



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Dear Mr. Stroble:

This letter provides the results of the U.S. Environmental Protection Agency's (EPA) continued compliance inspection (Inspection No. EPA-LANL-CCP 5.10-24) of the Central Characterization Project (CCP) waste characterization (WC) program for contact-handled (CH) transuranic (TRU) waste at the Los Alamos National Laboratory (LANL) in Los Alamos, NM. As a result of this continued compliance inspection, EPA confirmed that the LANL-CCP continues to characterize CH TRU waste consistent with the conditions and limitations from EPA's baseline approval granted in June 2007 (EPA Air Docket No. A-98-49; II-A4-88). The enclosed report (EPA Air Docket No. A-98-49; II-A4-141) gives the details of the evaluation.

In accordance with 40 CFR 194.8(b), this on-site inspection occurred on May 25-26, 2010. The onsite inspection covered all TRU waste characterization processes except non-destructive examination consisting of real-time radiography (RTR) and visual examination (VE) which took place offsite during the week of May 24, 2010.

EPA gave the baseline approval to the LANL-CCP's CH TRU waste characterization program in June 2007, in accordance with 40 CFR 194.8(b). During this inspection, the Agency evaluated a sample of the following WC activities:

- AK for sealed sources (S5000) wastes from the Offsite Source Recovery Program (OSRP) in LANL Waste Stream LA-05.00.01 and debris (S3000) wastes from LANL Waste Stream LA.MIN03-NC.001
- NDA – the High Efficiency Neutron Counter (HENC) No. 1 system for all approved CH waste categories
- VE/RTR training through interviews of personnel, training records, and examination of training materials



EPA continues to approve the LANL-CCP CH TRU WC program in the configuration observed during this inspection consistent with the limitations described in the baseline inspection report cited above.

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

Sincerely,



Tom Peake, Director
Center for Waste Management and Regulations

Enclosure

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DOCKET NO: A-98-49; II-A4-141

WASTE CHARACTERIZATION INSPECTION REPORT
EPA CONTINUED COMPLIANCE INSPECTION NO. EPA-LANL-CCP 5.10-24 OF
THE CENTRAL CHARACTERIZATION PROJECT WASTE CHARACTERIZATION
PROGRAM
FOR CONTACT-HANDLED TRANSURANIC WASTES
AT THE LOS ALAMOS NATIONAL LABORATORY

May 25 and 26, 2010

U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 Executive Summary	4
2.0 Purpose of Continued Compliance Inspections	4
3.0 Purpose of This Report	5
4.0 Scope of Inspection.....	5
4.1 Continued Compliance Inspection Participants	5
4.2 Performance of the Continued Compliance Inspection	6
4.2.1 Acceptable Knowledge	7
4.2.2 Nondestructive Assay	14
4.2.3 Real-Time Radiography and Visual Examination/Visual Examination Technique.....	17
5.0 Summary of Results and Conclusions	18

ATTACHMENTS

- Attachment A: Approval Summary for LANL-CCP Contact-Handled Waste Characterization Program
- Attachment B: Documents Reviewed in Support of Continued Compliance Inspection of LANL-CCP's Contact-Handled Waste Characterization Program

ACRONYMS AND ABBREVIATIONS

AK	acceptable knowledge
AKSR	AK Summary Report
Am	americium
BDR	batch data report
Be	beryllium
CBFO	Carlsbad Field Office
CCA	Compliance Certification Application
CCP	Central Characterization Project
CRA	Compliance Recertification Application
Cs	cesium
CH	contact-handled
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FR	Federal Register
HENC	High Efficiency Neutron Counter
HLW	high-level waste
INL	Idaho National Laboratory
LANL	Los Alamos National Laboratory
Li	lithium
LLD	lower limit of detection
LOQI	List of Qualified Individuals
LWA	Land Withdrawal Act
MIN	Waste Stream LA-MIN03-NC.001
NCR	nonconformance report
NDA	nondestructive assay
NDE	nondestructive examination
NMMSS	Nuclear Materials Management Safeguards System
NRC	U. S. Nuclear Regulatory Commission

OSRP	Offsite Source Recovery Program
POC	pipe overpack container
Pu	plutonium
RLWTF	Radioactive Liquid Waste Treatment Facility
RTR	real-time radiography
SNF	spent nuclear fuel
T1	tier 1
T2	tier 2
TRU	transuranic
U	uranium
VE	visual examination
VET	visual examination technique
WIPP	Waste Isolation Pilot Plant
WMP	waste material parameter
WSPF	Waste Stream Profile Form
WTS	waste tracking system

1.0 EXECUTIVE SUMMARY

This report documents the basis for the U.S. Environmental Protection Agency's (EPA's) evaluation of the U.S. Department of Energy's (DOE's) Los Alamos National Laboratory (LANL) waste characterization program for contact-handled (CH) transuranic (TRU) wastes. EPA inspection occurred May 25-26, 2010.

On April 18, 2007, EPA proposed to approve the CH waste characterization program implemented at LANL by the Central Characterization Project (CCP) and subsequently approved the program in June 2007 (see EPA Docket No. A-98-49; II-A4-88). Periodically, EPA conducts continued compliance inspections to evaluate if conditions of the original approval are being met, and to determine if any modifications to the process affect conditions of the original approval.

In accordance with 40 CFR 194.8(b) and 194.24, EPA conducted continued compliance inspection No. EPA-LANL-CCP-5.10-24. EPA evaluated the adequacy, implementation, and effectiveness of selected technical processes implemented by LANL-CCP for characterizing CH TRU waste proposed for disposal at the Waste Isolation Pilot Plant (WIPP). The waste characterization systems inspected at LANL were acceptable knowledge (AK) and nondestructive assay (NDA). A review of selected batch data reports (BDRs) for nondestructive examination (NDE), which consists of real-time radiography (RTR) and visual examination (VE) was done offsite by EPA contractor staff.

No findings or concerns were identified during this continued compliance inspection. As a result of this inspection, EPA confirms that:

- LANL-CCP CH TRU waste characterization program continues to comply with the conditions and limitations that are discussed in the baseline inspection report; and
- no substantive changes are necessary to the LANL tiering designations as presented in the baseline inspection report (EPA Docket No. A-98-49; II-A4-88).

A summary of EPA's approvals of the LANL CH TRU waste characterization program is included as Attachment A.

2.0 PURPOSE OF CONTINUED COMPLIANCE INSPECTIONS

Under the changes to 40 CFR 194.8 promulgated in the July 16, 2004, *Federal Register* notice, EPA must perform a single baseline inspection of a TRU waste generator site's waste characterization program (Vol. 69, No. 136, pages 42571–42583, July 16, 2004). The purpose of EPA's baseline inspection is to approve the site's waste characterization 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.

Following EPA's baseline approval, EPA has the authority to conduct continued compliance inspections to verify that the site continues to use only the approved waste characterization

processes to characterize the waste, and remains in compliance with all the regulatory requirements. EPA is also authorized to evaluate and approve changes, if necessary, to the site's approved waste characterization program by conducting additional inspections under the authority of 40 CFR 194.24(h).

3.0 PURPOSE OF THIS REPORT

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

- Describes the sample of the LANL waste characterization systems evaluated during this inspection
- Identifies all areas where waste characterization systems have changed relative to the baseline approval configuration and assesses the impact, if any, of those changes
- Provides objective evidence to support the EPA continued approval basis for all waste characterization systems
- Provides objective evidence of outstanding findings or concerns, as applicable
- Describes any tests or demonstrations completed during the course of the inspection and their relevance to EPA's approval decision

EPA's continued approval of the LANL-CCP waste characterization program will be conveyed to DOE separately by letter. More information is also on EPA's Web site at <http://www.epa.gov/radiation/WIPP/index.html> in accordance with 40 CFR 194.8(b)(3).

4.0 SCOPE OF INSPECTION

The scope of this continued compliance inspection was the evaluation of selected elements of the waste characterization systems in use at LANL-CCP to characterize CH TRU wastes that were approved during the baseline inspection of LANL-CCP. During this inspection, EPA evaluated samples of the following waste characterization activities:

- AK for sealed sources (S5000) wastes from the Offsite Source Recovery Program (OSRP) in LANL Waste Stream LA-05.00.01 and debris (S3000) wastes from LANL Waste Stream LA.MIN03-NC.001 (Section 4.2.1)
- NDA – the High Efficiency Neutron Counter (HENC) No. 1 system for all approved CH waste categories (Section 4.2.2)
- VE/RTR training through interviews of personnel, training records, and examination of training materials (Section 4.2.3)

4.1 Continued Compliance Inspection Participants

The continued compliance evaluation was held at LANL on May 25-26, 2010. Personnel who participated in the continued compliance evaluation are listed in Table 1, along with each person's affiliation and function during the evaluation.

Table 1. Continued Compliance Inspection Participants

Name	Affiliation, Function
Rajani Joglekar	EPA Headquarters, Lead Inspector
Ed Feltcorn	EPA Headquarters, Inspector
Connie Walker	SC&A, AK Technical Evaluator
Patrick Kelly	SC&A, NDA and RTR/VE Technical Evaluator
Dorothy Gill	SC&A, RTR/VE Technical Evaluator ¹
Sue Peterman	CCP, Site Project Manager
Michael Valentine	CCP, CH Program Coordinator
Kathleen Leonard	CTAC/CBFO, Observer
David Ploetz	CCP Manager
Tim Hall	NMED, Observer
Richard Baumann	MCS, NDA
Sean Stanfield	MCS, NDA EA
Fred Oney	Vee Jay Technologies, RTR
Eric Lyles	Vee Jay Technologies, RTR
Tommy Mojica	CCP, VEE
Joseph Garcia	CCP, VEE
Randy Fitzgerald	CCP, AKE
Joe Wachter	Canberra, NDA
Michael Papp	CCP-Technical Specialist, AK
Jim Schoen	CCP-Technical Specialist, AK
Julia Whitworth	CCP, AK
Joe Tenorio	CCP, AK
Margie Marting	CCP, AK
Joe Harvill	CCP-WTS, NDA

¹Dorothy Gill was not present at LANL; she performed a desk-top review of RTR and VET using documents that were provided to EPA during the on-site inspection at LANL.

4.2 Performance of the Continued Compliance Inspection

This evaluation included four waste characterization areas: AK, NDA, RTR, and VET. AK and NDA are addressed in separate sections of this report (4.2.1 and 4.2.2, respectively), while RTR and VET are addressed in the same section (4.2.3). These systems had been evaluated previously during the baseline inspection and, in some cases, subsequent Tier 1 (T1) evaluations. The evaluations of these areas led EPA to conclude that they were essentially unchanged from what EPA previously had inspected and approved.

4.2.1 Acceptable Knowledge

Background Information

LANL included all OSRP sealed sources in a single AKSR, CCP-AK-LANL-008, which includes three distinct waste streams: LA-OS-00-01.001, LA-OS-00-03, and LA-OS-00-04. Because EPA had not evaluated LA-OS-00-03 or LA-OS-00-04 previously, LA-OS-00-03 was in the scope of this continued compliance inspection in addition to the non-OSRP Waste Stream LA-MIN03-NC.001. These four waste streams are summarized below.

Waste Stream LA-OS-00-01.001 is a non-mixed waste stream that consists of manufactured sealed sources in metal containers that are placed inside metal pipe overpack containers (POCs) and packaged into 55-gallon drums. These sealed sources contain varying amounts and combinations of plutonium (Pu), americium (Am) or other TRU radionuclides, including beryllium (Be), lithium (Li) or other light elements (e.g., boron, carbon and fluorine) to create neutron emissions (References D003, M133, D031, C032, and C035). There are also combination sources containing $^{241}\text{Am-Be}$, $^{238}\text{Pu-Li}$, or $^{241}\text{Am-Li}$ neutron sources coupled with a cesium-137 (^{137}Cs) gamma emitter as a single inseparable unit to provide both neutron and gamma emissions.

Waste Stream LA-OS-00-03 consists of manufactured ^{241}Am foil-type sealed sources from smoke detectors that are packaged into 55-gallon drums. The sources are ^{241}Am embedded in a gold (Au-Am) foil matrix, which is sandwiched between a silver backing and a lead or gold laminate (References D026 and D027). The confining barrier prevents dispersion of the radioactive material under normal and most accidental conditions related to the use of the source. The sealed sources contain varying amounts of ^{241}Am and combinations of ^{241}Am and other radionuclides.

Waste Stream LA-OS-00-04 consists of manufactured sealed sources in metal containers, which are placed inside metal POCs that are packaged into 55-gallon drums. This waste stream contains non-volatile hazardous constituents in the encapsulating material or as shielding, particularly cadmium and lead. Therefore, this is a mixed waste stream, different from non-mixed Waste Stream LA-OS-00-01.001.

Waste Stream LA-MIN03-NC.001 is composed of homogeneous dewatered sludge generated in the TA-50-01 RLWTF (Radioactive Liquid Waste Treatment Facility) at LANL from November 16, 1979 to February 2, 2000. The sludge originated from settling of particulates in the clariflocculation tanks from November 1979 to June 1990. Dewatered sludge was also generated during the cleanout of the clariflocculation tanks from October 1997 to February 2000 and this sludge was further dewatered by rotary drum vacuum filtration in a filter that was pre-coated with Perlite® or diatomaceous earth. The final dewatered sludge consists of 25% - 40% solids. The dewatered sludge was packaged in a standard 5-mil thick plastic liner in a 90- or 125-mil polyethylene liner inside a 55-gallon U.S. Department of Transportation (DOT) 17C drum, and approximately 10 pounds of dry Portland cement was added below and above the sludge during packaging for moisture absorption. Liquid was discovered during RTR review of these

containers (it was not necessarily evident through VE). EPA elected to examine this waste stream due to the presence of liquids, the quantity of which is limited in the CCA and CRAs.

EPA selected the following two of these four waste streams to evaluate for continued compliance with AK requirements during this inspection:

- **OSRP Waste Stream LA-OS-00-03 (OSRP):** The OSRP waste stream was selected to evaluate whether conditions of the original approval were being met, to understand and evaluate ongoing characterization results, and to determine whether any modifications to EPA’s approval are required to ensure continued compliance.
- **Waste Stream LA-MIN03-NC.001:** This non-OSRP Waste Stream was selected because liquids were detected within this waste stream, and EPA’s compliance certification includes limitations on liquids within the repository.

The EPA inspector used a modified set of AK elements to streamline the inspection and ensure that key elements were examined. The AK references examined are listed in Attachment B. The following technical elements were selected for more detailed examination during the inspection, the results of which are summarized in the text of this report:

- 1) Compliance with T1 requirements
- 2) Continued compliance with waste stream definition and determinations
- 3) Continued adequacy of the AK characterization process to define the radiological and physical composition of the waste
- 4) Continued compliance with Land Withdrawal Act (LWA) requirements – spent nuclear fuel (SNF), high-level waste (HLW), Defense Determination
- 5) Continued adequate identification and management of prohibited materials
- 6) Continued implementation of the overall waste characterization process and production of key documents including AK Accuracy Reports, modifications to WSPFs, AK-NDA memoranda, modifications to the AK Summary Report (AKSR) and other applicable documentation

The following NDA and NDE batch data reports (BDRs) were examined for traceability:

Drum Number	Waste Stream	NDA BDR No.	NDE BDR No.
62349	LA-OS-00-03	LA07-OSR-CH-007	LA07-OSR-VE-007
62703	LA-OS-00-03	LA07-OSR-CH-003	LA07-OSR-VE-005
S814201	LA-MIN03-NC.001	1LANDA1138	LA-RTR2-09-0154
S817040	LA-MIN03-NC.001	2LANDA0507	LA-RTR2-09-0167

Technical Evaluation

The following elements were examined for both waste streams during the EPA continued compliance inspection. The elements are a subset of the typical technical elements examined during EPA Baseline or T1 inspections.

- (1) Compliance with T1 requirements was examined and, while found to be adequate, prompted modifications of the EPA's T1 language.

LA-OS-00-03: EPA's baseline approval was based on CCP-AK-LANL-008, Revision 3, which did not include LA-OS-00-03, which was added to the AKSR after EPA's baseline approval. EPA addressed the potential addition of these wastes, as follows in its baseline approval:

Considering that LANL's OSRP program could actively recover sealed sources, their characterization and categorization into an approved or new waste stream is of interest to EPA due to their potential for having different radiological contents. Therefore, EPA has assigned a T1 tier when new OSRP wastes are added to the AK Summaries since the baseline inspection (CCP-AK-008)... EPA does not know at this time whether CCP will attempt to include these [²⁴¹Am sealed sources] in the current sealed sources stream, or whether new stream(s) will be defined, but EPA expects any AK summaries dealing with sealed sources to adequately justify the waste stream as defined. Providing AK summaries that include these sources is considered a T2 change. (See Table 1, where this is included as a T2 change).

EPA's Baseline Approval Tiering Table states the following as a T1 change: "Any new waste category, or new OSRP wastes addressed in AK Summaries separate from CCP-AK-008". EPA's information at the time of the baseline approval was not adequate to clearly understand the ramifications of adding the ²⁴¹Am foil waste stream to CCP-AK-008. While LANL-CCP has complied with the T1 requirements, EPA has determined that the addition of waste streams like LA-OS-00-03 requires separate examination of AK origins and radiological composition to ensure compliance with 40 CFR 194.24 and LWA requirements. Therefore, EPA modifies the T1 language to state that addition of any OSRP waste streams beyond LA-OS-00-01.001, LA-OS-00-03, and LA-OS-00-04 to CCP-AK-008, as well as any new OSRP waste streams, remains a T1 change. This waste stream will not be subject to load management.

LA-MIN03-NC.001: LANL does not intend to load manage LA-MIN03-NC.001, and this waste stream is not a sealed source, so the T1 requirement pertaining to sealed sources is not applicable. Therefore, compliance with T1 requirements has been demonstrated for waste stream LA-MIN03-NC.001.

- (2) Continued compliance with waste stream definition and determinations was examined and found to be adequate.

LA-OS-00-03: LA-OS-00-03 is composed entirely of ²⁴¹Am foils from commercial smoke detectors. A company named NRD (see <http://www.nrdstaticcontrol.com>) collects used by-products from these sources for disposal, and LANL accepts these sources through the OSRP. At the time of EPA's continued compliance inspection, 70 drums from this source were in the waste stream; each drum contains 19-20 cans, each of which contains hundreds and hundreds of

individual foils. LANL-CCP representatives stated that the foils were from this single collection point, and are composed almost entirely of ^{241}Am (see Item 3, below). The physical composition of the waste is well defined because the configuration and physical composition of the foils are determined using VE at the time of packaging. LANL OSRP representatives also stated that the waste is from a single source and was generated and used in a single process. As a result, LANL-CCP has adequately defined this waste stream.

LA-MIN03-NC.001: LANL has shipped Waste Stream LA-MIN03-NC.001 since July 2005. The waste stream continues to be composed of homogeneous dewatered sludge generated in the TA-50-01 RLWTF main treatment process at LANL. Wastewater from a number of LANL generator sites resulted in the generation of sludge at the treatment facility. Therefore, the radiological composition of this multi-source waste stream cannot be defined using a default isotopic signature (see Item 3, below). While the waste stream is composed primarily of sludges, it may also contain small amounts of personal protective equipment (PPE), plastic, metal, and other miscellaneous debris. The waste was generated during two time periods. Sludge was first generated from November 1979 through June 1990, through settling of sludge in the clariflocculation tanks and collection in the treatment system. The waste stream also includes dewatered sludge generated during the cleanout of these same tanks from October 1997 to February 2000. Based on the information presented in Item 5 and since the waste stream has been shipped for over 10 years, the waste stream has been adequately defined.

- (3) Continued adequacy of the AK characterization process to define radiological and physical characteristics of the waste was evaluated and found to be sufficient.

LA-OS-00-03: Radiological characterization of ^{241}Am sources is AK-based, using documentation and information available for each source and its radionuclide distribution using a three-step process: 1) determination of primary radionuclide and quantity of radioactivity in the source based on documentation; 2) determination and "application" of radionuclide distributions within the source including uncertainties; and 3) decay correction of source material from time of material manufacture to the time of characterization. Information is derived from source certification, source shipping data sheets, Nuclear Materials Management Safeguards System (NMMSS) database, source fabrication documents, source/device markings, Nuclear Regulatory Commission (NRC) device registry information, source manufacturer's sales catalogs, drawing, measured source dimensions, and NRC licenses. LANL is the primary producer of ^{241}Am , with about 70 individual batches of ^{241}Am produced (Reference D007). ^{241}Am sources are composed primarily of americium (87.3% by weight), with the remaining isotopes being plutonium Material Type 56 (MT 56), i.e., about 16% ^{240}Pu and 84% ^{239}Pu . The predominant radionuclides by mass following decay calculations within the ^{241}Am sources are ^{241}Am , ^{239}Pu , and ^{241}Pu (D007, M011).

While the AKSR included the ^{241}Am isotopic distribution, the detailed waste stream discussion did not provide more information about Waste Stream LA-OS-00-03, other than to state that it is composed of ^{241}Am sealed sources. EPA required that the AKSR be updated, and a freeze file change was provided that will be included in the next revision of the AKSR. Related source documents supported this revision. An AK-NDA memorandum was not prepared for EPA's original sealed source inspection, but LANL-CCP representatives indicated that reference C010

doubles as an NDA memorandum, and reference C025 also contains pertinent information. Attachment 7 presents the general characterization approach used to characterize the ^{241}Am foils. LANL-CCP OSRP representatives determined the isotopic mass distribution of radionuclide in the foils and concluded that over 99.6% of the mass was attributable to ^{241}Am . Using this information and the remaining distribution data for the other 0.4%, OSRP representatives stated that because the cans contained only foils, the weight of each can (full and empty) is related to the mass of the foils and, hence, the radionuclide mass in each can. OSRP representatives used this information to determine the ^{241}Am mass within cans and drums. EPA did not review this characterization process in detail, but the general approach agrees with the overall programmatic approach to characterizing OSRP waste. Based upon these data, the radiological composition of the sources was adequately established (References C003, D007, M008, and M011).

Waste Stream LA-OS-00-03 is composed exclusively of ^{241}Am and iron-based metal. LANL-CCP estimated the waste material parameters (WMPs) using data obtained at the time of packaging. The sources are made from Am embedded in a gold foil matrix; the gold-Am foil is sandwiched between a silver backing and a palladium laminate. Based upon manufacturer's information, they are composed of 99.8% iron-based metals/alloys, and the rest of the material is other metals. The physical composition of the ^{241}Am foils has been adequately established based on VE of the Am foils during packaging.

LA-MIN03-NC.001: Waste Stream LA-MIN03-NC.001 includes approximately 5,285 containers of homogeneous dewatered sludge generated from November 16, 1979 to February 2, 2000. A wide variety of different radionuclides contaminate the LA-MIN03-NC.001 waste stream due to the more than 20 different facilities discharging or shipping waste to the RLWTF. For example, the principal nuclear materials used in the TA-55 facility at the time of waste stream generation were ^{238}Pu , ^{239}Pu , and ^{235}U , although a variety of other radionuclides were used or processed including ^{241}Am , ^{243}Am , cerium (^{144}Ce), curium (^{244}Cm), ^{137}Cs , neptunium (^{237}Np), protactinium (^{231}Pa), thorium (^{232}Th), uranium (^{233}U , ^{234}U , ^{235}U , ^{236}U , ^{238}U) and ^{236}Pu and ^{244}Pu (References C016, C019, C028 and D082). All of these may be present in waste water diverted to the RLWTF, but the specific quantities and subsequent isotopic distributions were variable.

The AKSR states that the predominant radionuclides by mass are expected to be ^{235}U (37%), ^{238}U (37%), and ^{239}Pu (25.6%), with other radionuclides expected in trace amounts. However, AK Accuracy Reports present recent evaluations of radiological characterization data by LANL-CCP indicating that ^{239}Pu and ^{238}U are the most prevalent radionuclides by mass at 56.85% and 33.02%, respectively. The AK-NDA memorandum states that it continues to be impossible to establish default isotopics for this waste stream. EPA expects the AKSR to be updated to more accurately reflect the waste stream radionuclide composition, and this remains a T2 change.

The WMPs for Waste Stream LA-MIN03-NC.001 were estimated by reviewing WIPP Waste Information System (WWIS) WMP data for 1,135 drums packaged from November 1979 to December 1987, representing about 20% of the waste stream. LANL-CCP assumed that data for this earlier time period would be representative of drums closed or containerized from 1987-2000 (the latest date when the waste stream was generated). Based on these data, the WMPs

were estimated to be composed predominantly of inorganic matrices (90.83-100%), with lesser amounts of plastic, metals and other materials.

- (4) Continued compliance with LWA requirements (SNF, HLW, Defense Determination) was evaluated and found to be adequate.

LA-OS-00-03: CCP-LANL representatives state that Waste Stream LA-OS-00-03 is composed exclusively of ^{241}Am foils used in smoke detectors. Reference materials verified this assertion, supporting LANL-CCP's contention that the waste stream does not contain SNF or HLW. This OSRP waste stream complies with this aspect of the LWA.

The ^{241}Am foils are solely from domestic, commercially produced and distributed smoke detectors. The detectors themselves are not defense related, and LANL-CCP representatives stated that the ^{241}Am foils were produced by commercial industries and used for non-defense purposes. LANL-CCP provided reference D025, which concludes that the foils are defense waste because the ^{241}Am was generated during defense-related activities including weapons production. Reference D025 states: "Justification that this waste stream is defense: Radioactive materials in the sealed sources are activation or decay products of defense materials production, resulting from materials separations during defense nuclear material byproduct management, and are now managed for defense nuclear materials security and safeguards....[the defense sources are]...weapons activities including defense inertial confinement fusion...defense nuclear materials production...defense nuclear waste and materials by-product management... defense nuclear materials security and safeguards."

The DOE has responsibility for developing a sound rationale for the defense pedigree of the TRU waste. The ^{241}Am foils comprising this waste stream, however, have been used in commercial applications. The US DOE, for national security reasons, decided to accept them as part of the OSRP program for its proper disposition. The ^{241}Am foils meet the radiological characteristics of the TRU waste and therefore, are eligible for WIPP disposal.

LA-MIN03-NC.001: Specific buildings and operations contributed process liquid waste to the TA-50-01 RLWTF for treatment. These buildings and operations performed both defense and non-defense related activities, but liquid wastes from these operations were inseparably commingled in pipelines or within influent holding tanks at the RLWTF prior to treatment. Therefore, the effluent is defense related (References C096, D005, D013, D022, D025, D028, D078, and M227). This defense determination remains unchanged and applies to the remaining drums in Waste Stream LA-MIN03-NC.001.

SNF is "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing." HLW is "the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation." Waste Stream MIN consists of homogeneous waste containing radioactive material from wastewater treatment, maintenance and decontamination and decommissioning (D&D), and

repackaging operations, and did not involve separation or reprocessing of constituents of elements from reactor fuels. The sludge does not contain SNF, and fuel material managed in the original process areas was "test" in nature, and hence did not generate waste that could be considered SNF. LANL Waste Stream MIN03-NC.001 continues to be in compliance with this aspect of the LWA.

- (5) Identification and management of prohibited materials were examined and found to be adequate following identification of liquids and subsequent drum remediation for Waste Stream LA-MIN03-NC.001.

LA-OS-00-03: LANL-CCP personnel indicated that the absence of prohibited items is verified at the time of waste stream packaging (References M031 and P001). Waste Stream LA-OS-00-03 does not contain compressed gases because the original sealed sources are produced from a closed system that precludes the introduction of extraneous materials, such as pressure vessels containing compressed gases (References D026, D027, and M072). There are no free liquids in the waste stream (References D026 and D027), a condition that was also verified during packaging. LANL-CCP OSRP's review of manufacturer documentation determined the absence of non-radionuclide pyrophorics in the waste stream, which was also verified during packaging through VE (Reference P001).

LA-MIN03-NC.001: EPA examined this waste stream because of the potential presence of liquid as a result of sludge dewatering. CCP-LANL indicated that of the 5,000 drums originally in the waste stream, 1,000 had not been shipped, but each drum would undergo remediation to remove liquids at the LANL Dome 231 Permacon facility. Multiple nonconformance reports (NCRs) were generated dealing with this issue. Note that LANL-CCP used VE to characterize the waste stream prior to 2008, after which RTR was used (including Quicksan, according to LANL-CCP) to identify containers with liquid that will undergo remediation. Liquid was identified on the top, sides, and bottom of these containers and is currently removed by suction of water from drums. When asked to provide information about the quantity of liquids present, LANL-CCP representatives stated that the liquid content of some drums was relatively high (i.e., 10 gallons or more), but more recently characterized containers show 1-2 gallons of liquid. The extracted liquid is adsorbed and added back to the top of the drum. According to LANL-CCP, 75 of the remaining 1,000 containers in this waste stream had been remediated at the time of EPA's inspection. Fast scan data aren't included in the AK record; EPA requested that this information henceforth be presented in the AK record.

- (6) Implementation of the waste characterization process and production of key documents including AK Accuracy Reports, modifications to WSPFs, AK-NDA memoranda, modifications to the AKSR, and other applicable documentation were found to be adequate.

EPA requested copies of AK documentation to verify the continued preparation of these documents and their inclusion in the AK Record. The list of documents applies to both the LA-OS-00-03 and LA-MIN03-NC.001 waste streams and is presented in Attachment B.

AK Findings and Concerns

There were no findings or concerns in the area of AK during this inspection.

AK Summary

Based on the inspection and the results discussed above, EPA determined that the AK elements examined during this inspection were in compliance with EPA's baseline determination.

AK Changes to Tiering

EPA originally specified that any new waste category or new OSRP wastes addressed in an AKSR separate from CCP-AK-008 is a T1 change. Specifically, this means that any new waste category, or new OSRP wastes addressed in AKSRs other than Waste Streams LA-OS-00-01.001, LA-OS-00-03, and LA-OS-00-04 presented in CCP-AK-008 Revision 8, remains a T1 change.

4.2.2 Nondestructive Assay

The two EPA-approved NDA units at LANL-CCP are the HENC Nos. 1 and 2. These units are essentially equivalent with respect to design, hardware, and software and both have had modifications to the system's calibrated (operational) range, see Attachment A. This report documents the basis for EPA's technical evaluation of the continued compliance of LANL-CCP's NDA program as evidenced by evaluating the HENC No. 2 unit. Specifically, this report documents EPA's evaluation of the following:

- Establishing that the HENC Nos. 1 and 2 NDA systems were in fact the same systems that EPA had inspected and approved previously
- LANL-CCP NDA procedures for HENC Nos. 1 and 2 calibration, operation, and data reporting and validation to ensure that all aspects of the NDA process at LANL-CCP were appropriately documented
- Personnel responsible for the LANL-CCP NDA procedures for the calibration, operation, and data reporting and validation for the HENC Nos. 1 and 2 were appropriately trained and the training was documented
- Calibrations were technically adequate and appropriately documented for the HENC Nos. 1 and 2
- The total measurement uncertainty (TMU) of assays performed on the HENC Nos. 1 and 2 had been adequately determined and appropriately documented and was unchanged from EPA's last evaluation
- The lower limit of detection (LLD) of the HENC Nos. 1 and 2 had been adequately determined and appropriately documented and was unchanged from EPA's last evaluation

Technical Evaluation

- (1) The design of the HENC Nos. 1 and 2 were assessed and were found to be unchanged since the last EPA inspection.

The HENC Nos. 1 and 2 are located on Pad 10 in Area G of TA-54 at LANL, in the same location as when they were last inspected by EPA. The systems incorporate two measurement modalities, a passive neutron counter and an integral gamma-ray spectrometer. The passive neutron counter uses multiple ^3He proportional counters, along with a multiplicity shift register and an external ^{252}Cf source for the Add-a-Source matrix correction function, to determine the spontaneously fissioning mass content of waste containers. Isotopic ratios are normally determined by multi-group analysis (MGA) of the gamma-ray spectrum based on measurement data obtained with the integral gamma-ray spectrometer. The integral gamma-ray spectrometer is a high-purity germanium (HPGe) detector used to acquire the gamma-ray spectrum to be analyzed by MGA and to provide direct quantification of a number of radionuclides, including ^{238}Pu , ^{239}Pu , ^{241}Pu , ^{241}Am , ^{233}U , ^{235}U , ^{238}U , ^{137}Cs , and ^{237}Np . The spectrometer used a multi-curve efficiency calibration based on the waste matrix density to correct for the attenuation of gamma rays inside the drum. There were no major hardware or software changes to either of the HENC systems for the neutron and gamma modalities.

- (2) The calibration and operational procedures for the HENC Nos. 1 and 2 were assessed and were found to be adequate.
- (3) All personnel involved with the calibration, operation and data validation of the HENC Nos. 1 and 2 were appropriately trained, as reflected in their training records.
- (4) The passive neutron and gamma calibrations of the HENC Nos. 1 and 2 had been performed as required and were unchanged since the last EPA inspection.

The original calibration of the HENC Nos. 1 and 2 for their use in the WIPP program were performed at Canberra Industries in Meriden, CT. The calibrations of both HENC systems have been modified, as documented in the following:

- Canberra Industries Document No. CAL-HENC-97, "Neutron Multiplicity Counter Mass Calibration Report: High-Efficiency Neutron Counter (HENC), Mobile Trailer #55," and Canberra Industries Document No. CALSUP-HENC-97N1997
- Neutron Multiplicity Counter Supplemental Mass Calibration Report: High-Efficiency Neutron Counter (HENC), Mobile Trailer #55
- Canberra Industries, Calibration Report for the MCS HENC #1 Including Passive Neutron Calibration Verification and Gamma Spectrometer Calibration and Confirmation, Revision 2, April 28, 2004
- MCS-HENC1-NDA-1002, "Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation," Revision 2, dated April 4, 2005

There were no formal changes to the calibration or operational ranges of either HENC unit since EPA'S last evaluation. There were no concerns regarding the neutron or gamma calibration and continued performance of either HENC unit.

- (5) The TMU of assays performed on the HENC Nos. 1 and 2 had been adequately determined and appropriately documented previously and were unchanged.

The original determinations of the TMU for both the HENC units are documented in:

- CI-HENC-TMU-101, "Total Measurement Uncertainty for the MCS HENC #1 With Integral Gamma Spectrometer," Revision 2, April 28, 2004, for the MCS HENC No.1
- Total Measurement Uncertainty for the HENC#2 with Integral Gamma Spectrometer, CI-HENC2-TMU-101, April 2006 for the MCS HENC No. 2

The TMU determinations for the passive neutron measurement for both units included contributions from the calibration uncertainty, calibration counting statistics, matrix and source distribution effects, background effects for high atomic number waste matrices, and uncertainties due to isotopics, chemical forms, and neutron multiplication. For the integral gamma-ray spectrometer, the TMU evaluation included contributions from counting statistics, background fluctuations, interferences from other gamma-emitting radionuclides, calibration uncertainties, matrix non-homogeneities, non-uniform source distributions, isotopic measurement uncertainties, and effects from self-absorption. The TMU for both HENC units were technically adequate and appropriately documented, and were unchanged from EPA'S last evaluation.

- (6) The LLD of the HENC Nos.1 and 2 had been adequately determined and appropriately documented and was unchanged from EPA last evaluation.

The LLD of a given NDA measurement depends on the type of measurement (passive neutron or gamma), the properties of the waste matrix being assayed, the data acquisition (measurement) time, and the environmental background. For this reason, the LLD is expected to vary from drum to drum and also may vary between measurements of the same drum. The NDA2000 software estimates and reports the LLD of each of the 10 WIPP-tracked radionuclides for each measurement, including the non-measured radionuclides, ^{242}Pu , ^{234}U , and ^{90}Sr . Only measured values that exceeded the reported LLD for that measurement were to be reported and were used in calculations of derived quantities, such as total TRU alpha activity and TRU alpha activity concentration. The LLDs for both HENC units were technically adequate and appropriately documented, and were unchanged from EPA'S last evaluation.

NDA Findings and Concerns

There were no findings or concerns in the area of NDA during this inspection.

NDA Summary

Based on the inspection and the results discussed above, EPA determined that the NDA elements examined during this inspection were in compliance with EPA's baseline determination.

NDA Changes to Tiering

There were no changes to the T1 or T2 designations as a result of this inspection.

4.2.3 Real-Time Radiography and Visual Examination/Visual Examination Technique

EPA's baseline evaluation included RTR, VE and VET, including OSRP (sealed sources) wastes. During this continued compliance inspection, EPA sampled both RTR and VET by reviewing records following the onsite portion of the inspection due to logistical considerations. This approach limited the availability of specific documents that would normally be available during the onsite inspection. The EPA inspection reviewed the elements of the RTR process listed below:

- Documentation of RTR activities through use of an approved procedure
- Proper execution of RTR activities
- Management oversight and independent review of RTR activities
- Training of RTR personnel

The RTR facility uses radiography to determine the following:

- Types and amounts of Waste Material Parameters (WMPs)
- Presence or absence of prohibited items
- Testing for new operators on the RTR system using specifically placed items

Real-Time Radiography:

- Information about the last demonstration of capabilities performed by the RTR operators was not readily available. Specifically, the written records and digital video disks (DVDs) should be available on site at LANL and these should be reviewed to verify qualification of the RTR operators.
- **RTR BDR No. LA-RTR-10-017** identifies two people as Independent Technical Reviewers (ITRs). One of them (Phillip Dillard) is included on the List of Qualified Individuals (LOQI), but the second (David McCoy) is not. LANL-CCP personnel stated that David McCoy's training was current, but without the current LOQI there is no clear way to tell from the documents reviewed onsite if his training was current.

- **RTR BDR No. LA-RTR-08-0095** was provided for EPA's review. This BDR was dated June 2008 and was found to be adequate upon review. The LOQI for that time was not provided and the EPA inspector was not able to verify the operator's qualifications.

The above items LANL-CCP needs to address to have most current training records.

Visual Examination Technique:

1. EPA noted that containers in VET BDR No. LAVE550001 all contained leaded rubber gloves, but the only WMP assigned is rubber. During the original 2006 baseline inspection at LANL, it was noted that WMP weights are inconsistently recorded for leaded rubber gloves. Specifically, in RTR, gloves are recorded only under the rubber WMP, but in VE, the weights of the gloves are assigned as 60% rubber and 40% other metals. VE personnel were unable to provide the rationale for assigning the weights (60:40) in this manner.
2. The BDR provided for review was dated November 2007 and was found to be adequate upon review. The LOQI for that time was not provided and the EPA inspector was not able to verify the operator's qualifications.
3. Attendance sheets for EPA-related training were provided for review, and they did not include 15 of the 18 OSRP operators that were listed on the May 18, 2010, LOQI. These sheets were provided subsequently and included all appropriate OSRP personnel.

RTR and VET Findings and Concerns

There were no findings or concerns in the areas of RTR or VE during this inspection.

RTR and VET Summary

Based on the inspection and the results discussed above, EPA has determined that the RTR and VET elements examined were in compliance with EPA's baseline determination.

RTR and VET Changes to Tiering

EPA's baseline approval did not specify any RTR or VET T1 changes and there are no changes to that based on this continued compliance inspection.

5.0 SUMMARY OF RESULTS AND CONCLUSIONS

Summary

During this continued compliance inspection, EPA did not identify any findings or concerns related to continued compliance of any technical area of the LANL-CCP CH TRU waste characterization program.

Conclusion

Based on the results of this continued compliance inspection, EPA maintains its approval of the LANL-CCP CH TRU waste characterization program in the configuration observed during this inspection consistent with the limitations described in the baseline inspection report (see EPA Docket No. A-98-49; II-A4-88).

Tiering Changes

Based on the results of this T1 evaluation, EPA has not revised the T1 and T2 designations assigned during the LANL-CCP baseline approval.

ATTACHMENT A

**APPROVAL SUMMARY FOR LANL-CCP
CONTACT-HANDLED WASTE CHARACTERIZATION PROGRAM**

Approved Activity	EPA Inspection Number, Approval Dates	Docket Number
LANL-CCP CH Baseline Approval	LANL-CCP-05.06-8 — June 21, 2007	A-98-49, II-A4-88
T1 Change – Extension of range for the High Efficiency Neutron Counter (HENC) No. 2	October 28, 2007	A-98-49; II-A4-91
T1 Change – Extension of range for the High Efficiency Neutron Counter (HENC) No. 1	December 7, 2007	A-98-49, II-A4-95

ATTACHMENT B

DOCUMENTS REVIEWED IN SUPPORT OF CONTINUED COMPLIANCE INSPECTION OF LANL-CCP's CONTACT-HANDLED WASTE CHARACTERIZATION PROGRAM

- CCP-TP-005 Attachments 1, 4, 5, 6, 7, 8, 10, for Waste Streams LA-MIN03-NC.001 and LA-OS-00-03, various dates, prepared May 20, 2010
- CCP-AK-LANL-004, Central Characterization Project Acceptable Knowledge Summary Report For LOS ALAMOS NATIONAL LABORATORY TA-50 MIXED TRANSURANIC WASTE STREAMS: LA-MIN03-NC.001, LA-CIN02.001, LA-MHD09.001, Revision 9, August 26, 2009
- CCP-AK-LANL-008, Central Characterization Project Acceptable Knowledge Summary Report For LOS ALAMOS NATIONAL LABORATORY OFF-SITE SOURCE RECOVERY PROJECT SEALED SOURCES WASTE STREAMS LA-OS-00-01.001, LA-OS-00-03, AND LA-OS-00-04, Revision 8, February 22, 2010
- WSPF Change Notice: TA-50 Radioactive Liquid Waste Treatment Facility Homogenous Inorganic Solids (LA-MIN03-NC.001) Change Notice #1, Update for WIPP Operating Record, November 6, 2006
- Waste Stream Profile Form LA-OS-00-03, April 21, 2010
- Correspondence from LANL-CCP to Mr. C. G. Fesmire, Subject: REVIEW OF CCP-LANL WASTE STREAM PROFILE FORM NUMBER, LA-OO-00-03, WIPP ELIGIBLE OSR SEALED SOURCES (NON-PIPE OVERPACK COMPONENT {POCS}), April 27, 2010
- Correspondence, R.P. Kantrowitz, to CCP Records Custodian, SUBJECT: SUBMISSION OF CHANGE NOTICE #1 FOR WASTE STREAM PROFILE FORM LA-MIN03-NC.001, The WSPF was approved by DOE CBFO on July 25, 2005, change notice date April 16, 2008
- CCP Waste Stream Characterization Checklist, LA-MIN03-NC-01, Lots 69 and 70, provided March 12 and 18, 2010
- PTS Print outs for containers S814201, S817040, 850118, PTS and SPM Radiography and NDA Checklists provided May 26, 2010
- NCR-LANL-09-05 Revisions 1 and 2, NCR-LANL-0015-08, NCR LANL LA-RTR2-09-0154, traceability of Container S814201, prohibited item and NDA NCRs, May 18, 2005 October 6, 2008, and 2009
- Inter-Office Correspondence, from V.K Cannon to D.K. Ploetz, CCP Project Trend Report From July through December, 2009, Los Alamos National Laboratory, February 24, 2010

ATTACHMENT B

DOCUMENTS REVIEWED IN SUPPORT OF CONTINUED COMPLIANCE INSPECTION OF LANL-CCP's CONTACT-HANDLED WASTE CHARACTERIZATION PROGRAM

- Interim Audit Report A-10-14 LANL-CCP TRU Waste Characterization and Certification, Lee Bishop, May 28, 2010
- PTS screen shots, Container ID Nos. 62349 and 62703 May 24, 2010
- C036, Waste Material Parameters for Mixed Waste Stream No. LA-OS-00-03, N-3-09-014, February 10, 2009
- Training Records, CCPAK-LANL-008, February 22, 2010
- Training Records, CCP-AK-LANL-004, September 2, 2009
- AK Accuracy Reports, Los Alamos National Laboratory Waste Stream Number LA-MIN03-NC.001, Lots 1-64, March 27, 2006 through March 16, 2010
- Canberra Industries Document No. CAL-HENC-97, "Neutron Multiplicity Counter Mass Calibration Report: High-Efficiency Neutron Counter (HENC), Mobile Trailer #55," and Canberra Industries Document No. CALSUP-HENC-97N1997
- Neutron Multiplicity Counter Supplemental Mass Calibration Report: High-Efficiency Neutron Counter (HENC), Mobile Trailer #55
- Canberra Industries, Calibration Report for the MCS HENC #1 Including Passive Neutron Calibration Verification and Gamma Spectrometer Calibration and Confirmation, Revision 2, April 28, 2004
- MCS-HENC1-NDA-1002, "Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation," Revision 2, dated April 4, 2005
- CI-HENC-TMU-101, "Total Measurement Uncertainty for the MCS HENC #1 With Integral Gamma Spectrometer," Revision 2, April 28, 2004 for the MCS HENC No.1
- Total Measurement Uncertainty for the HENC#2 with Integral Gamma Spectrometer, CI-HENC2-TMU-101, April 2006 for the MCS HENC No. 2