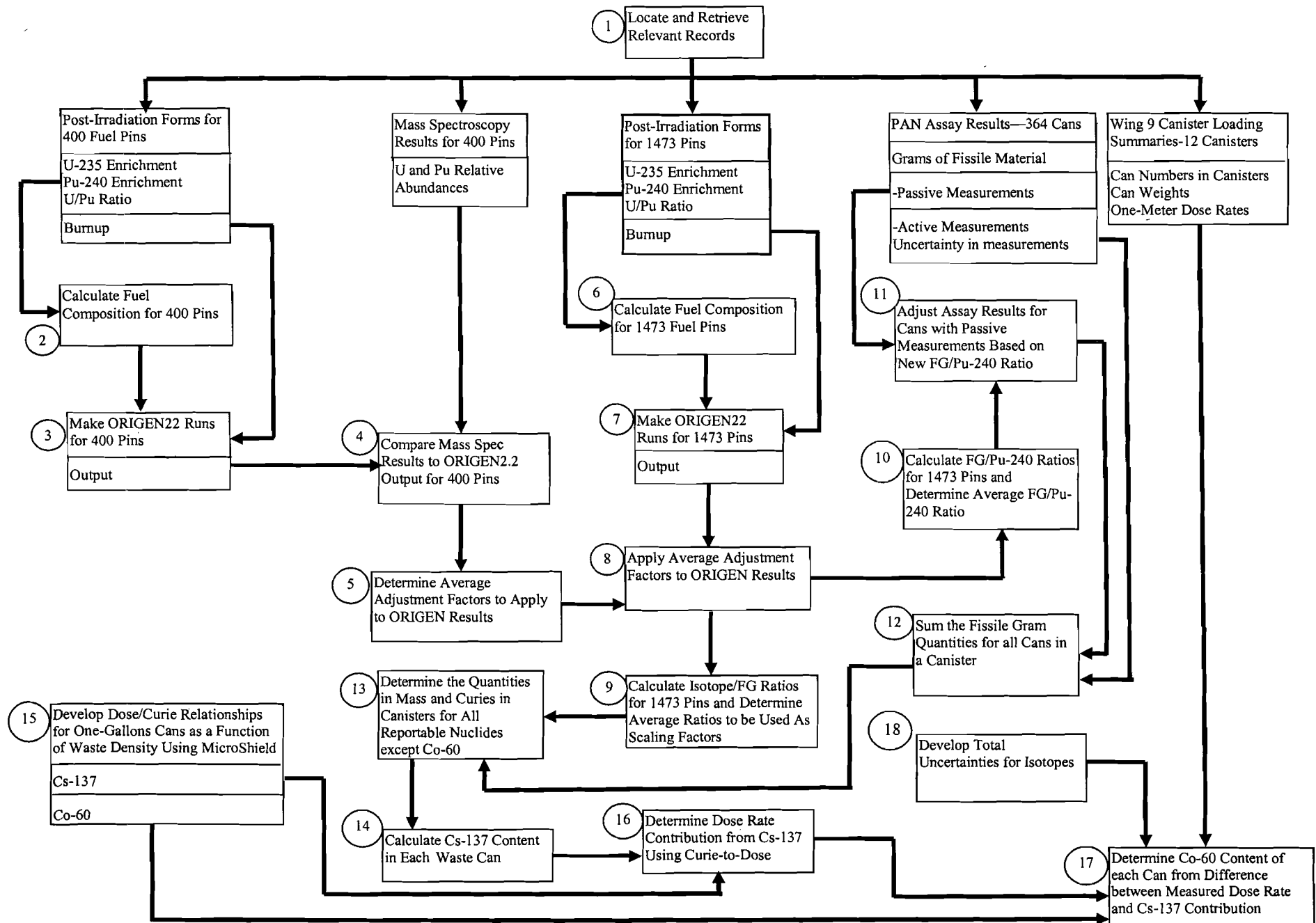


Figure 3. RH TRU Radiological Characterization Flow Diagram for 12 Canisters Loaded with Cans

Four Bulk-Loaded Canisters:

The characterization for the bulk-loaded canisters was similar to the approach for the twelve canisters described above. Based on the DTC relationship established for the twelve canisters (364 cans total), the relative abundances of ^{137}Cs and ^{60}Co were determined. Using MicroShield®, a dose/curie relationship was developed as a function of waste density for the 55-gallon (208 liter) drums. By combining the measured one-meter dose rates from the historical Wing 9 Canister Loading Summaries, and the newly-derived relative abundances of ^{137}Cs and ^{60}Co and the MicroShield® dose/curie relationship, the ^{137}Cs and ^{60}Co curies were determined and summed for each of the four bulk-loaded canisters. The inverse of the ^{137}Cs to fissile gram scaling factor described above was used, i.e., a fissile gram-to- ^{137}Cs scaling factor, was applied to yield a fissile gram value for each canister. The fissile gram scaling factors that were derived from the twelve canisters discussed above were then applied to the four bulk-loaded canisters to provide values for the remaining WIPP-tracked radionuclides. This process is illustrated in Figure 4.

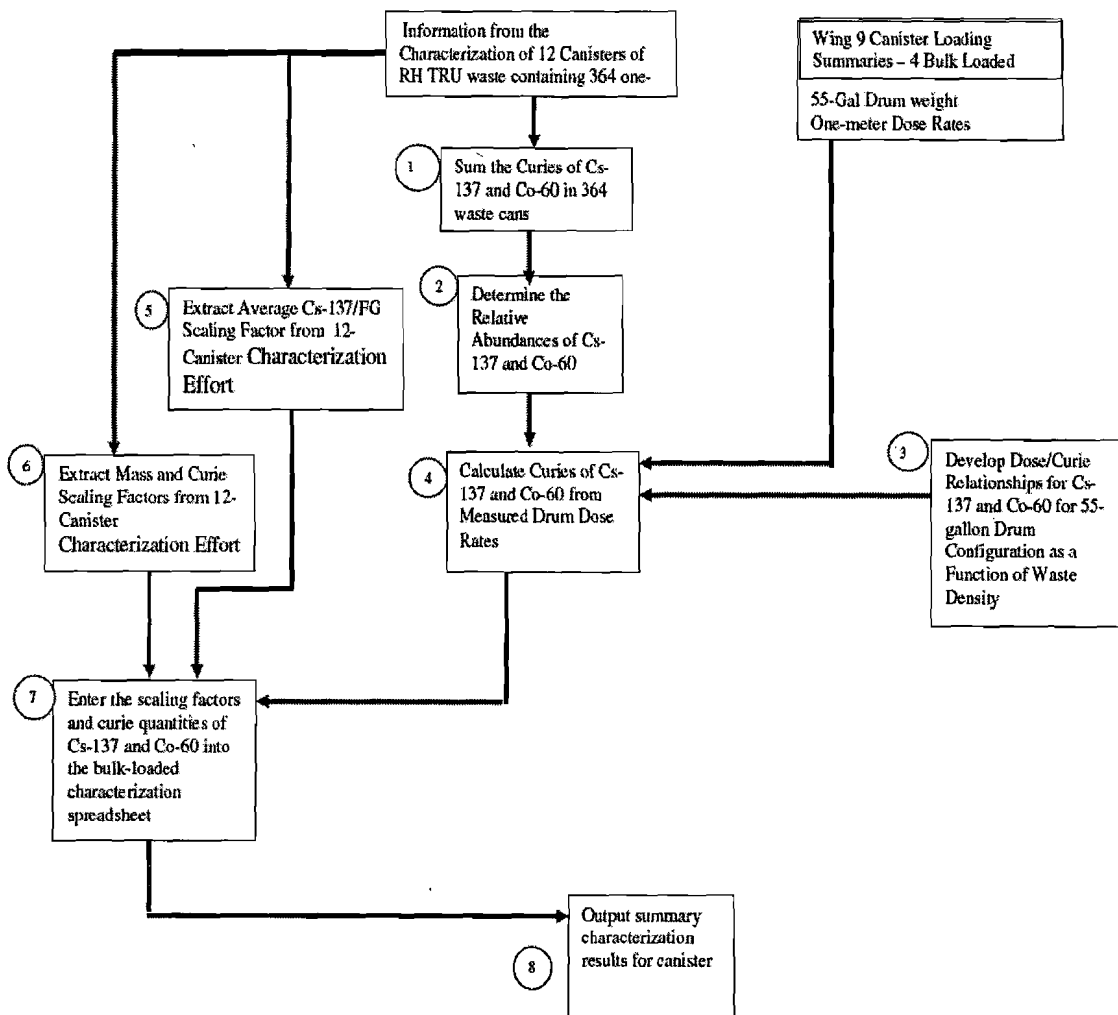


Figure 4. Radiological Characterization of 4 Bulk-Loaded Canisters Using Dose-to-Curie Methodology

Both characterization methods were evaluated in terms of the following:

- Technical adequacy of the approach as supported by the LANL-CCP WC program's documents, procedures, and controls
- Knowledge and understanding of the personnel involved in the RH WC program

Technical Evaluation

The EPA inspection team evaluated the following aspects:

(1) Technical Adequacy of Active and Passive PAN Data – Twelve Canisters

The PAN data upon which this characterization approach was based were generated at LANL in 1990 and 1991. The PAN system itself was described in LA-UR-91-125, *Description of the PAN Assay System for Remote-Handled Waste*. It was modeled after a second generation PAN that had been developed at LANL for use with CH TRU wastes, and was modified by adding lead shielding and configuring it to accept 21 cm diameter by 30 cm high steel cans as opposed to the standard 208 liter drums used for CH wastes. The basic detector type (bare and shielded ^3He detectors), corner-mounted flux monitor, floor-mounted collimated *on-can* flux monitor, and the use of pulsed thermal neutron interrogation produced by a Zetatron neutron generator (providing 14 MeV neutrons bursts of 5 – 10 $\mu\text{seconds}$ in duration repeating at 50 Hz) were the same, although there were fewer ^3He detectors than are typically used for CH TRU assays. This document provides adequate technical details regarding the system's components and operation, including: system description; assay algorithm and data acquisition software; active and passive assay mode operation; active mode matrix correction; active and passive calibration standards; operator training and requirements; assay procedures; assay precision, bias and detection limit; active and passive errors; and choice of active versus passive assay values. This document was adequate for describing the technical basis and operation of the PAN system for the LANL RH waste stream.

Regarding the actual PAN active and passive mode data, four separate calculation packages were reviewed: LANL-RH-33, *Active PAN Data Validation*; LANL-RH-34, *Passive PAN Data Validation*; LANL-RH-35, *Waste Can PAN Data Validation*; and, LANL-RH-36, *Evaluation of Early PAN Data*. LANL-RH-33, LANL-RH-34, and LANL-RH-35 document the process used to assess the PAN data, and they provide an adequate record supporting the technical adequacy of the PAN values for the purpose. LANL-RH-36 is necessary because approximately thirty-seven cans, as well as calibration standards for both active and passive modes, were performed beginning in April 1990 until July 1, 1990, and the majority of the PAN assays were performed after July 1, 1990⁶. There were a total of 364 assays performed, one for each can. Upon completion of the initial 37 assays, adjustments were made to the system's calibration that was in effect for the remaining assays. However, the initial 37 assays were not reevaluated in light of the changed calibration and LANL-RH-36 assessed the impact of this. The raw data from the 37 runs were reanalyzed using the recreated PAN algorithms and the *old* (pre-April 1, 1990) and *new* (recalculated with post-April 1, 1990 calibration) values were compared. The discrepancies

⁶ The number of assays may include performance and/or quality control assays or samples.

between the two values appear insignificant, and in those cases where discrepancies exist, the reported fissile gram values are higher than would have been reported with the post-April 1, 1990 calibration.

(2) Characterization of Four Bulk-Loaded Canisters

The characterization of these four canisters relies heavily upon the calculations performed in support of the twelve canisters for which there were PAN measurements, described above, and is documented in LANL-RH-23. The specific components of this approach are detailed in: LANL-20 (specific abundances of ^{137}Cs and ^{60}Co); LANL-RH-17 (scaling factors for isotopes of interest); and, LANL-RH-22 (DTC correlations for ^{137}Cs and ^{60}Co). The values for all conversion factors (Specific Activity, Specific Heat, FGE, and PE Curies) were taken from the appropriate sources (CH-TRAMPAC Document, Revision 2 and DOE/WIPP-02-3122).

(3) Radionuclide Documentation in lieu of Batch Data Reports

The sixteen canisters of LANL-CCP RH TRU waste were not documented in a batch data report (BDR) as is the practice at TRU waste sites when documenting waste characterization data for a number of containers in a batch. Instead, the formal documentation for each canister's radionuclide values was presented in CCP-AK-LANL-501, Revision 1, pages 80 through 95. The EPA inspection team verified that the data sheet for each canister contained the following information:

- Canister number
- Waste stream designation
- Net waste weight
- Fissile gram content
- Scaling factor in grams or curies per fissile gram
- Activity values and uncertainties for the 10 WIPP-tracked radionuclides in nCi/g
- TRU alpha concentration
- Plutonium equivalent curies in curies
- Fissile Gram Equivalents in grams
- Decay heat in watts
- Volume activity in curies per liter
- The data sheets in CCP-AK-LANL-501 were based on calculations that were derived from several calculation packages. The EXCEL spreadsheet in LANL-RH-20 uses the input provided by the CMR Wing RH TRU Canister Loading Summary (Reference M006-RH-AK) and include: the canister number; can weight; can contact dose-rate; can one-meter dose rate; and PAN measured total fissile gram quantity with uncertainty.

There were several minor errors in CCP-AK-LANL-501 and discrepancies between the technical information in CCP-AK-LANL-501 and specific calculation packages. These were discussed with LANL-CCP personnel during the inspection and EPA included them on an EPA Inspection Issue Tracking Form (See Attachment A.2 of this report for a copy of this form). It is discussed below.

EPA Concern No. LANL-CCP-RH-RC-07-002C: The issues are as follows:

- The calculation package LANL-RH-20 provides the technical basis of the derivation of the radionuclide values for each of the sixteen RH canisters. These values are presented in CCP-AK-LANL-501, Revision 0 that serves as the official record of the radionuclide values for these canisters that will be entered in WWIS.
- The ^{137}Cs and ^{60}Co values for canister LA12 shown on page 85 in CCP-AK-LANL-501 do not agree with the values for those two radionuclides that were derived in LANL-RH-20. CCP-AK-LANL-501, Revision 0 contains Figures 8-1 and 8-2 on pages 53 and 54, respectively. These figures are different from the same plots shown in the calculation package LANL-RH-11 and the values in CCP-AK-LANL-501 are incorrect.
- CCP-AK-LANL-501 requires minor changes to the text.
- Calculation packages LANL-RH-23 and LANL-RH-24 should be revised to explicitly present the statistical treatment of all components of the uncertainty determination.

Resolution: CCP-AK-LANL-501, LANL-RH-23 and LANL-RH-24 were revised appropriately.

Status of Concern: This concern is closed.

(4) RH and TRU determinations

The records addressing the determination that the sixteen canisters met the definition of TRU wastes (TRU alpha activity concentration greater than 100 nCi/g) and RH waste (contact dose equivalent rate in excess of 200 mrem/hr) were examined, as discussed below:

- TRU waste containers must have a concentration of TRU radionuclides greater than 100 nCi/g:

As stated previously, BDRs were not prepared for the sixteen containers in this waste stream. The radionuclide values that were determined for the canisters are contained in CCP-AK-LANL-501, pages 80 through 95. All sixteen containers indicate TRU concentrations greater than 100 nCi/gram, although the listing for one container (LA04) indicates a TRU Alpha Activity Concentration of 120 ± 40 nCi/g. The error is a one-sigma value and, expressed a little differently, the range of this container's true value at the one-sigma confidence interval lies between 80 and 160 nCi/g. Alternately, several other containers (LA08 through LA14) have TRU Alpha Activity Concentrations in excess of 12,000 nCi/g with one-sigma errors on the order of 25%.

- RH TRU containers must have a contact external dose equivalent rate in excess of 200 mrem/hr:

The external exposure rate (dose rate) measurements of each of the steel cans were made at the time the cans were weighed, and the measured values are recorded in the CMR Wing 9 RH TRU Canister Loading Summary. All measurements were made at a distance of one-meter at the midpoint of the cans and the value that was recorded for each can was the highest value observed as the can was turned (rotated). The measurements were made with the appropriate instruments, i.e., an RO-3C meter for lower radiation fields and a PIC-6B for the higher radiation fields. The measurement records for the cans indicate external dose rates greater than 200 mrem/hr in all cases. For the four bulk-loaded canisters, the values taken from the LANL records were obtained at the time the drums were packaged on November 18, 1991. All of these measurements indicate one-meter external dose rates in excess of 200 mrem/hr.

8.2.1 Scaling Factor Development

Development of the fissile gram and dose rate based scaling factors is a complex task that incorporated various types of information related to the fuel pins that were processed in Wing 9 of the CMR facility, including the following:

- Fuel pin type and characteristics
- ^{235}U enrichment
- ^{240}Pu enrichment (for mixed oxide fuels) and burnup
- U/Pu ratios (for mixed oxide fuels)
- Mass spectrometry results for destructive assay (DA) of 400 fuel pins

The scaling factors were incorporated in a drum characterization spreadsheet based on the output from the ORIGEN2.2 computer runs from the 1,473 fuel pins that were extracted using the ORIOUT00.EXE program, as documented in Calculation LANL-RH-15. The isotope quantities that were derived in this manner were adjusted using the factors developed with the MS data, as documented in LANL-RH-16, to derive scaling factors that allowed the calculation of mass or curie quantities for each fuel pin. These were summed to yield fissile gram quantities (based on the ^{235}U and ^{239}Pu values), which were used to derive radionuclide-specific scaling factors. This process was essentially the same in concept as what was observed previously for the INL-CCP RH WC program. The difference was that these scaling factors were based on each can's measured fissile gram content, whereas with INL RH waste the radionuclides were scaled to each container's measured external dose, assuming that each container's measured dose rate consisted predominantly of ^{137}Cs . Specifically, the LANL approach is a Fissile Gram-to-Curie scaling factor.

A DTC scaling factor was also developed for the steel cans, as documented in LANL-RH-11. However, the purpose of the DTC was to convert the activity in curies of ^{137}Cs to a one-meter dose rate and then to convert the measured dose rate into activity (curies) of ^{60}Co , both of which were done using MICROSIELD 7.00. This DTC was based on the following:

- Can density, calculated for each can, that ranged from 0.3 to 2.5 g/cm³
- Paint can and steel can outside diameters, height, and wall thickness
- Internal volume

Two series of calculations were performed, one for ¹³⁷Cs and one for ⁶⁰Co. These produced the plots shown in Figures 5 and 6, respectively.

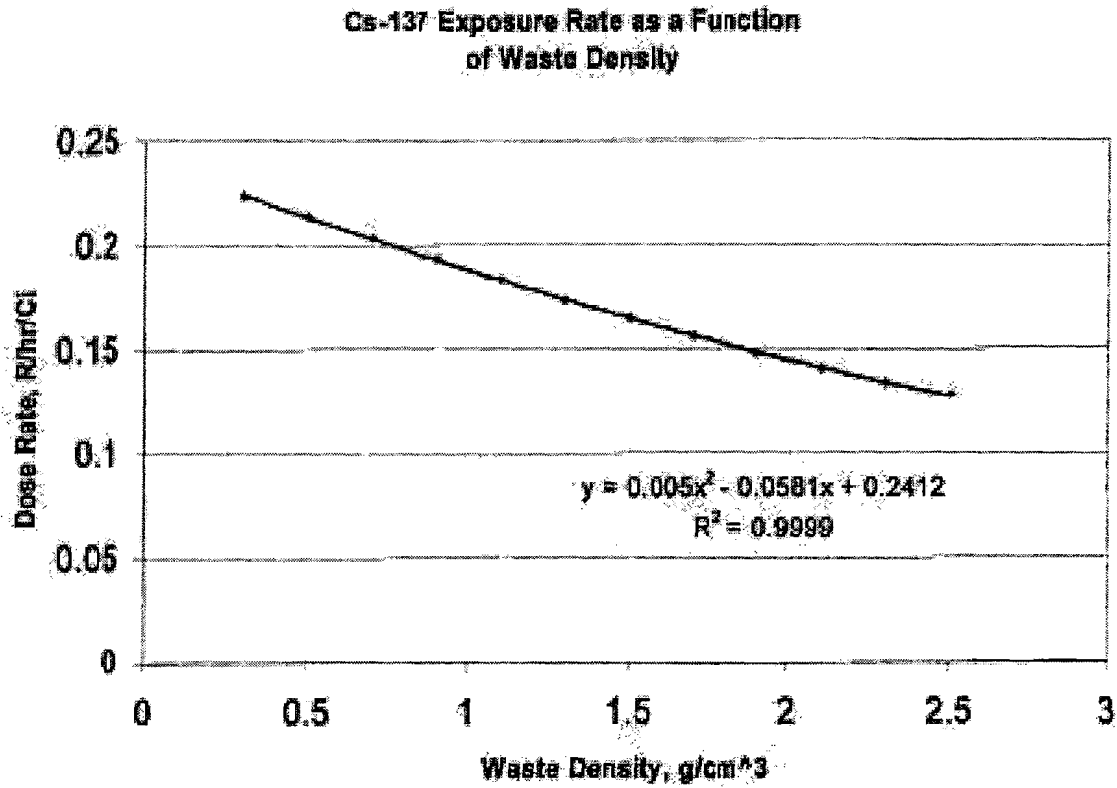


Figure 5. ¹³⁷Cs Dose Rate versus Density for 1½-Gallon Cans

Co-60 Exposure Rate vs. Waste Density for 1 1/2 Gallon Can

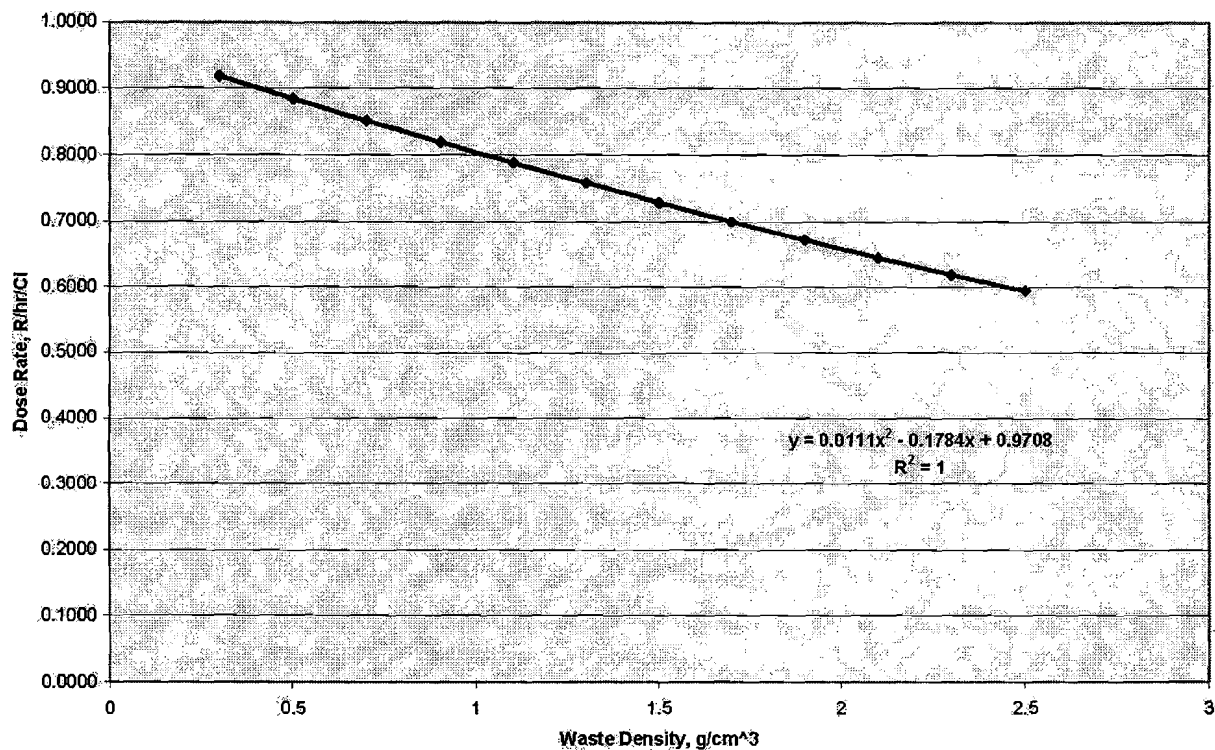


Figure 6. ⁶⁰Co Dose Rate versus Density for 1½-Gallon Cans

Scaling Factor Technical Evaluation

The technical basis and degree to which the scaling factors are representative of the RH TRU wastes for which LANL-CCP requested approval were evaluated during this inspection. The following elements were evaluated and verified:

(1) Waste stream definition

This inspection focused on a group of wastes that LANL-CCP stated were contained in a single waste stream, which included fuel pins that were dissimilar with respect to their radionuclide content. Specifically, they consisted of three fuel types: U, low enriched U (LEU), and highly enriched U (HEU); U and Pu; and, thorium. The EPA inspection team concluded that the assignment of all containers to a single waste stream was technically justified and technically supportable.

(2) Technical aspects and derivation of scaling factors

The EPA inspection team evaluated the following aspects:

- Activity values that are used are derived from modeling and statistical metrics that support their use, and the statistical metrics include mean and standard deviation values for each measured radionuclide.
- The appropriateness of the choice of physical constants and radionuclide-specific attributes (specific activity, physical half-life, neutron cross sections, photon transition probabilities, etc.) and the technical correctness of the values assigned to each attribute.
- Isotopic activity values are normalized to each container's PAN-based fissile gram determination or the major radionuclide(s) responsible for the container's external dose rate, i.e., ^{137}Cs and ^{60}Co .
- The calculated results used to develop the factors and convert the measured fissile gram quantities and external dose rates to radionuclide activity levels.
- Calculations supporting the scaling factors are performed using appropriate shielding analysis techniques, i.e., MCNP5 and Microshield 7.00.
- Computer programs (ORIGEN2.2) used for calculations of the activities of the WIPP-tracked radionuclides account for the following:
 - The beginning conditions of the fuel used to produce the TRU isotopes
 - Exposure of fuel to neutron fields in a nuclear reactor (fission)
 - Change in radionuclides following irradiation
 - Reactor neutron energy spectrum is known or calculated in order to determine the effective cross-sections of radionuclides leading to the creation of WIPP-tracked radionuclides
 - Appropriate cross-sections are used or generated for each reactor condition
 - Fuel exposure history is used to calculate isotope generation and depletion

(3) Documentation of technical aspects

Development of the scaling factors is documented in calculation packages that were prepared and reviewed by Jene Vance and Jim Holderness. These packages address a variety of aspects, including:

- Verification of MCNP5, Microshield 7.00 and ORIGEN2.2
- Evaluation of all potential contributors to a container's dose rate, specifically ^{137}Cs and ^{60}Co , plus other gamma emitting members of the ^{232}U decay series, e.g., ^{228}Ac and ^{208}Tl
- U and Pu relationship in the fuel pins from which the wastes originated
- The nature and history of the fuel pins, reactor cross-sections, and operating histories
- Potential sources of uncertainty, discussed below

The EPA inspection team members reviewed a subset of these packages in detail and discussed them with the documents' authors and Mark Doherty (CCP/WTS). During these discussions, EPA questioned several aspects extensively and modifications to the calculation packages were made in response to the EPA inspection team's concerns. All potential concerns were resolved and, apart from minor discrepancies with respect to specific documentation details, the calculation packages were found to be technically adequate.

(4) Evaluation of Total Measurement Uncertainty (TMU)

The development of TMU for Waste Stream Number LA-MHD03.002 is based on the propagation of uncertainties present in all aspects of the determination of the radiological constituents of RH TRU waste. The TMU determination included the contributions of:

- Drum weight measurement
- PAN measurement uncertainty
- MCNP5 issues
- MicroShield issues
- Other gamma emitters
- Individual pins to the total
- Burnup history
- Reported burnup
- Internal code issues
- Modeling

The EPA inspection team did not have any open technical issues or concerns relative to the development and application of radionuclide scaling factors based on the objective evidence reviewed during this inspection.

8.3 Mass Spectrometry Data to Support ORIGEN2.2

The purpose of the ORIGEN2.2 modeling was to develop technically based scaling factors to allow a waste container's activity values for each of the 10 WIPP-tracked radionuclides to be correlated with another measured quantity, i.e., an external gamma dose rate or neutron-based fissile gram determination. While this is essentially a modeling exercise, there was a verification or validation of the ORIGEN2.2 output that was performed using data from 400 fuel pins that were sampled and assayed using MS. The use of MS data in support of the ORIGEN2.2 derived scaling factors had been assessed during EPA Inspection No. EPA-INL-CCP-RH-6.06-8. Based on that inspection, EPA determined that there is sufficient information and data available to demonstrate that the isotopic data used to verify the ORIGEN2.2 output were technically sound. Specifically, EPA determined that the data were generated by an analytical system with acceptable accuracy, precision, and bias to support its use in providing an objective check on the radionuclide scaling factors that were derived using ORIGEN2.2 for LANL-CCP RH TRU wastes (see Docket No. A-98-49, II-A4-72).

All aspects of the LANL-CCP documentation in support of LANL RH Waste Stream Number LA-MHD03.002 are technically adequate.

8.4 Technical Evaluation: Physical Form and Prohibited Item Characterization

All 16 canisters were packaged and sealed by 1991 in accordance with LANL procedures and practices in place at that time. These procedures addressed waste identification and packaging, and personnel training. As a result of these practices, individual can contents are presented and recorded in both logbooks and Waste Description Records. Because the individual cans are in permanently sealed canisters that are not amenable to NDE, confirmation of waste contents via VE or RTR as presented in the WCPIP is not practical. As a result, LANL-CCP chose to examine the use of an equivalent QA qualification process to meet requirements within the WCPIP. Complete examination of the Waste Description Records and Log Books (AK record) further led LANL-CCP to conclude that a demonstration of QA equivalency may not be an appropriate confirmation tool due to incompleteness of the available records and, in some instances, it did not fully support the implementation of specific processes. Therefore, LANL-CCP chose to implement confirmation through a Peer Review process with the scope discussed in the seven sections shown below.

- (1) Description of physical parameters in the AK Summary and related supporting documents was examined for physical characteristic description adequacy and discrepancy resolution.

The AK Summary, CCP-AK-LANL 500, Revision 2 indicates that the waste is composed of approximately 11.7% organic and 88.30% inorganic wastes. The Waste Matrix Code (WMC) assigned was heterogeneous debris, S5400, as obtained by reviewing individual can waste description records and accompanying log books. Note that the waste included three drums that contained approximately 50% S3000 solidified sludges (drums 37, 38, and 39 in Canister LA15). LANL-CCP asserted that when taken on the canister level, the waste within the subject canister was still considered debris, by definition. Given that the canisters are permanently sealed and loaded in drums, it is not reasonable to require consideration of the drum as a separate waste stream. Reference C300 is the primary reference that documents how Waste Material Parameters (WMPs) were assessed. As the EPA inspection team verified, none of the waste description records of log book entries identified the percentages of specific wastes within the containers. LANL-CCP therefore assumed an equivalent weight distribution of the various components, and this is a reasonable assumption given the type of data available.

In addition to the above written records, in the early 1990s, LANL performed an RTR examination of all sixteen RH canisters. This effort is part of the AK record and examination of the tape indicated the potential presence of sealed containers having a volume greater than 4 liters within drums inside canisters LA04, LA05, and LA06. Because identification was based on an AK record discrepancy (e.g., old RTR tapes versus Waste Record Descriptions/Log books), the issue was documented on an AK Discrepancy Resolution form. There were three subject canisters identified as ineligible for shipment to WIPP pending resolution of this discrepancy. During the inspection, it was noted that the waste transfer cans that RTR had identified as sealed containers had an "O" ring at the container lip to seal the containers, but Log/Description records specifically stated that this "O" ring was removed to vent the containers, thus indicating that the containers are not, in fact, sealed. LANL-CCP examined this more thoroughly following the EPA inspection, and verified that removal of the "O" rings adequately

vented the containers. LANL-CCP revised CCP-AK-LANL-500 appropriately to address this issue and EPA considers this issue to be closed.

- (2) Procedures used to perform VE were examined for comparability with the WCPIP and attainment of DQOs/QAOs.

References P121 and P123 reflect the waste packaging and record keeping mandates that were in place at the time the subject wastes were packaged. Reference P121 (Securing and Disposing of Waste from Wing 9 of the CMR Building) required that an operator complete a Certified Waste Storage Record (CWSR) for each waste container that was loaded. Alternatively, a Radioactive Solid Waste Disposal Form with Supplemental Data Sheet could be provided. Procedures specified curie content calculation methodologies and determination of fissile components in TRU contaminated bulk waste. Reference P123, Attachment #7 of the LANL TRU Waste Certification Plan for the Processing of CH and RH TRU Solids from the Hot Cell Operations, also addresses the waste packaging and documentation requirements. Reference P123 includes a description of the waste generating processes and a requirement that the absence of liquid be verified through VE. Reference P123 requires that the operator complete a CWSR, including a waste package identification/serial number, when the waste is placed in a canister or drum. The procedure requires that the completed form be signed by a second person whose signature is recorded in the MST-5 record book.

EPA interviewed LANL-CCP AK personnel and examined historic records. These records included data and processes, the results of the peer review panel, and supporting information to assess whether the required processes for AK data verification had been followed and if the objective evidence documents that the WCPIP DQOs for liquids and physical properties had been met. The DQOs include:

- 1) Confirmation of the absence of residual liquids in excess of one percent
- 2) Determination of the waste's physical form (i.e., CPF, ferrous metals) as required by the final certification rule

Note that EPA requires physical form identification to include verification of the waste stream, as well as identification of the physical characteristics/form of the waste. In addition to DQOs, the following QAOs specific to the waste's physical form as specified in WCPIP must also be met:

- 1) Precision: maintained by reconciling any discrepancies between two operators...with regard to the identification of important waste characteristics
- 2) Accuracy: maintained by requiring operators to pass a comprehensive examination with a score of 80% and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification and subsequent requalification
- 3) Representativeness: contents placed in containers will be described on the data forms

- 4) Completeness: [to ensure completeness] The relevant information must be collected [and documented]... on a videotape and/or data form, or other unalterable media
- 5) Comparability: is ensured by ...meeting the training requirements and complying with the minimum standards used to implement the characterization process

The WCPIP specifies:

If a site intends to use records of visual examination performed prior to implementation of this WCPIP to demonstrate compliance with a DQO, it must demonstrate that the information collected regarding the waste stream and individual containers is sufficient to meet the QAOs and the programmatic DQOs that can be satisfied using VE.

Based on the above information and requirements, EPA began by obtaining and reviewing several references. All references reviewed for pertinent information by EPA are listed above. Of these, the following were particularly pertinent to waste physical form, prohibited item identification, and LANL-CCP's evaluation process:

- C002, C015, C016, C017, C300, C303, C306, C307, C309
- M162
- U076, U069, U111, U112, U113, U114, U115, U116, U117, U118, U119, U120, U121, U122, U123, U124, U125, U126
- P067, P068, P121, P122, P123, P207, P505
- WCPIP
- CCP-AK-LANL-500, Revision 2
- CCP-QP-002

A comparison of requirements in place at the time of waste packaging indicate that while several of the basic elements are included in the historic procedures, exact duplication of WCPIP requirements was not performed. The procedures indicated that the general DQOs of physical form be identified, but the specific waste material parameters, WMC, Code Group, or SCG was not required for identification. Although inferred, the data sheets do not require verification of waste stream. However, the EPA inspection team member was unable to verify that the QAOs related to physical form identified in the WCPIP were met by the historic processes and procedures used to package these wastes. LANL-CCP determined independently that the available information did not support an equivalent QA determination as a means of verification. Therefore, LANL-CCP elected to subject the available data to a peer review to establish whether the information would satisfy DQOs even if, for example, dual signatures were not apparent on all data forms. Based on the limited data sample set examined during the inspection, EPA assesses that this approach is reasonable.

(3) Training procedures and records for LANL personnel that performed the VE were examined.

Reference P122, Personnel Training and Certification, 1990 indicates the minimum required training for hot cell operators, including radiation training, safe operating practices, and ALARA. However, the procedure examined did not include requirements for VE training. References P121 and P123 were read by the VE operators, as evidenced by signature pages at the end of each document. However, information was not clear in the materials reviewed to demonstrate that all the requirements for VE training that are specified in WCPIP, Section 4.1.1.2, had been met by VE personnel during the waste-packaging operations.

(4) Data Records were examined with respect to Physical Form and prohibited item information to assess contents.

Physical waste data were historically recorded on various forms. The contents of individual waste containers, either 1-gallon cans and direct load 55-gallon drums, were recorded on Waste Description Records (WDRs) that included the number of the individual 1-gallon can, the plastic can into which the 1-gallon can (called *alpha cans*, see page 42, above) was placed, and the 1½-gallon steel can into which each plastic can was placed, the top of which was welded shut. Available records indicated an itemization of each piece of debris or material that had been placed in each can, although neither the weights nor the volume percentages were included. SCG and other physical identifiers were not included on the form. The VE results were also documented in log books that offered the same detail as WDRs regarding physical form descriptions. Each non-direct load 55-gallon drum contains cans and each can's contents are recorded on WDRs. Each canister contains a maximum of three drums. The contents of each canister are presented on TRU Waste Storage Record. Reference M006 is a summary of the canister loadings that presents the specific cans and drums within each canister, so the contents of each can be traced. Based on the above information, LANL has information pertaining to the physical form of wastes in each can in each drum, which is subsequently placed in a canister. The information provided does not include detailed weight or volume percentages, waste material parameter identification, SCG identification, and other information typically available through VE as performed in compliance with the WCPIP. The TA-55 TRU Waste Storage or SWOON database was accessed to obtain the LANL canister information. Based on this information, it can be concluded that physical form data that can be correlated to each can does exist. Note that procedures required the identification of any liquid present within cans, and each can's contents were recorded with respect to the specific type of absorbent that was used, if any, as well as the potential presence of liquids. LANL-CCP did not use the CAR Tracking System (CTS) or Project Tracking System (PTS) because all characterization data was derived through AK and batch data reports were not prepared.

(5) Data compilation by LANL-CCP was examined with respect to VE-related data including physical form and prohibited item identification.

LANL-CCP assembled both radiological and physical form information, with physical form information assessed at a can level. Specifically, each can in each drum, subsequently placed in each canister, was evaluated to determine the contents, to assign material parameters to the identified wastes, and to estimate or approximate the waste material parameter weight

percentages. LANL-CCP's data evaluation process also included examination of records to identify the presence of free liquids, as well as the use of potential absorbents within cans. Data pertaining to physical form is contained in References U076 and U069. Records did not indicate waste material parameters or their percentages, so LANL-CCP assessed these by assigning all parameters an equal relative mass value [see item (1), above]. Additionally, LANL-CCP examined several records, some of which were also examined by EPA (e.g., P123), that addressed the management of liquids that might be present in this waste stream. Typically, liquids were either absorbed using vermiculite, Envirostone, or Portland cement, or were discarded via the drain system. None of the available information examined by LANL-CCP and subsequently checked by EPA indicated the presence of liquids within waste. See Item (1), above, for information pertaining to sealed containers greater than 4 liters.

(6) Physical Form Data Information Transfer to the WWIS was evaluated.

LANL-CCP personnel were interviewed regarding data input into the WWIS. The SPM stated that all information pertinent to radiological and physical form would be manually input into the WWIS based on the values contained in CCP-AK-LANL-501. The WWIS requires entry of the following data pertinent to physical form:

- Waste material parameter
- Waste material weight
- Waste matrix code
- Waste matrix code group

Examination of this reference indicates that radiological parameters are present in the document, but there is not a specific reference to the waste material parameters, waste material weights, WMCs, and waste matrix code group(s). CCP-AK-LANL-500 contains this information and it will be used as the official source for this information. LANL-CCP assumes that the entire drum is considered CPR for all canisters containing debris as per the WCPIP.

(7) Results of the Peer Review Panel were evaluated.

A peer review panel (Panel) was convened from April 9-12, 2007, for the purpose of verifying VE data that were generated at LANL in the 1990s. The panel was tasked with determining if the VE data were technically robust to support decisions regarding the residual liquid content and physical form of the wastes. EPA examined the Panel's report in the context of its technical scope and results to understand the process that was followed and its relevance to this inspection. To document their review process, the Panel developed a DQO and QAO checklist based upon WCPIP requirements for physical form and liquid identification that addressed data precision, accuracy, representativeness, and comparability. The DQOs and QAOs used by the peer review panel are noted to be consistent with the WCPIP. The Panel did not address specific WCPIP requirements and instead attempted to assess whether the DQOs and QAOs had been achieved, noting that exact replication of WCPIP requirements would not be possible. EPA's review indicates that the results of the peer review process are reasonable.

EPA noted that the Panel indicated that wastes derived from a Sodium Cooled Fast Reactor (SFR) at DOE's Savannah River Site (SRS) in Aiken, South Carolina, were included in the data set, and thus were inconsistent with the AK Summary for this waste stream. Further investigation by LANL-CCP indicated that this was a simple typographical error, and that the wastes in question were generated in a Size Reduction Facility (SRF) in Wing 9 of the CMR at LANL. The Panel initially rejected containers with the SRF association because they believed the waste to have originated from SRS, and were thus ineligible for inclusion in the waste stream. However, because the SFR was, in fact, present at LANL in the Wing 9 Hot Cell, rejection of the containers was unnecessary.

All aspects of the LANL-CCP documentation in support of LANL RH Waste Stream No. LA-MHD03.002 are technically adequate.

8.5 Technical Evaluation: Attainment of Data Quality Objectives (DQOs)

(1) Verification methods for each DQO were assessed.

LANL-CCP representatives indicated that AK will be used as the basis for all characterization, and AK will be verified predominantly through demonstration of an equivalent QA program. This approach could not be used for some elements, so various aspects of the radiological characterization required the application of conceptual models, and aspects of the physical form characterization required the use of peer review. This approach taken by LANL-CCP to verify each DQO were consistent with the requirements in the WCPIP.

(2) Attainment of DQOs was evaluated.

As a result of the analysis presented in items (1) through (15) in Section 8.1, above, the EPA inspection team was able to assess how each DQO will be addressed. As required in the WCPIP, the following DQOs must be addressed:

- Defense determination
- TRU waste determination
- RH waste determination
- Activity determination (TRU Alpha Activity per canister, including identification and quantification of 10 WIPP-tracked radionuclides)
- Residual liquids
- Physical form, including metals and CPR

All DQOs are based on AK that is verified through demonstration of an equivalent QA program, limited confirmatory modeling, and/or peer review. EPA concludes that LANL-CCP has adequately presented how the DQOs were achieved.

9.0 RESPONSE TO COMMENTS

By the end of the comment period (October 9, 2007), EPA received one set of public comments. (Comments are available from EPA Docket ID No. EPA-HQ-OAR-2007-0643). EPA received a late set of comments from the same commenter on November 8, 2007. EPA evaluated those comments and revised the report accordingly. Attachment B provides the public comments and EPA's response.

10.0 SUMMARY OF RESULTS

10.1 EPA Findings and Concerns

The two concerns identified during the inspection, as well as LANL-CCP's responses, are discussed in the preceding sections of this report. Copies of the EPA Inspection Issue Tracking Forms that capture these issues are included in Attachments A.1 and A.2. All issues were adequately addressed prior to the inspection closeout in Albuquerque, New Mexico. No EPA issues remain open at this time.

10.2 Conclusions

EPA's inspection team determined that LANL-CCP's RH WC program activities were technically adequate. EPA is approving the LANL-CCP-RH WC program as supported in the documentation examined during this inspection as described in this report. The approval includes the AK process for RH retrievably-stored TRU debris waste stream, LA-MHD03.002, that consists of sixteen canisters as described in this report. All aspects of the LANL-CCP documentation in support of this RH waste stream are technically adequate.

There are no outstanding issues related to the LANL RH WC program that was evaluated during this inspection. Each of the parts of Section 7 describes the documents that EPA reviewed during the inspection. EPA determined that the documentation available to the inspection team adequately supports the characterization of LANL RH Waste Stream No. LA-MHD03.002. The waste stream that is approved is of a finite nature (i.e., 16 sealed canisters) and no additional waste containers belonging to this waste description exist at LANL or would be subjected to the waste characterization techniques described in the report in the future. Hence, this baseline approval will not be implemented to characterize any additional waste containers belonging to this LANL RH waste stream.

Also, as stated earlier in this report, there is no tiering of the LANL-CCP WC elements since no additional WC activities are expected for LANL-CCP relative to these RH TRU wastes.

11.0 REFERENCES

U.S. Department of Energy, Carlsbad Area Field Office, "Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (CH-WAC)," Revision 3, DOE/WIPP-02-3122, Carlsbad, New Mexico, April 25, 2005.

U.S. Environmental Protection Agency, "Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the Disposal Regulations: Certification Decision; Final Rule," *Federal Register*, Vol. 63, No. 95, May 18, 1998, pp. 27354, 27405.

U.S. Code of Federal Regulations, *Title 40, Protection of Environment*, Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes."

U.S. Code of Federal Regulations, *Title 40, Protection of Environment*, Part 194, "Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations."

U.S. Department of Energy, Carlsbad Area Field Office, "Remote Handled TRU Waste Characterization Program Implementation Plan", DOE/WIPP-02-3214, Revision 0D, Carlsbad, New Mexico, October 30, 2003.

U.S. Department of Energy, Title 40 CFR Part 191, Compliance Certification Application for the Waste Isolation Pilot Plant, DOE/CAO 1996-2184, Carlsbad, New Mexico, 1996.

U.S. Department of Energy, Title 40 CFR Part 191, SUBPART D AND C, Compliance Recertification Application 2004, DOE/WIPP/2004-3231.

U.S. Department of Energy, Carlsbad Area Field Office, "Quality Assurance Program Description (QAPD)", DOE/CBFO-94-1012, Revision 7, Carlsbad, New Mexico, July 2005.

U.S. Nuclear Regulatory Commission, "Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC)."

Attachments A.1 and A.2
EPA Inspection Issue Tracking Forms

Attachment A.1

EPA Inspection Issue Tracking Form, EPA Issue No. LANL-CCP-RH-AK-07-001C

| | |
|--|--|
| Inspection No. EPA-LANL-RH-CCP-05.07-8 | Issue Number: LANL-CCP-RH-AK-07-001C Date: May 10, 2007 |
| Inspector: C. Walker Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | Sample Size: Various Population size (if known): 16 canisters |
| <p>Description of Issue: Several issues were identified during the course of the inspection, all of which were addressed through revisions of documents or freeze file commitments. The issues that were identified and resolved include:</p> <ol style="list-style-type: none"> 1) Reference C301 addresses assembly and interpretation of LANL radiological information. The document includes LANL summary information pertaining to $^{235}\text{U}/^{239}\text{Pu}$ ratios that are incorrect based upon review of supporting can data. A summary statement indicating the error and noting that the data do not jeopardize waste stream identification has been added to C301. 2) The Peer Review report pertaining to physical form and liquid identification in the 16 canister LA-MHD03.002 LANL RH waste stream has been added to the AK source document reference list as reference P505. The Peer report includes a typographical error pertaining to inclusion of SFR waste (there is no such waste in the waste stream inventory), and the AK Document Summary has been prepared that identifies this information limitation. 3) CCP-AK-502, the Certification Plan/Confirmatory Test Plan has been revised to correct typographical errors pertaining to inclusion of Peer Review references, and other minor changes. 4) CCP-AK-500, the AK Summary, has been modified through Freeze File changes (i.e., will be edited in the future when the Summary is updated) that modify text to clarify that there is no surrogate CH waste stream from CMR, and to also clarify the accuracy of the LANL radiological data included in the AK Summary (sourced from C301) pertaining to apparently anomalous $^{235}\text{U}/^{239}\text{Pu}$ ratios. Additionally, a Freeze File change has been submitted that changes Section 5.4.3 that indicates the predominant radionuclides in fuel types that ultimately occur in waste, and the general composition of the waste relative to the LANL identification of the 10 WIPP-tracked radionuclides based on historic AK data. | |
| B. Regulatory Reference: 40 CFR 194.24(c) | |
| C. Site requirement(s): WCPIP | |
| D. Discussed with: Kevin Peters, Mark Doherty, Steve Schafer, and Court Fesmire | |
| E. Additional Comments: Draft responses to these items were provided prior to the inspection closeout and the issues have been resolved. LANL-CCP agreed to formalize these changes and submit the revised documents to EPA before EPA completes the proposed inspection report for the Federal Register notice. | |
| <p>F. Site Response Information: Site Response Required? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Site Response Due Date: NA</p> | |

Attachment A.2

EPA Inspection Issue Tracking Form, EPA Issue No. LANL-CCP-RH-RC-07-002C

| | |
|--|---|
| Inspection No. EPA-LANL-RH-CCP-05.07-8 | Issue Number: LANL-CCP-RH-RC-07-002C Date: May 10, 2007 |
| Inspector: P. Kelly Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | Sample Size: All RH samples, 16 canisters Population size (if known): All 16 canisters |
| <p>Description of Issue: The calculation package LANL-RH-20 provides the technical basis of the derivation of the radionuclides values for each of the sixteen RH canisters. These values are presented in CCP-AK-LANL-501, Revision 0 that serves as the official record of the radionuclide values for these canisters that will be entered in WWIS. The ¹³⁷Cs and ⁶⁰Co values for canister No. LA12 shown on page 85 in CCP-AK-LANL-501 do not agree with the values for those two radionuclides that were derived in LANL-RH-20.</p> <p>CCP-AK-LANL-501, Revision 0 contains Figures 8-1 and 8-2 on pages 53 and 54, respectively. These figures are different from the same plots shown in the calculation package LANL-RH-11 and the values in CCP-AK-LANL-501 are incorrect. Additionally, CCP-AK-LANL-501 requires minor changes to the text.</p> <p>Calculation packages LANL-RH-23 and LANL-RH-24 should be revised to explicitly present the statistical treatment of all components of the uncertainty determination.</p> | |
| B. Regulatory Reference: 40 CFR 194.24(c) | |
| C. Site requirement(s): WCPIP | |
| D. Discussed with: Jene Vance, Mark Doherty, Larry Porter, Court Fesmire | |
| E. Additional Comments: Draft responses to these items were provided prior to the inspection closeout and the issues have been resolved. LANL-CCP agreed to formalize these changes and submit the revised documents to EPA before EPA completes the proposed inspection report for the Federal Register notice. | |
| F. Site Response Information: Site Response Required? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Site Response Due Date: NA | |

Attachment B
EPA's Response to Public Comments

EPA's Response to Public Comments

EPA received one set of public comments on October 8, 2007, from Southwest Research and Information Center (SRIC) in response to the August 22, 2007, *Federal Register* notice that proposed EPA's decision to approve various components of the LANL RH TRU waste characterization program implemented by CCP (See FR Vol. 72 No.162 47023-47026, August 22, 2007). (See EPA Docket ID Nos. EPA-HQ-OAR-2007-0643-003). The comments have been included verbatim below along with EPA's response. For some comments (i.e., those specific to the canisters discussion in the AK Summary Report), EPA requested CBFO/CCP provide information to include in a response. CBFO/CCP provided this information in a memorandum, which we have docketed as supporting document along with the EPA letter approving LANL-CCP's RH WC program and sixteen LANL RH canisters for WIPP disposal. (See EPA Docket ID No. EPA-HQ-OAR-2007-0643-0006 and 0007.) We evaluated the CBFO/CCP responses to comments and, based on that, we have provided our responses. Please note that wherever EPA has modified the text from the proposed approval report to address a specific comment, the modified text presented in this attachment is underlined for emphasis. The text in the actual report is not underlined. We also have included the CBFO/CCP responses to public comments where applicable. CBFO/CCP will reference this memorandum in the AK Summary Report (AKSR) and will submit the revised AKSR to EPA, documenting the revisions to the AKSR upon completion of the LANL-CCP review and sign off process.

In the course of responding to the October 8, 2007, comments from SRIC, EPA received additional information from CBFO that resulted in a draft response. SRIC commented on CBFO's draft response and then submitted to EPA an additional set of comments (See EPA Docket ID No. EPA-HQ-OAR-2007-0643-0008) that clarified their initial submission. Upon closer examination EPA determined that these new comments did not warrant additional responses because they were determined to be a restatement of the original comments. However, the late comments are also included in our response to comments. Some of EPA's responses address both the initial and late comments while other responses were directed to only the initial comments. EPA's responses are labeled accordingly. The CBFO/CCP response, when provided, addressed only the initial comments.

General Comment No. 1: The commenter opposes EPA's proposed approval "... based on the current, inadequate Acceptable Knowledge (AK)." Further, the commenter contends that "EPA has overlooked various problems with AK. . . . also objects to a baseline inspection that does not include a site inspection and that is based solely on a document review at another site."

EPA Response: *EPA disagrees with the commenter. Where necessary, EPA asked CBFO/CCP to clarify issues raised by the commenter. EPA believes that for most RH waste characterization inspections, a site visit is not necessary. These sixteen RH containers were not subjected to recent radiological analysis, visual examination and/or evaluation of audio/video recordings that required EPA to evaluate equipment and personnel proficiency to confirm AK as is customarily done for contact-handled waste. As part of the LANL RH inspection, EPA evaluated AK documents, models and algorithms that were developed and used to perform dose-to-curie conversions, and old audio/video tapes. Since these evaluations were based on reviewing documents as opposed to observing current WC operations, none of these evaluations required a*

site visit at LANL. For this inspection, no additional knowledge would have been gained by looking at the pad holding the sixteen preloaded canisters stored in the underground shaft at LANL.

General Comment No. 2: In summary, SRIC believes that the errors and discrepancies discussed are more than sufficient to preclude approval of the baseline inspection at LANL CCP RH Waste Characterization Program. At a minimum, additional documentation is required. When such documentation is provided, EPA must revise the Inspection Report and allow additional public comment before making a final approval decision. Potentially, EPA must deny approval and require a new characterization program for the entire waste stream.

***EPA Response:** EPA has obtained additional documentation from CBFO/CCP and upon its evaluation has determined that this documentation merely clarifies information already in the record. It does not provide significant new information about which the public lacked adequate notice. EPA has revised the Inspection Report where needed. Since no new information has been provided by CBFO/CCP and all information given has been docketed as it was received, there is no need to repropose the approval decision. We note that the CBFO/CCP submission was placed in the docket when we received it. We received a set of late comments on it. These essentially did not identify new issues arising out of the CBFO/CCP submission. We have included responses to this set of late comments, where applicable.*

Specific Comments:

Initial Comment No. 1: What happened to the 17th drum in this RH waste stream?

The Acceptable Knowledge Summary Report (AKSR), CP-AK-LANL-500, Rev. 2, states that the Waste Stream is LA-MHD03.002 with 16 RH canisters with volumes of 0.89 cubic meters (Page 19 of 85), or a total volume of 14.2 cubic meters. The TWBIR ID number is LA-TA-03-27. Page 9 of 85. In contrast, TWBIR ID LA-TA-03-27, submitted as part of the EPA Recertification Application, shows that waste stream to be 72.8 cubic meters of stored RH waste. Appendix DATA, Attachment F, Annex J, J-LA-21. LA-TA-03-27 included former waste stream LATR04. Appendix DATA, Attachment F, Annex J, J-LA-22. LA-TR04 was "17 RH Canisters." TWBIR, P-LA-20, December 1995, Inventory Date 12/31/91. The AKSR also states that waste stream LA-MHD03.002 includes 17 RH canisters, but that "[o]ne canister (LA19) has been excluded...due to radiological issues that may result in this container being recharacterized as contact-handled (CH) TRU or low-level waste." Page 7 of 85. Clearly, from the time of its initial creation in 1991, the waste stream has been 17 RH canisters, yet it has now been reduced to 16 canisters with incomplete and inadequate information about the problems with that 17th canister, and why, whatever the problems, they do not implicate some of the remaining canisters and the overall adequacy of the AK. At a minimum, there needs to be a fuller explanation of why that canister has always been included as part of the waste stream, but now is not. Potentially, all 16 RH canisters need to be fully characterized without reliance on the past AK characterization.

CBFO/CCP Response: We [CBFO] assume the commenter is referring to the 17th canister (LA 19), not the 17th drum. AK documentation did not confirm canister LA 19

was part of the same waste stream as the other 16 RH canisters. Canister LA 19 has been traditionally included in the Transuranic Waste Baseline Inventory Report (TWBIR) LANL waste stream. The waste stream delineations in the TWBIR are different than waste streams that result when applying the requirements for delineating waste streams in Attachment A of the WCPIP. The criteria specified in the WCPIP are used to delineate waste streams and this delineation may not coincide with any historical waste stream delineation.

Late Comment No. 1: On page 1 (unnumbered) of its response CBFO agrees that AKSR must be revised to include the information as to the exclusion of canister LA19 from the waste stream. That revision is required, as are others.

In addition, the references for excluding canister LA19 include two references (M165 and U127) that SRIC does not have. Moreover, M165 is not listed as a source document in Section 9.0 of the AKSR, so that requires an additional revision of the AKSR. For SRIC and other members of the public to adequately comment, the references and source documents must be publicly available from DOE. EPA should require that those documents are publicly available, preferably on the WIPP website.

EPA Response to Initial and Late Comments No. 1: EPA agrees that AKSR report could have provided specific information supporting the decision that the 17th RH canister did not belong to the waste stream proposed for approval. However, this information was not necessary since 17th RH canister was not proposed for disposal at WIPP. The TWBIR and actual waste stream designations do not always coincide when the WCPIP waste stream definition is applied. Documentation available on the 17th RH canister (LA 19), which LANL-CCP evaluated, indicated that the contents of that canister did not meet the WCPIP definition and therefore, LANL-CCP excluded the canister from the waste stream proposed for approval. Because this container was not included in the proposed waste stream, information regarding it was not provided to EPA for evaluation. Thus, this container was out of the inspection's scope. Regarding the rest of the sixteen canisters, EPA has concluded that these containers meet the definition of TRU and RH waste. In this instance EPA does not believe that it is necessary for EPA to make these references available to the public in the EPA Docket because both CBFO and EPA could provide them to the interested public if requested. In the future, when appropriate, EPA may docket specific source documents for public review.

Initial Comment No. 2: Why are three canisters (LA16, LA17, and LA 18) different from nine other canisters and what else is in those three canisters?

Canisters LA07, LA08, LA09, LA10, LA11, LA12, LA13, LA14, LA15 each contain three 55-gallon drums with 12 steel cans in each drum. Canisters LA16 and LA 17 each have one 55-gallon drum with 12 steel cans. What is in the rest of those two canisters – air, dunnage, or something else? Canister LA18 contains one drum with 12 steel cans and one drum with 4 steel cans. What else is in drum B43 in addition to the four steel cans? A drum with the configuration of just four steel cans is not described. And what else is in the canister in addition to the two drums? The AKSR should provide the information, and it does not, and SRIC has not found.

another document that provides the information. At a minimum, the characterization information is incomplete. Potentially, those three canisters must be opened to determine what they contain.

CBFO/CCP Response: The AK record provides no information as to why LANL chose to place different amounts of waste in canisters LA16, LA17, and LA18 than was placed in the other canisters.

The review of the AK record has indicated that in addition to the single drum identified in Canister LA16, this canister also contains three aluminum spacers (array bundles). Although documented in the AK record, the identification of the three bundles in the canister was not clearly documented in the typical waste description records. This discrepancy in AK information is being evaluated using the discrepancy resolution process and does not affect compliance with the DQOs defined by the WCPIP.

The review of the AK record concluded that canisters LA 17 and LA 18 do not contain any additional material.

Late Comment No. 2: On page 3 (unnumbered) of its response, CBFO states that missing information about Canister LA16 "is being evaluated using the discrepancy resolution process." SRIC believes that the process should be completed and reported to EPA before EPA can take further action on approving the Baseline Inspection Report, since there is an acknowledged problem in the waste description records that are an essential part of the AK record and an essential basis of the AKSR. The AKSR should also be revised to include complete, accurate information about canister LA16.

On page 3 (unnumbered) of its response, CBFO states that "canisters LA17 and LA18 do not contain any additional material." CBFO has not responded to the basic issue raised by SRIC – why do the three canisters (LA16, LA17, and LA18) have different amounts of waste than the other nine canisters? In addition, the response does not answer the question posed as to what else is in the canister in addition to the steel cans. There is no response to the question as to what else is in drum B43 in addition to the four steel cans. The AKSR does not accurately describe the contents of the three canisters, nor does CBFO cite source documents that provide that information. Thus, those problems raised by SRIC have not been addressed, and the AK has not been shown to be reliable or complete.

EPA Response to Initial and Late Comments No. 2: *CBFO/CCP has stated that Canister LA 18 (which contains Drum B43) does not contain additional material. Reference M165 is the RH Canister Loading Logbook and Assay Bundle/Insert Drawings and it addresses canister loading. This reference has been provided to EPA and placed in the AK Record and will be part of the revised AKSR. The presence of aluminum spacers (array bundles) does not impact compliance with the WCPIP. EPA does expect that any AK-AK discrepancies identified by LANL-CCP will be addressed through the formal CCP Discrepancy Resolution process and a copy of DR006 that addresses this issue has been provided to EPA. EPA accepts that the CCP Discrepancy Resolution Process will be effective at addressing this issue and should this process identify other issues relevant to waste isolation, EPA expects LANL-CCP to perform the appropriate actions. These canisters do not need to be opened because the AK record identified that canister*

LA 16 contains array bundles while LANL-CCP states that canisters LA 17 and LA 18 do not contain array bundles. The AK record was re-examined by LANL-CCP specifically for the purpose of identifying the presence of array bundles. As CBFO/CCP has stated, EPA agrees that the presence of array bundles does not impact debris waste characterization for RH waste in accordance with the WCPIP.

Initial Comment No. 3: The AK documentation does not necessarily demonstrate the accuracy of the information as to what each steel can contains.

The AKSR, in Attachment 4, provides the inventory of the 16 RH canisters, including a listing of 364 Steel Cans by number and by package date. The actual Waste Description Records (WDRs) (Document U076) contain some substantially different information. A couple of the several examples include:

Steel Can #194 is packaged on 2-29-88 (as in AKSR), but the bottom of both pages states it was "Loaded & Welded 1/11/90."

Steel Can #173 is packaged on 1/19/88 (as in the AKSR), but the bottom of each of the three pages states it was "Loaded & Welded 1/4/90."

Given the nearly two years that elapsed between the two steel cans being "packaged" and "loaded and welded," there must be an explanation and documentation of why and how it is known that the WDRs are accurate and why other or different items might not be in those steel cans. There are numerous other steel cans that have different "packaged" and "loaded and welded" dates, so this is a much bigger discrepancy than just two steel cans.

Additionally, there is no documentation that the two persons who "loaded" and "verified" the information on the WDRs were also involved in the loading and welding. Once again, these many discrepancies must be explained and documented.

There are also other discrepancies in the AK records. For example, the WDRs for Steel Cans #291, 292, 415, 416, 112, 111, 414, are blank in the "verified by" section. For Canister B08, a discrepancy report was done when there were no initials in the "verified by" section. But there are no discrepancy reports for those steel cans that are missing a second initial for the verifier.

Some of the WDRs show that steel cans were "re-loaded," "emptied and re-loaded," "re-packed," or some of the contents were "removed." See, for example, steel cans 111, 112, 116, and 131. Again, these discrepancies are not noted in the AKSR, nor is there apparently any documentation to substantiate the specific items in those and other steel cans.

Since SRIC only did spot checking of the WDRs, it is likely that there are similar and other discrepancies. Those discrepancies are from the original AK records and were apparently not noted by CCP, since there are no discrepancy records for those matters in the references or in the five discrepancy reports noted in the EPA Inspection Report. For SRIC, these discrepancies cast significant doubt on the accuracy and reliability of the AK. Further, the discrepancies call into serious question the accuracy and reliability of the CCP review of those records, since the errors

are not noted or explained by CCP. SRIC does not believe that an AK with those and other errors meet the requirements of 40 CFR 194.8. At a minimum, additional explanation and documentation is required. In the absence of such additional information, the baseline approval cannot be granted.

CBFO/CCP Response: The AK record is accurate and the cited examples are explained in the AK record as described below.

Steel Can #194 – Drum B14 – Canister LA07:

Pg. 53 of logbook (U069) – Loaded and Verified (both initialed on 1/11/90).

Steel Can #173 – Drum B14 – Canister LA07:

Pg. 51 of logbook (U069) – Loaded and Verified (both initialed on 1/4/90).

Steel Can #291 – Drum B13 – Canister LA07:

Pg. 69 of logbook (U069) – Loaded and Verified (both initialed on 3/16/90).

Steel Can #292 – Drum B20 – Canister LA09:

Pg. 69 of logbook (U069) – Loaded and Verified (both initialed on 3/16/90).

Steel Can #414 – Drum B18 – Canister LA08:

Pg. 96 of logbook (U069) – Loaded and Verified (both initialed on 9/25/90).

Steel Can #415 – Drum B19 – Canister LA09:

Pg. 96 of logbook (U069) – Loaded and Verified (both initialed on 9/25/90).

Steel Can #416 – Drum B19 – Canister LA09:

Pg. 96 of logbook (U069) – Loaded and Verified (both initialed on 9/25/90).

Steel Can #111 – Drum B19 – Canister LA09:

Pg. 41 of logbook (U069) – Notes that can had been unpacked and reloaded by 11/3/89 and to see MST-14 for date (10/19/89)

Pg. 42 of logbook (U069) – Loaded and Verified (both initialed on 12/13/89).

Steel Can #112 – Drum B19 – Canister LA09:

Pg. 46 of logbook (U069) – Motor removed from #112 packaged into #104 (in Drum B28, Canister LA012) on 10/27/89 (both initialed on 10/27/89). Logbook U070 (pg. 93) verifies the loading of the motor into #104 (can 14-2). MST-14 Waste Description Record (U076) verifies this date.

Pg. 47 of logbook (U069) – Loaded and Verified (both initialed on 12/8/89).

Steel Can #116 – Drum B14 – Canister LA07:

Pg. 47 of logbook (U069) – Emptied and repackaged on 12/8/89 – Loaded and Verified (both initialed on 12/8/89).

Steel Can #131 – Drum B14 – Canister LA07:

Pg. 37 of logbook (U069) – Loaded and Verified (both initialed on 11/3/89).

Dates of the activities associated with the management of the waste cans after they were initially packaged (e.g., reloading, welding, and removal of particulates) are documented on the WDRs and logbooks. The fact that the time between initial packaging and final closure (welding) may have been performed months or years apart is not uncommon for RH waste operations nor is it considered a discrepancy.

In the case where the WDRs did not include a verification signature for a given can, the log books were reviewed to confirm that a loader and verifier were present during packaging. Dual signatures and/or initials were verified in all cases, with the exception of drum B08. For this container an AK discrepancy report was developed to address the absence of a verifier's signature. The records relating to the specific packaging operations conducted for this container provide evidence that two operators were working together on the day B08 was loaded.

Canister LA19 is segregated by storing it in an independent shaft. These shafts are described in Section 4.1.1 of the AK Summary Report.

Late Comment No. 3: On pages 3 and 4 (unnumbered) of its response, CBFO states that source document U069 (Logbooks) provides the information that is incomplete in Waste Description Records (WDRs) that SRIC cited. However, the AKSR includes Attachment 4 to provide "container specific information" and source document U076 is the only citation given for that information. That is the source document that SRIC used to point out some inaccuracies – and we noted that it was based on a spot check, so there are likely additional problems. CBFOs response shows another inaccuracy in the AKSR and an additional revision is needed. The WDRs are not fully complete and accurate information on the materials in each container. Rather, one has to compare the WDRs to other sources, which are not cited for that purpose in the AKSR. Thus, the AKSR also needs to be revised to clearly describe that source document U069 (and other documents?) provide accurate information, when such information is missing from the WDRs.

As a related matter, SRIC does not have source document U069, so it is not possible to fully comment on the AKSR or the Baseline Inspection Report, which also does not state that the logbooks must be consulted to supplement incomplete or inaccurate WDRs. For the LANL Baseline Inspection, and any future baseline inspections, CBFO must make all references and source documents upon which it relies publicly available. EPA must require such documents to be publicly available so that the public can fully comment.

Late Comment No. 5: On page 4 (unnumbered) of its response, CBFO states that logbooks were used in various cases to "confirm that a loader and verifier were present during packaging. Dual signatures and/or initials were verified in all cases, with the exception of drum B08." **DR0[0]3** provides that verification information only for drum B08 and not for the various other drums, nor has CBFO cited any other document for that more extensive logbook verification process. SRIC believes that such documentation should be provided and that the AKSR should be revised to address that issue.

EPA Response to Initial Comment No. 3 and Late Comments No. 3 and 5: EPA has evaluated the CBFO/CCP initial response and believes it to be adequate. In addition, EPA evaluated the drum loading procedures presented in P067 and Discrepancy Resolution DR003, both of which are referenced in the WCIR. The data reviewed presents detailed procedures that were implemented for drum loading as well as information pertaining to drum B08. EPA's inspection process involves sampling of data to assess the validity of information with respect to compliance with the WCPIP. EPA determined that LANL-CCP relied upon the process of Peer Review to assess the physical characteristics data, as allowed by the WCPIP. The Peer Review Panel concluded that the material in the AK Record was sufficient to make appropriate technical determinations. EPA's inspection did not directly assess the technical adequacy of the Peer Review.

Source document U069 was made available to EPA during the inspection process and it is included in the EPA inspector's records. Also, the AKSR has been sufficiently revised to reference information from U069. This document can be obtained by contacting Quality Assurance Manager, USDOE/Carlsbad Field Office, P.O. Box 3090, Carlsbad, NM 88221. In this instance EPA does not believe that it is necessary for EPA to make this reference available to the public. In the future, when appropriate, EPA will docket specific source documents for public review.

CBFO/CCP did provide documentation for a logbook verification process in the revised AKSR and EPA has determined it to be adequate.

Initial Comment No. 4: In addition to the problems with the AK, which are not discussed, there are inaccuracies in EPA's Waste Characterization Inspection Report (WCIR), Docket A-98-49, II-A4-89.

Initial Comment No. 4a: The WCIR states: "In the early 1990s, waste derived from these fuel pins were loaded into 364 1-1/2-gallon steel cans that were welded shut." Page 1. Since the AKSR Attachment 4 shows that more than 100 of the steel cans were "packaged" (loaded) between 1986 and 1989, and some steel cans were welded as early as 1986, the use of the date "early 1990s" is inaccurate and is not based on the AK records.

EPA Response to Initial Comment 4a: EPA Agrees with the Commenter and the text in question and in other places throughout the report has been revised as follows:

From 1986 through the early 1990s, wastes derived from these fuel pins were loaded into 364 1½-gallon steel cans that were welded shut.

Late Comment No. 4: SRIC comments stated that the differences in loading and welding dates must be explained. The CBFO response is the first, partial, discussion of that matter, which also should be included as a revision to the AKSR, along with any source documents for that process.

EPA's Response to Late Comment No. 4: In the revised AKSR, CBFO/CCP states the reasons for differences between the loading and welding dates. The differences are due to the need to fill

drums with sufficient waste materials, which were generated over time, causing a delay in welding the drums until they contained enough waste to reach the desired fill height.

Initial Comment No. 4b: The WCIR accepts the adequacy of the Active and Passive PAN Data for the 12 canisters with steel cans. Pages 31-32. However, after reiterating that there are 364 steel cans, there are only 359 PAN assays discussed (37 assays from April 1990 to July 1, 1990 and 322 assays after July 1, 1990). There is no discussion as to whether all 364 steel cans were actually assayed and if they were not, why there is any reliable PAN data on the steel cans that were not assayed, nor any identification of the specific cans that were not assayed.

EPA Response to Initial Comment 4b: *EPA agrees with the Commenter. The text incorrectly states that there were 359 PAN assays performed after July 1990, however the correct total number of assays is stated as 364 in several documents, e.g., CCP-AK-LANL-500 and CCP-AK-LANL-501. Accordingly, the report text has been revised as follows:*

Page 33: LANL-RH-36 is necessary because approximately thirty-seven cans, as well as calibration standards for both active and passive modes, were performed beginning in April 1990 until July 1, 1990, and the majority of the PAN assays were performed after July 1, 1990. There were a total of 364 assays performed, one for each can. Upon completion of the initial 37 assays, adjustments were made to the system's calibration that was in effect for the remaining assays.

Initial Comment No. 4c: The WCIR states that there are “up to 12 welded-shut cans” (page 8), or “to a maximum of 12 cans per drum” (page 10), or “up to 12 cans” (page 42), which leaves the impression that the 55-gallon drums contained differing numbers of steel cans. However, according to the AKSR, each of 30 drums had exactly 12 steel cans and one drum had 4 steel cans. The WCIR report language should be changed to correctly state the actual configuration.

EPA Response to Initial Comment 4c: *EPA agrees with the Commenter and the sections of the text that were cited in the comment have been revised as follows:*

Page 8: Figure 2 presents the assembly of the RH canister containing up to three drums, each of which contains 12 welded-shut cans.

Page 10: These 1½-gallon cans were loaded into 55-gallon (208 liter) drums (12 cans per drum) and the drums were transferred to a total of twelve RH canisters, with each canister containing up to three drums.

Page 42: The VE results were also documented in log books that offered the same detail as WDRs regarding physical form descriptions. Each non-direct load 55-gallon drum contains 12 cans and each can's contents are recorded on WDRs.

Initial Comment No. 5: In the absence of a physical inspection and review of procedures at LANL, EPA cannot rely on the assurance that the waste stream will be properly handled and shipped to WIPP.

The 17th canister (LA19) is apparently still being stored as part of the waste stream. SRIC believes that EPA must inspect all 17 canisters and verify the procedures as to how they will be managed and shipped to WIPP. Such an inspection and approval of actual procedures is necessary to ensure, among other things, that there is physical segregation of canister LA19 so that it could not be inadvertently shipped to WIPP, as was done in June 2007 with an uncharacterized drum from the AMTWP. Even though the AMTWP shipment was a standard waste box and not an RH canister, SRIC believes that EPA must make a physical inspection and ensure that the procedures at LANL would preclude that 17th canister, or any other canister that has not been approved, from being shipped.

Therefore, SRIC objects to the baseline inspection approval based on document review in Albuquerque and no actual inspection of the waste stream at LANL. SRIC further believes that it is an inappropriate practice for any site to be given a baseline approval without EPA physically inspecting the site and the waste streams for which approval is to be given.

Late Comment No. 6: On page 4 (unnumbered) of its response, CBFO states that “Canister LA19 is segregated by storing it in an independent shaft.” There is no source document cited. Section 4.1.1 of the AKSR, which is referenced in the response, includes two source documents (P301 and P302), but SRIC does not have those documents. Once again, SRIC believes that CBFO must make those source documents publicly available and that EPA should require such availability. In addition, SRIC believes that the AKSR must also be revised to address this matter.

EPA Response to Initial Comment No. 5 and Late Comment No. 6: EPA disagrees with the Commenter. As stated earlier, EPA determined that these canisters do not need to be opened because the AK record identified that canister LA 16 contained array bundles while canisters LA 17 and LA 18 did not. The AK record was re-examined specifically for the purpose of identifying array bundles. The presence of array bundles in canister LA 16 does not impact RH debris waste characterization in accordance with the WCPIP. EPA agrees, however, that since the disposition of the 17th canister is indeterminate at this time, any time in the future when CBFO/CCP decides its disposition, CBFO/CCP must notify EPA and provide the appropriate documentation.

The CBFO/CCP has revised the AKSR to include rationale for the need to segregate canister LA19 in an independent shaft. As stated previously EPA will make source documents available to the public when necessary.

Late Comment No.7: Thus, SRIC believes that CBFO has not yet provided essential information that EPA must have in order to make a favorable baseline inspection determination. Further, there are numerous revisions that should be made in the AKSR. That revised document should be made publicly available for an additional public comment period and EPA should also issue a revised Waste Characterization Inspection Report that should also be subject to additional public comment.

Please provide SRIC with any additional correspondence with or responses by CBFO, as well as any future developments in this Baseline Inspection Report process.

EPA Response to Late Comment No. 7: EPA disagrees with the commenter. The additional information provided by CBFO/CCP at EPA's request does not contain new information and consists mainly of clarifications of the previously submitted responses to the initial public comments. The CBFO/CCP-provided information at EPA's request in response to the public comment is sufficiently detailed and it supports its baseline approval of the CCP-LANL RH WC program.