



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



JAN 4 2012

OFFICE OF  
AIR AND RADIATION

J. R. Stroble  
Manager, National TRU Program  
Carlsbad Field Office  
U.S. Department of Energy  
P.O. Box 3090  
Carlsbad, NM 88221-3090

Dear Mr. Stroble:

This letter provides the results of the U.S. Environmental Protection Agency's unannounced inspection (EPA Inspection No. EPA-NRD-CH-UA-09.11-24). On September 19 and 20, 2011, EPA conducted concurrent inspections of the Central Characterization Project (CCP) waste characterization program activities for contact-handled (CH) transuranic (TRU) waste at the Idaho National Laboratory (INL) and Carlsbad Field Office. INL-CCP is responsible for characterizing TRU waste from small quantity generators such as Nuclear Radiation Development, LLC (NRD) in compliance with the EPA waste characterization requirements at 40 CFR 194.24. The enclosed report (EPA Air Docket No. A-98-49; II-A4-157) gives the details of the inspection.

In accordance with 40 CFR 194.8(b), EPA performed the concurrent inspections. As a result of this inspection, EPA confirmed that the INL-CCP's characterization of SQS waste from NRD is consistent with the conditions and limitations from EPA's baseline approval for CH TRU waste dated November 2, 2005 (See EPA Air Docket No. A-98-49; II-A4-59) and Tier 1 changes approved since the baseline approval.

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

Sincerely,

Tom Peake, Director

Center for Waste Management & Regulations



Enclosure

cc: Electronic Distribution  
Christine Gelles, DOE EM HQ  
Alton Harris, DOE EM HQ  
Joe Franco, CBFO  
Ed Zimianski, CBFO  
Norma Casteneda, CBFO  
Ron Unger, CBFO  
Court Fesmire, CBFO  
Alan Perrin, EPA  
Ray Lee, EPA  
Paul Giardina, EPA Region 2  
John Kieling, NMED  
Trais Kliphuis, NMED  
David Ploetz, WTS

**EPA DOCKET NO. A-98-49; II-A4-157**

**WASTE CHARACTERIZATION CONTINUED COMPLIANCE REPORT:  
EPA UNANNOUNCED INSPECTION EPA-NRD-CH-UA-09.11-24  
OF THE CENTRAL CHARACTERIZATION PROJECT  
WASTE CHARACTERIZATION PROGRAM FOR  
THE CONTACT-HANDLED NUCLEAR RADIATION DEVELOPMENT WASTE  
AT IDAHO NATIONAL LABORATORY**

**September 19–20, 2011**

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

**December 2011**

## CONTENTS

1.0	Introduction.....	1
2.0	Inspection Scope .....	2
3.0	Background.....	2
4.0	Personnel.....	3
5.0	Performance of the Inspection .....	4
5.1	Acceptable Knowledge.....	5
5.2	Nondestructive Assay .....	14
5.3	Real-Time Radiography for CH TRU Wastes.....	17
6.0	Summary of Results.....	18
6.1	Summary of Concerns.....	18
6.2	Conclusion .....	18

## ATTACHMENTS

- Attachment A: Acceptable Knowledge Information Requested for Waste Stream ID-NRD.1
- Attachment B: Evaluation of Responses to Waste Stream ID-NRD.1 Questions Post-Conference  
Call Evaluation of Data Provided September 30 - October 3, 2011
- Attachment C: List of Documents Reviewed

## TABLE OF TABLES

Table 1.	EPA Approvals of the SQS AK Process and INL-CCP CH Waste Characterization Program.....	3
Table 2.	EPA Inspection Team Members .....	3
Table 3.	Personnel Interviewed.....	4
Table 4.	Batch Data Reports Examined, Waste Stream ID-NDR.1.....	6
Table 5.	Waste Stream ID-NDR.1 Waste Material Parameter Estimates.....	8
Table 6.	Waste Stream ID-NRD.1 Waste Characterization Traceability .....	11
Table 7.	NDA Batch Data Reports Examined .....	15

## 1.0 INTRODUCTION

This report describes results of the U.S. Environmental Protection Agency's (EPA's) unannounced continued compliance inspection of the Central Characterization Project's (CCP's) Small Quantity Site (SQS) program. On September 19-20, 2011, under the authority of 40 CFR 194.21(a)(1) and 24(h), the EPA performed Inspection EPA-NRD-CH-UA-09.11-24. The inspection's focus was CCP's characterization of debris waste from Nuclear Radiation Development, LLC (NRD), a small generator site located near Grand Island, New York.

This inspection took place in two stages with two separate EPA inspection teams. On September 19 and 20, 2011, an EPA inspection team visited CCP offices in Carlsbad, New Mexico, where waste characterization records are maintained. The focus of EPA's inspection in Carlsbad, New Mexico, was Acceptable Knowledge (AK) and Nondestructive Examination (NDE). On September 20, 2011, a second EPA inspection team visited CCP's Idaho National Laboratory (INL-CCP) located in Idaho Falls, Idaho. At INL, EPA inspectors focused on Nondestructive Assay (NDA). These concurrent unannounced inspections serve as a means of getting a complete picture of the processes CCP used to characterize NRD waste. For several years preceding this inspection, INL-CCP has been characterizing wastes from small generator sites such as NRD, Lawrence Berkeley National Laboratory<sup>1</sup> (LBNL), and Lawrence Livermore National Laboratory (LLNL) under the SQS program. Prior to this inspection, EPA had not evaluated in full INL-CCP's characterization of transuranic (TRU) wastes from the SQS program.

The purpose of this inspection was to evaluate the continued compliance of the contact-handled (CH) TRU characterization processes implemented by INL-CCP for characterizing TRU wastes such as NRD Waste Stream ID-NRD.1. INL-CCP routinely characterizes CH TRU waste containers from the SQS as mentioned above.

The EPA inspection team in Carlsbad focused on the following aspects of the characterization program for NRD waste:

- Acceptable Knowledge Summary Reports (AKSRs) and supporting documentation
- Waste Stream Profile Forms (WSPFs) and related attachments
- EPA-selected real time radiography (RTR) Batch Data Reports (BDRs)
- Audio/Visual (A/V) recordings of the physical contents of waste containers
- Traceability of waste containers through the entire characterization process
- Tracking of EPA-selected waste containers from receipt through disposal

The EPA team in Carlsbad also sampled items from the following waste characterization areas:

- NDE container characterization A/V tape recordings and written BDRs to evaluate the identification of cellulose, plastic and rubber in containers
- Selected training DVDs from RTR operators to evaluate the estimation of liquid volumes and identification of waste items in training containers

---

<sup>1</sup> This facility was formerly called Lawrence Berkeley Laboratory, LBL.

- RTR training materials provided to operators to qualify them and maintain their proficiency, as documented in CCP training records

The INL EPA inspection team focused on the INL-CCP nondestructive assay (NDA) systems and supporting documentation for characterizing CH TRU waste produced at NRD, including three NRD waste containers selected for replicate analysis.

The EPA inspection teams evaluated the areas listed above by conducting interviews with INL-CCP personnel, observing execution of the NDA process and reviewing documents and records as objective evidence. The EPA inspection teams did not identify any formal concerns and there are no open issues regarding the characterization of Waste Stream ID-NRD.1 as a result of this inspection. While not registered as a formal response, EPA did determine that the AK documentation initially provided by CBFO for this Waste Stream ID-NRD.1 was not adequate in terms of defense determination. EPA submitted a series of questions to CBFO related to this issue. EPA instructed that NRD waste may not be shipped to WIPP for disposal until CBFO/INL-CCP satisfactorily responds to EPA's questions concerning AK documentation. Following EPA-CBFO dialogue, all questions were adequately addressed. CBFO's responses to EPA's questions improved several documents and provided important details to better support this important aspect (defense determination) of AK. The EPA inspection team determined that the waste characterization programs for this waste stream are adequate and in compliance with the requirements of 40 CFR Part 194.

## **2.0 INSPECTION SCOPE**

The following components of the system of controls implemented for Waste Stream ID-NRD.1 were evaluated under the inspection authority described in 40 CFR 194.8(b):

- Acceptable Knowledge
- Nondestructive Assay
- Nondestructive Examination

As part of the inspection, EPA reviewed objective evidence and verified that the INL-CCP waste characterization program continues to perform waste characterization in compliance with the requirements of 40 CFR Part 194.

## **3.0 BACKGROUND**

Under the SQS program, TRU waste from other sites is shipped to INL, where the majority of the characterization is performed by INL-CCP, and all document records are maintained at CBFO in Carlsbad, New Mexico. For this reason, EPA evaluated the NDA activities relative to the NRD waste at INL-CCP and evaluated the relevant records at CBFO. EPA conducted a baseline inspection at INL-CCP in 2005, and this was the basis for EPA's approval of the INL-CCP waste characterization program for CH TRU wastes. EPA has approved several subsequent Tier 1 (T1) changes at INL for the CH waste characterization program and evaluated the SQS waste characterization program at INL-CCP and the Advanced Mixed Waste Treatment Program (AMWTP), which is co-located at INL, as shown in Table 1, below.

**Table 1. EPA Approvals of the SQS AK Process and  
INL-CCP CH Waste Characterization Program**

EPA Inspection Number	Approval Dates	Public Docket No.
INL-CCP Baseline CH Inspection INL-CCP-CH-05.05-08	November 2005	A-98-49; II-A4-59
INL-CCP Tier 1: Addition of High Efficiency Neutron Counter	November 2005	A-98-49; II-A4-60
INL-CCP Tier 1: Visual Examination as Quality Control check for Real-Time Radiography	November 2005	A-98-49; II-A4-61
INL-CCP Tier 1: Pits 4 and 6 Acceptable Knowledge	August 2006	A-98-49; II-A4-67
INL-CCP Tier 1 Addendum: Pits 4 and 6	December 2006	A-98-49; II-A4-67
INL-CCP Tier 1: Evaluation of the Super High Efficiency Neutron Counter Nondestructive Assay System	February 2007	A-98-49; II-A4-86
INL-CCP Tier 1: Waste Assay Gamma Spectrometer Calibration Extension	October 2008	A-98-49; II-A4-107
INL-CCP Tier 1: Visual Examination using Audio/Visual approval	March 2009	A-98-49; II-A4-110
INL-CCP Tier 1: Recalibration of the High Efficiency Neutron Counter Nondestructive Assay System	September 2009	A-98-49; II-A4-119
AMWTP Tier 1: Eligibility of Hanford's CH Legacy Debris Waste Streams MPFPD, RLM231ZD, RLM325D, and RLMPFPCD for Inclusion in AMWTP's BN510 (Super-Compacted) Debris Waste Stream	June 2010	A-98-49; II-A4-127
INL-CCP Continued Compliance Inspection Report	February 2011	A-98-49; II-A4-142
INL-CCP Tier 1: Additional Waste Assay Gamma Spectrometer Calibration for Filters	June 2011	A-98-49; II-A4-150

#### 4.0 PERSONNEL

The two EPA inspection teams consisted of the personnel shown in Table 2.

**Table 2. EPA Inspection Team Members**

Name	Affiliation	Inspection Role	Inspection Team
Mr. Ed Feltcorn	EPA ORIA	EPA Inspection Team Lead	INL
Ms. Rajani Joglekar	EPA ORIA	EPA Inspection Team Lead	CBFO
Ms. Lindsey Bender	EPA ORIA	EPA Inspection Team Observer	CBFO
Mrs. Connie Walker	SC&A, Inc.	Technical Inspector, AK	CBFO
Ms. Dorothy Gill	SC&A, Inc.	Technical Inspector, RTR	CBFO
Mr. Patrick Kelly	SC&A, Inc.	Technical Inspector, NDA	INL

The EPA inspection team interviewed and obtained information and/or inspection support from the INL-CCP and CBFO personnel listed in Table 3.

**Table 3. Personnel Interviewed**

Personnel Name	Affiliation/ Function	Technical Area	CBFO/ INL	Entrance/Exit Meeting	
				CBFO	INL
Mark Doherty	CCP-TechSpecs	AK	CBFO	√	-
Trey Greenwood	WTS	AK	CBFO	√	-
Tom Morgan	NTP/DOE CBFO	-	CBFO	√	-
Jim Vernon	SPM	-	CBFO	√	-
Andrew Stallings	CCP SQS Manager	-	CBFO	√	-
Bill Verlanic	CCP	NDA	INL	-	√
Preston Abbot	MCS	NDA	INL	-	√
Jerry Wells	DOE-ID	NDA	INL	-	√*
Vince Medina	CCP	NDA	INL	-	√
Joe Harvill	WTS	NDA	CBFO	√	√*
Mike Sensebaugh	WTS	-	CBFO	√	√*
J.R. Stroble	NTP/DOE CBFO	-	CBFO	√	√*
D.K. Ploetz	WTS	-	CBFO	√	√*
Mark Percy	WTS	-	CBFO	√	√*
Bruce Larue	Idaho State	-	INL	-	√*
Bart Morales	MCS	NDA	INL	-	-
Crary Davis	MCS	NDA	INL	-	-
Heather Elwood	MCS	NDA	INL	-	-

\*Individuals participating in INL Exit Meeting by telephone

## 5.0 PERFORMANCE OF THE INSPECTION

### Background

The logistics of an unannounced inspection are different from a scheduled inspection at a TRU generator site. Neither DOE HQ nor CBFO personnel knew that an EPA inspection would be occurring at this time. As a result, certain aspects of the site's waste characterization program may not be available for evaluation at the time of inspection. For example, waste characterization systems of interest to the EPA inspection may not have operational and key personnel or those who characterized the waste containers present at the site, particularly since CCP personnel typically move among the DOE TRU waste characterization sites and are not tied to a specific site. However, on this inspection, key personnel were present or accessible by phone for interviews or addressing EPA inspectors' questions/issues.

In preparation for a scheduled inspection, the EPA technical inspectors typically obtain and review the latest revisions of key procedures and reports weeks prior to the inspection for the development of inspection checklists. For an unannounced inspection, EPA technical inspectors prepare using what they know to be the latest revisions of these documents received as part of T1 change requests and/or Tier 2 concurrence process. However, these documents may have been revised or superseded without EPA's knowledge. This may require the EPA inspection team to modify or adjust the inspection's scope on short notice on site. For this inspection, for the most part, the operating procedures for radiological characterization, RTR and VE that the EPA inspection team used to prepare were the current versions.

## **Logistics – Carlsbad**

On Monday, September 19, 2011, at approximately 8:00 am, EPA concurrently sent a scope of the unannounced inspection to the headquarters (HQ) DOE and the CBFO. The EPA inspectors met with CCP management and CCP staff responsible for TRU waste at CCP's Carlsbad Office for a pre-inspection meeting to explain the inspection's scope and provide a copy of the inspection plan. Over the two-day inspection period, the EPA inspectors met with J.R. Stroble (CBFO), Norma Castaneda (CBFO), Tom Morgan (CBFO), D.K. Ploetz (Manager, Washington TRU Solutions, WTS), Mike Sensebaugh (WTS), Jim Vernon (INL-CCP Site Program Manager) and Andrew Stallings (CCP-SQS Manager); Mark Doherty (NRD AK Expert or AKE) participated via telephone. The EPA team interviewed AKEs and the Site Project Manager (SPM) and examined AK records with an emphasis on the NRD waste's defense determination and training for RTR/VE. The inspection continued on September 20, 2011, and concluded with an exit briefing at CBFO. EPA inspectors raised one issue discussed in Section 5.1(7) of this report. EPA AK personnel prepared a list of questions based on their review at CBFO and these were provided to CBFO post inspection. During two subsequent EPA-CBFO conference calls, EPA obtained answers to all questions, as shown in Attachment B. EPA had a formal inspection close-out by telephone on October 5, 2011.

## **Logistics – Idaho National Laboratory**

On Tuesday, September 20, 2011, at approximately 8:00 am, EPA concurrently sent a scope of the unannounced inspection to the HQ DOE and the INL-CCP. The EPA inspectors met with INL-CCP management and INL-CCP technical staff responsible for characterizing CH NRD wastes for a pre-inspection meeting to explain the inspection's scope and provide a copy of the inspection plan. The EPA inspectors scheduled inspection activities in concert with INL-CCP personnel. Following these meetings, the EPA inspection team personnel began their inspection, accompanied by appropriate INL-CCP personnel. The inspection continued until the afternoon, at which time the EPA inspection team had a post-inspection EPA Briefing/Close-Out Meeting with INL-CCP personnel and CBFO personnel participating via teleconference.

### **5.1 Acceptable Knowledge**

AK provides information on several aspects of TRU wastes at INL-CCP, including:

- Defense waste status (defense determination)
- Spent Nuclear Fuel (SNF), High-Level Waste (HLW) presence
- Physical composition of the waste including waste material parameters (WMPs) and waste matrix codes (WMCs)
- Waste stream definition
- Radionuclide composition

EPA examined the following technical elements related to AK:

- Waste stream identification and definition
- Radionuclide content of waste
- Physical composition of waste
- Sufficiency of AKSR including source document integration and sufficiency
- Drum data traceability
- Defense origin of waste
- SNF and HLW status
- Waste Stream Profile Form (WSPF)
- Non-Conformance Reports (NCRs)
- Accuracy
- Implementation of load management
- AK-NDA Communication
- Overall procedural technical sufficiency and scope and ability to follow the AK waste characterization process

### **Documents Reviewed**

The EPA inspection team examined a variety of documents related to AK, most of which were provided in electronic format. The list of all documents that EPA requested at the beginning of the Carlsbad inspection is presented in Attachment A. The list of actual documents that were reviewed is presented in Attachment C. The following RTR and NDA BDRs were examined:

**Table 4. Batch Data Reports Examined, Waste Stream ID-NDR.1**

Drum Number	RTR BDR No.	NDA BDR No.*
ND1087R	INRTR5110088	Not provided
ND1032R	INRTR5110082	INNDA5110112
ND1002R	INRTR5110085	INNDA5110117

\* NDA BDR Nos. INNDAH110067, INNDA5110113 and INNDA5110120 were also provided, but only those associated with the specified drums are presented in the table.

### **Technical Evaluation**

According to the AKSR, NRD has been generating two WIPP-related waste streams since 1981: LA-OS-00-03, consisting of used or returned americium-241 (<sup>241</sup>Am) foils collected by the Los Alamos National Laboratory Offsite Recovery Program (LANL OSRP); and ID-NRD.1, consisting of process waste generated from <sup>241</sup>Am foil production and solidified molten glass from precious metal recovery. NRD sent drummed wastes from ID-NRD.1 to INL-CCP for characterization and certification for WIPP disposal. EPA performed an unannounced inspection to evaluate INL-CCP's characterization activities associated with Waste Stream ID-NRD.1. Attachment A presents the information that EPA requested at the beginning of the inspection, and Attachment B presents questions posed by EPA related to the issue of defense determination as a result of the inspection process. EPA evaluated the adequacy of the AK specific to this CH TRU retrievably-stored waste stream based on information obtained during the inspection and subsequent AKSR revisions and additional source document reviews. The following technical areas were examined:

- (1) The definition of Waste Stream ID-NRD.1 was evaluated and found to be adequate.

Waste Stream ID-NRD.1 is a CH debris stream composed of waste generated from the production of alpha foils<sup>2</sup> and recovery of precious metal (gold and silver), as described in the AKSR, Revision 1 (References C006 and C007). It consists primarily of metal and other debris including vitrified material in pipe nipples generated by the separation of <sup>241</sup>Am and precious metals.

The primary mission of NRD is the manufacture of <sup>241</sup>Am foils used in smoke detectors and other industrial and research applications. NRD performs two distinct processes that generated Waste Stream ID-NRD.1. Alpha foils are manufactured using proprietary procedures to mix, laminate, and fabricate the foils, and waste is generated as part of the production and maintenance process. Precious metals were recovered from molten scrap foil using a sodium borate flux and carbon rod extraction process, and waste rods encrusted with <sup>241</sup>Am were placed in steel pipe nipples (References P001, P002, P003 and P004). Foil production and waste generation began in 1969 and Waste Stream ID-NRD.1 was generated from 1981–2007 (Reference M012). NRD wastes generated prior to 1979 were shipped to Hanford; wastes generated after this date remained in storage on site at NRD.

Waste Stream ID-NRD.1 originally contained 42 drums of process/filter waste and 25 drums of solidified molten glass waste, but NRD repackaged these into 87 drums in 2010, with a total waste volume of 18.1 cubic meters (m<sup>3</sup>). The molten glass waste and process/filter waste are packaged in different configurations and are not commingled, and both waste types contain <sup>241</sup>Am from manufacturing and recovery activities. NRD originally received high-purity <sup>241</sup>AmO<sub>2</sub> powder that contained minor amounts of plutonium (Pu) and neptunium (Np) as impurities from LANL and Oak Ridge National Laboratory (ORNL) (References C002, C013, M005, M011, M012 and P005). See Item (2) below for additional radiological information and Item (3) below for additional information about the physical composition of the waste stream.

EPA questioned whether Waste Stream ID-NRD.1 should be considered two separate waste streams because there are two waste populations that were generated by different processes, i.e., manufacturing and recovery. EPA determined that the radiological compositions of the two components are identical, and their chemical compositions are comparable. INL-CCP stated that while one to two drums of waste may be generated annually, the actual anticipated volume could be much less. EPA accepts the single waste stream determination because the waste stream volume is limited, its physical composition and process origin are well defined, and the radiological and chemical compositions support a single waste stream determination. EPA expects INL-CCP to revisit the waste stream determination if these processes or the waste composition changes substantially in the future.

---

<sup>2</sup> NRD produced foils containing <sup>241</sup>Am and polonium-210 (<sup>210</sup>Po), both alpha-emitting radionuclides. The scope of this inspection was only the foils containing <sup>241</sup>Am, which are referred to as *alpha foils* or <sup>241</sup>Am foils in this report. These terms are synonymous.

- (2) Acceptable knowledge pertaining to the radionuclide characteristics of Nuclear Radiation Development wastes was examined and found to be adequate.

The <sup>241</sup>Am supplied to NRD by ORNL and LANL is composed almost entirely of AmO<sub>2</sub>, with trace amounts of Pu, Np, and other metals. The AKSR presented data for a single sample (Reference M005) in which the AmO<sub>2</sub> powder was composed of 86.54 – 87.9 weight percent (wt%) <sup>241</sup>Am. The remaining 12-14% consisted of oxygen and impurities, including Pu, which accounted for approximately 0.2-0.5 wt% (1271 – 4,748 parts per million) divided between <sup>240</sup>Pu (12%) and <sup>239</sup>Pu (88%) (Reference M005). The <sup>237</sup>Np progeny of <sup>241</sup>Am is also expected in small amounts from radioactive decay. EPA examined additional supplier documentation and agrees that the composition in the AKSR is supported by available data. EPA examined radiological information for the companion product foil Waste Stream LA-OS-00-03 (Reference M013), indicating that the product foils are over 99.9% <sup>241</sup>Am with minor amounts of <sup>241</sup>Pu, consistent with the waste stream's composition.

NRD contracted Mobile Characterization Services (MCS) to assay each NRD waste container prior to shipment to INL, as part of CCP's characterization of the waste for shipment. MCS used a segmented gamma scanner (SGS) NDA system to assay each container, and INL-CCP summarized these results to develop a general understanding of the waste stream's radiological composition. Based on the SGS data, INL-CCP concluded that <sup>241</sup>Am and <sup>237</sup>Np are the predominant isotopes by weight and <sup>241</sup>Am accounts for over 99% of the waste stream's activity (Reference M010). The radiological composition of the waste stream is adequately defined.

- (3) Identification of physical form including waste material parameters and prohibited items was assessed and found to be adequate.

As indicated in Item (1) above, the waste falls into two general categories, process waste or waste containing solidified molten glass. NRD packaging information indicated the presence of metal items (hand tools, cans, pumps and lead shielding), other inorganic material (laboratory waste, carbon blocks and solidified glass), and cellulosic, plastic and rubber materials. NRD records did not indicate the presence of organic or inorganic matrices; only trace quantities of soil were anticipated (References C002, C003, C006, C009, M001, M007, M008 and M009).

NRD performed non-WIPP radiography on each of the 87 containers prior to shipment, and INL-CCP personnel used this information as part of the Process Knowledge (PK) process for shipment. The waste stream's composition based on the radiography results (Reference M009) is shown in Table 5, below.

**Table 5. Waste Stream ID-NDR.1 Waste Material Parameter Estimates**

Waste Material Parameter Description	Average Weight Percent	Weight Percent Range
Iron-based metals and alloys	45.22	13.16 - 81.08
Aluminum-based metals/alloys	0.04	0 - 5.34
Other metals	0.36	0 - 8.22
Other inorganic materials	19.04	0 - 64.40
Cellulosics	8.23	0 - 73.68
Rubber	10.89	0 - 49.43
Plastics (waste materials)	2.93	0 - 18.58

Waste Material Parameter Description	Average Weight Percent	Weight Percent Range
Organic matrix	<0.1	0 - <0.1
Inorganic matrix	13.13	0 - 40.49
Soils/gravel	0.16	0 - 21.28
<b>Total Organic</b>	<b>22.21</b>	<b>-</b>
<b>Total Inorganic</b>	<b>77.79</b>	<b>-</b>

The INL-CCP RTR information did not correspond directly to the anticipated information in NRD records with respect to the presence of inorganic matrix and soils/gravels. INL-CCP indicated that the difference was due to the presence of absorbent material that was not identified in the NRD records, as well as dust or "fines" identified as soils by INL-CCP. The physical composition of Waste Stream ID-NRD.1 is adequately understood.

(4) AK procedural adequacy and implementation were assessed and found to be adequate.

CCP-TP-005, Revision 23 was approved June 30, 2011, and was in place at the time Revision 0 of the ASKR was prepared. It includes processes and procedures for the following AK activities:

- Documentation Management
- Compiling Documentation
- Recording Documentation
- Review and Submittal of Documentation
- Waste Stream Characterization
- Determining Documentation Accuracy
- Re-evaluating Documentation
- Resolving Discrepancies
- Updating for Additional Waste Stream Containers
- Container Tracking Spreadsheet Development and Maintenance

CCP-TP-005 Revision 23 also includes several attachments:

- Attachment 1 – Acceptable Knowledge Documentation Checklists
- Attachment 2 – Record of Communication
- Attachment 3 – Acceptable Knowledge Source Document Summary
- Attachment 4 – Acceptable Knowledge Source Document Reference List
- Attachment 5 – Hazardous Constituents
- Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging
- Attachment 7 – Radionuclides
- Attachment 8 – Waste Containers List
- Attachment 9 – Waste Characterization Data Cross-Reference
- Attachment 10 – Acceptable Knowledge Re-evaluation Checklist
- Attachment 11 – Acceptable Knowledge Source Document Discrepancy Resolution Form
- Attachment 12 – Form and Content Guide for AK Summary Reports
- Attachment 13 – CCP Waste Stream Characterization Checklist
- Attachment 14 – CCP Acceptable Knowledge Accuracy Report
- Attachment 15 – CCP TRU Waste Correlation and Surrogate Summary Form

Attachments 1, 3, 4, 5, 6, 7 and 8 were provided to EPA during the inspection. The AK evaluation checklist (Attachment 10), Waste Stream Characterization Checklist (Attachment 13), and AK Accuracy Report (Attachment 14) were not available at the time of EPA's inspection. INL-CCP does not anticipate preparation of a Correlation and Surrogate Summary Form (CSSF, Attachment 15). Attachments provided were prepared using CCP-TP-005 Revision 22, but this is acceptable because these attachments were generated prior to approval of CCP-TP-005, Revision 23. EPA determined that INL-CCP demonstrated the ability to follow the AK procedure for the elements examined.

- (5) The Acceptable Knowledge Summary Report was assessed and found to be adequate after revisions.

EPA examined the AKSR and found it to be inadequate in several areas, including:

- Waste generation dates and early waste disposition history
- Defense application and uses of NRD <sup>241</sup>Am foils
- Relationship to LANL Waste Stream LA-OS-00-03 (containing NRD <sup>241</sup>Am foils)
- Physical composition, including packaging and RTR history
- Radiological composition, including additional documentation of <sup>241</sup>Am sources and their radiological composition and historic NRD NDA results
- Additional supporting references pertaining to waste shipment and composition

INL CCP revised the AKSR to address these inadequacies. INL-CCP provided additional source documents M011, M012 and M013 and an updated M005 to support the AKSR revisions and the revised AKSR is adequate.

- (6) Drum traceability and the ability to follow the acceptable knowledge waste characterization process for containers were assessed and found to be adequate.

EPA selected three containers presented in CCP-TP-005, Attachment 8 for traceability analysis. Table 6 below presents the results of EPA's traceability review.

NRD originally packed waste in cans that were placed in drums, and the NRD drums can be traced to the final INL-CCP drums. The selected drums were traceable through the characterization steps performed by NRD and INL-CCP. It should be noted that the AK record did not include drum records that were generated several years earlier when the waste was placed in cans. NRD provided information from its database covering the last two years (2008-2010).

**Table 6. Waste Stream ID-NRD.1 Waste Characterization Traceability**

Drum	NRD Feed Drum and Feed Can Data <sup>1</sup>	NRD repackage data*	NRD RTR*	NRD NDA†	CCP RTR	CCP NDA	CCP IDC Information
ND 1087R Pipe Nipple Waste	Can Nos. 20101203-001-010; 20101215-001-016 from 2/2011 file print out Feed ID: NRD Container 1936	Waste Container Packaging Form 12/3-15/2010	BDR ND- RTR1-008 12/20/2010	NDA 2000 Assay Report 2/17/2011	INRTR5110088	INNDAW110129 (not provided; obtained from IDC Information)	IDC print out with RTR and NDA Status; WDS information not available; Provided 10/3/2011
ND 1032R Process and Maintenance Debris Waste	Can Nos. 20100816-001-101; 20100819- 001-003; 20100901-002-007 2/2011 file print out. Feed ID: NRD Containers 1124 and 954	Waste Container Packaging Form 8/16/2010- 9/1/2010	BDR ND- RTR1-005 12/02/2010	NDA 2000 Assay Report 1/31/2011	INRTR5110082	INNDAS110112	IDC print out showing RTR and NDA Status; no WDS information available. Provided 10/3/2011
ND 1002R Process and Maintenance Debris Waste	Can Nos. 20100406-001-005; 20100408- 001-006; 20100412-002-005; 20100413- 001-007; 20100414-001-003; 20100415- 001 2/2011 file print out. Feed ID: NRD Containers 1683, 1842, and 456	Waste Container Packaging Form 4/06/2010- 4/15/2010	BDR ND- RTR1-006 12/03/2010	NDA 2000 Assay Report 1/31/2011	INRTR5110085	INNDAS110117	IDC print out showing RTR and NDA Status; no WDS information available. Provided 10/3/2011

\* Reference M008

† Reference M010

- (7) Defense origin of transuranic wastes was found to be adequate after DOE responded to EPA questions and revised the relevant documents.

The AKSR states that Waste Stream ID-NRD.1 is "contaminated with materials from atomic energy defense activities associated with defense nuclear materials production and defense nuclear waste and materials by-products management." INL-CCP submitted a defense determination request in August 2008 to CBFO for NRD activities that was approved by DOE in December 2008: Reference D001 is the LA-OS-00-03 waste determination and Reference D002 is the ID-NRD.1 waste determination.

Reference D002 states that Waste Stream ID-NRD.1 was generated "during production of sealed sources (which were recovered domestically) containing radioactive material [ $^{241}\text{Am}$ ] originating from the DOE Weapons Program." Reference D002 also states that Waste Stream ID-NRD.1 is defense in origin because "[radioactive] materials in the sealed source production waste are activation/decay products of defense production resulting from materials separation during defense nuclear material by-product management, and are now managed for defense nuclear materials security and safeguards." This justification is weak because Waste Stream ID-NRD.1 is not managed for defense nuclear material security and safeguards; Waste Stream LA-OS-00-03 is managed for this purpose (Reference D001). However, because these two waste streams came from the same defense materials production process, Waste Stream ID-NRD.1 can qualify as waste from defense activities. Reference D002 states that the defense justification applied to Waste Stream LA-OS-00-03 also applies to Waste Stream ID-NRD.1, since the latter was generated during generation of the  $^{241}\text{Am}$  foils in Waste Stream LA-OS-00-03. The defense determination goes on to state that since LANL is the source of the  $^{241}\text{Am}$  in the waste stream, the  $^{241}\text{Am}$  was generated as a by-product of the production of defense-related nuclear materials. Reference D002 concludes that Waste Stream ID-NRD.1 is defense-related because the waste is associated with:

- Naval Reactors Development
- Weapons activities including defense inertial confinement fusion
- Defense nuclear waste and materials by-products management
- Defense nuclear materials production
- Defense nuclear materials security and safeguards and security investigations
- Defense research and development

The revised AKSR states that NRD produced  $^{241}\text{Am}$  foils that are used in military applications associated with detectors for smoke, chemical agents, and explosives, as well as other industrial and research applications. For example,  $^{241}\text{Am}$  foils were purchased by Sandia National Laboratory for use in the "MicroHound" explosives detector that was used in defense applications. Also, smoke detectors were purchased by the Knolls Atomic Power Laboratory, whose work supports naval reactors development (References C013, D002, M011 and M012).

EPA had a number of questions regarding the documentation for Waste Stream ID-NRD.1 that CBFO had initially prepared to support the defense determination; see Attachment B. EPA was concerned about the inadequate documentation for the NRD.1 waste stream. EPA submitted these questions to CBFO and, following EPA-CBFO dialogue, CBFO answered all questions and

revised all documents appropriately (see attachment B of this report). EPA instructed that CBFO/INL-CCP may not ship the NRD waste containers to WIPP for disposal until relevant AK documents are revised to expand on the waste's defense origin rationale. CBFO's responses to EPA's questions improved several documents and provided important details to better support this important aspect of AK. EPA concluded that the revised references examined adequately supported DOE's defense determination for Waste Stream ID-NRD.1.

- (8) Spent Nuclear Fuel and High-Level Waste Status were evaluated and found to be in compliance with the WIPP Land Withdrawal Act.

The Land Withdrawal Act (LWA) prohibits the WIPP disposal of SNF fuel and HLW waste, as defined by the Nuclear Waste Policy Act (NWPA). The NWPA states that SNF is "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing." The *DOE Radioactive Waste Management Manual* expands on this definition and states that, "test specimens of fissionable material irradiated for research and development only, and not production of power or plutonium, may be classified as waste, and managed in accordance with the requirements of this Order when it is technically infeasible, cost prohibitive, or would increase worker exposure to separate the remaining test specimens from other contaminated material." HLW is defined by the NWPA as "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 ID-NRD.1 is composed of debris waste generated during production of <sup>241</sup>Am foils and recovery of precious metals from waste foils; no spent fuel was ever managed or used at the facility. NRD did not manage or generate HLW.

- (9) Waste Stream Profile Form preparation and completeness were evaluated and found to be adequate.

INL-CCP provided a Draft WSPF for Waste Stream ID-NRD.1, which included a draft Characterization Information Summary (CIS) and Summation of Aspects. The Draft WSPF included information for all required elements, but EPA notes that some elements will be revised to address issues that came to light as a result of EPA's inspection. The Draft WSPF demonstrates that INL-CCP continues to be capable of preparing a WSPF. The final WSPF will be provided to EPA upon completion of waste shipments as a quarterly Tier 2 (T2) submission.

- (10) The Preparation of Nonconformance Reports was evaluated and found to be adequate.

INL-CCP provided one example Nonconformance Report (NCR), NCR No. NCR-INL-3162-11, Revision 0. The NCR was issued because the SGRS detector 3 (DETA3) did not meet gain specifications required in CCP-TP-010 during gain adjustments following detector warm-up. To resolve the issue, INL-CCP performed detector replacement, repositioning, repair, trouble shooting, and additional measurements as directed by the NDA Expert Analyst (EA), see Section 5.2(1). The NCR demonstrated INL-CCP's continued capability to prepare an NCR.

(11) AK accuracy was not assessed for the NRD waste.

An AK accuracy report was not available for this waste stream at the time of EPA's inspection and CCP was not required to have one in place, given the waste stream characterization status at the time of the inspection. EPA has examined the development of AK Accuracy reports by INL-CCP and at other CCP sites, and determined to be adequate. If, in the future, a need for an AK accuracy report arises, EPA expects to receive that as part of T2 change submittals of INL-CCP.

(12) Load management was found to be not applicable.

INL-CCP representatives indicated that Waste Stream ID-NRD.1 will not be load managed.

(13) NDA-AK communication was assessed and found to be adequate.

The NDA Memorandum for Waste Stream ID-NRD.1 presents a description of the waste stream and summary radiological information based on Revision 0 of the AKSR. The NDA Memorandum does not provide AK-based scaling factors except for <sup>137</sup>Cs and <sup>90</sup>Sr. Plutonium is not expected in the waste and there are no approved default plutonium isotopes, so direct gamma quantification will be used to assay these wastes. EPA views the NDA Memorandum as a critical document that links the NDA and AK aspects of each waste stream. The NDA Memorandum is adequate, although EPA expects to receive the revised AKSR reflecting changes to the radiological characterization data.

### **Summary of AK Findings and Concerns**

The EPA Inspectors did not identify any findings or concerns related to AK relative to Waste Stream ID-NRD.1 during this inspection, although several questions were raised that required revision of the AKSR and, as a result, other documents (e.g., WSPF). No modification of current T2 reporting requirements is necessary. These questions, early on into the investigation, resulted in EPA prohibiting shipment of NRD waste as scheduled for WIPP disposal. Eventually, all the questions were satisfactorily addressed and EPA allowed the NRD waste shipments to WIPP.

### **Conclusion**

EPA determined that NRD Waste Stream ID-NRD.1 was adequately addressed in terms of acceptable knowledge.

## **5.2 Nondestructive Assay**

The EPA inspection team evaluated INL-CCP's NDA processes for the characterization of NRD wastes. INL-CCP AK records that the EPA inspection team reviewed in advance indicated that there were a total of 87 drums of NRD wastes and, while all had been assayed, none had been shipped to WIPP. Upon arrival at INL-CCP the EPA inspection team did the following:

- Verified that all NRD containers had been assayed by requesting all NDA BDRs associated with NRD wastes

- Reviewed one hundred percent of the NRD BDRs for technical content and regulatory compliance
- Verified that the 87 NRD wastes containers were physically stored at INL-CCP by observing them in AMWTP Building WMF 631, Building Location Coordinates NO
- Identified the NDA instruments that had been used to assay NRD wastes, i.e., the SWEPP Gamma Ray Spectrometer (SGRS), the High Efficiency Neutron Counter (HENC) and the Waste Assay Gamma System (WAGS)
- Inspected each NDA system, including interviewing the personnel responsible for each system's calibration and operation, as well as the status of training for all personnel who conducted data review and validation of all NRD BDRs

### Documents Reviewed

The EPA inspection team examined a variety of documents related to NDA. The list of all documents that EPA reviewed is presented in Attachment C. The following NRD BDRs were examined:

**Table 7. NDA Batch Data Reports Examined**

NDA BDR Number	Number of Drums	NDA Instrument Used
INNDAS 110117	16	SGRS
INNDAS 110119	14	SGRS
INNDAS 110120	14	SGRS
INNDAS 110112	14	SGRS
INNDAS 110113	5	SGRS
INNDAS 110111	1	SGRS
INNDAS 110115	9	SGRS
INNDAS 110067	12	HENC
INNDAS 110129	1	WAGS
<b>Total Number</b>	<b>87</b>	-

### Elements Observed

- (1) Operation of the SWEPP Gamma Ray Spectrometer in Building WMF 628 was evaluated and found to be adequate.

The SWEPP Gamma Ray Spectrometer (SGRS) was used to assay 74 of the 87 drums of NRD waste (85%). This was intentional since the SGRS uses a filtered gamma detector. Specifically, the gamma detector is covered with a thin sheet (32 millimeters) of cadmium called a "filter" that effectively removes (filters) photons up to approximately 80 keV, which is important for assaying wastes with elevated concentrations of <sup>241</sup>Am. EPA observed that *Operator Aid: CCP-INL-223* was posted at the SGRS; this aid specified the acceptance criteria for peak centroid and energy for the system's four detectors. EPA observed the SGRS in operation during this inspection, and the operator was Heather Elwood, who was current as an Operator/ITR (Independent Technical Reviewer) for the SGRS on the CCP-Idaho National Laboratory List of Qualified Individuals (LOQI) dated September 14, 2011. EPA confirmed that the SGRS operator

used the current version of the SGRS operating procedure (CCP-TP-115, Revision 4); the SGRS software versions were current for NDA 2000 (Version 4.0), and Genie 2000 (Version 3.0), as required. EPA observed several entries in the *SGRS Operational Log Book, 2011*, INL-NDA-SGRS-017, and noted that a Non-Conformance Report (NCR) NCR-INL-3162-11 was issued for a performance problem related to the amplifier's gain on August 1, 2011. The appropriate corrective action (a detector was replaced) was taken and a calibration verification was performed for the system as required, and was documented in CCP-INL-SGRS-11-002, *Calibration Verification of the SGRS System after Detector Replacement and Energy Calibration*. The SGRS was returned to service on August 16, 2011. All aspects of the SGRS were acceptable.

- (2) Operation of the High Efficiency Neutron Counter in Building WMF 628 was evaluated and found to be adequate.

The High Efficiency Neutron Counter (HENC) was used to assay 12 of the 87 drums of NRD waste (14%). While the SGRS was the instrument of choice as discussed above, the HENC also uses a filtered gamma detector and was deemed an appropriate alternate for the time period the SGRS was not operational due to NCR-INL-3162-11. EPA did not observe the HENC in operation during this inspection. EPA did confirm that INL-CCP operator, ITR and Expert Analyst (EA) individuals who contributed to the HENC BDR that contained NRD drums were current on the CCP-Idaho National Laboratory list of qualified individuals (LOQI) dated September 14, 2011. EPA observed entries on pages 196-197 of the *HENC Operational Log Book, 2011*, INL-NDA-HENC-009 that documented the NRD HEBC assays. All aspects of the HENC were acceptable.

- (3) Storage of 87 55-gallon drums of NRD wastes was confirmed by visual inspection.

EPA performed a visual inspection to ensure that the NRD drums were still at INL and found all 87 drums in a building operated by AMWTP, Building WMF 631, Building Location Coordinates *NO*. EPA counted the drums and confirmed that their physical markings were consistent with their designation as NRD wastes. No drums of NRD wastes had been shipped to WIPP as of the date of this inspection.

- (4) One hundred percent of the Batch Data Reports for NRD wastes were evaluated and found to be adequate.

EPA examined all BRDs for the 87 NRD drums and examined them for the following aspects:

- Evidence of technical and compliance reviews by trained personnel
- Evidence that all containers were TRU, i.e., contained TRU alpha concentrations greater than 100 nCi/gram, and that there were activity concentrations and uncertainties reported for all WIPP-tracked radionuclides
- Quality Control (QC) measurements for all containers had been performed, the results were evaluated against appropriate acceptance criteria and found to be acceptable

- All results were reasonable, i.e., the containers had elevated concentrations of  $^{241}\text{Am}$  to a maximum of 23.6 Ci (Container No. ND1075R), little or no measurable  $^{239}\text{Pu}$  and small measurable amounts of  $^{240}\text{Pu}$ .

There were no concerns regarding the BDRs documenting the NDA of the 87 NRD waste drums.

### **Concerns**

There were no concerns relative to any aspect of the INL-CCP nondestructive assay process identified during this inspection.

### **Conclusion**

EPA determined that NRD Waste Stream ID-NRD.1 was adequately addressed in terms of radiological characterization by nondestructive assay. A sister waste stream LA-OS-00-03 was not in the scope of this inspection.

## **5.3 Real-Time Radiography for CH TRU Wastes**

### **Evaluation**

EPA reviewed three RTR BDRs generated during characterization of NRD wastes by INL-CCP. The RTR data were generated on the following dates:

- BDR No. INRTR5110081 was generated on July 19, 2011, using CCP-TP-053, Revision 10
- BDR Nos. INRTR5110084 was generated on July 25, 2011, and INRTR5110087 on July 28, both using procedure CCP-TP-053, Revision 11

All the BDRs contained a successful Measurement Control Report performed by a qualified RTR operator. There were no nonconformance reports (NCR) generated for these BDRs. An Independent Observation and Replicate Scan were performed by a different operator to the one performing the RTR scans in each BDR. EPA inspectors reviewed the written and audio/visual recordings for selected containers in each BDR and determined that data sheets were complete and were consistent between the records. The containers reviewed were:

- BDR INRTR5110081 – ND1016R, ND1016R (replicate scan)
- BDR INRTR5110084 – ND1068R, ND1068R (replicate scan), ND1015R, ND1014R
- BDR INRTR5110087 - ND1089R (replicate scan), ND1089R, ND1030R

The CCP List of Qualified Individuals (LOQI) reviewed by the EPA inspectors demonstrated that RTR data were generated by qualified personnel. EPA reviewed selected training records for the RTR operators generating the data contained in the three BDRs above. EPA determined that the operators were trained in accordance with CCP requirements.

## **Summary of RTR Findings and Concerns**

The EPA inspection team did not identify any concerns relative to RTR during this inspection.

## **Conclusion**

EPA concluded that CCP at INL continues to perform RTR examinations in a manner that is compliant with the requirements of 40 CFR Part 194 and EPA's 2007 baseline approval.

## **6.0 SUMMARY OF RESULTS**

### **6.1 Summary of Concerns**

The EPA inspection team did not identify any concerns during this inspection. However, EPA raised a few questions concerning AK documentation (see Attachment B) which CBFO/INL-CCP addressed to EPA's satisfaction. Based on this unannounced inspection, there are no open issues in the technical areas evaluated related to Waste Stream ID-NRD.1.

### **6.2 Conclusion**

The EPA inspection team evaluated selected aspects of the following waste characterization areas relative to Waste Stream ID-NRD.1:

- AKSRs and supporting documentation
- WSPFs and related attachments
- EPA-selected RTR BDRs
- A/V recordings of the physical contents of waste containers
- Traceability of waste containers through the entire characterization process
- Tracking of EPA-selected waste containers from receipt through disposal
- NDE container characterization A/V tape recordings and written BDRs to evaluate the identification of cellulose, plastic and rubber in containers
- Selected training DVDs from RTR operators to evaluate the estimation of liquid volumes and identification of waste items in training containers
- RTR training materials provided to operators to qualify them and maintain their proficiency, as documented in CCP training records
- INL-CCP NDA systems and supporting documentation for characterizing CH TRU waste produced at NRD, including three NRD waste containers selected for replicate analysis

The EPA inspection team determined that the waste characterization programs for Waste Stream ID-NRD.1 are adequate and in compliance with the requirements of 40 CFR Part 194. A sister waste stream (LA-OS-00-03) was not covered in the scope of this inspection.

**Attachment A**  
**Acceptable Knowledge Information Requested for Waste Stream ID-NRD.1**

- 1) If a revision of CCP-AK-INL-023 other than Revision 0 has been approved, please provide this AKSR.
- 2) All Source Documents listed at the end of CCP-AK-INL-023, latest revision.
- 3) Waste Stream Profile Form and related attachments, if available
- 4) All CCP-TP-005 Attachments and records pertinent to Waste Stream ID-NRD.1, including:
  - Attachment 1 – Acceptable Knowledge Documentation Checklist
  - Attachment 2 – Record of Communication (may be addressed through provision of source documents and Attachment 3)
  - Attachment 3 – Acceptable Knowledge Source Document Summary
  - Attachment 4 – Acceptable Knowledge Information List
  - Attachment 5 – Hazardous Constituents
  - Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging- including WMP memorandum
  - Attachment 7 – Radionuclides - including NDA memorandum
  - Attachment 8 – Waste Containers List- including Add Container Memorandum
  - Attachment 9 – Waste Characterization Data Cross-Reference (reference only, submission of an example is not required)
  - Attachment 10 – Acceptable Knowledge Re-evaluation Checklist
  - Attachment 11 – Acceptable Knowledge Source Document Discrepancy Resolution (may be addressed by providing source documents and Attachment 3)
  - Attachment 12 – Form and Content Guide for AK Summary Reports (reference only, submission of example is not required)
  - Attachment 13 – CCP Waste Stream Characterization Checklist
  - Attachment 14 – CCP Acceptable Knowledge Accuracy Report and related Memorandum
  - Attachment 15 – CCP TRU Waste Correlation and Surrogate Summary Form
- 5) Traceability information pertaining to the following containers (from AK Tracking spreadsheet) from CCP tracking system through WDS: ND1087R, ND1032R and ND1002R. Include copies of any paperwork generated at NRD. Describe the characterization process and relative responsibilities of CCP, AMWTP, and NRD. Note that this list may be augmented depending on information obtained in item (6).

6) Summary information pertaining to characterization results from BDRs (not entire BDR, just characterization results and SPM signature sheets), for BDRs representing the above containers OR as available.

7) Training records for Mark Doherty, W.G. Estill, and other CCP individuals responsible for this waste stream.

8) Example NCRs pertinent to the waste stream

**Attachment B**  
**Evaluation of Responses to Waste Stream ID-NRD.1 Questions**  
**Post-Conference Call Evaluation of Data Provided September 30 - October 3, 2011**

The questions that EPA posed relative to NRD wastes are listed below with CBFO's responses listed in italics followed by underlined text indicating that EPA considers all responses to be adequate.

1. AKSR Sections 4.2.1.1 and 5.2: Please clarify the dates presented in the document. The AKSR states that NRD has been producing <sup>241</sup>Am foils since 1969, but the waste described in the AKSR was first packaged in 1981 and the AKSR implies that the first documented <sup>241</sup>Am source (Oak Ridge/LANL) was obtained in 1984. Revise the document to clarify where waste generated prior to 1981 is located and to address whether <sup>241</sup>Am from other sources were used 1981–1984. Add more source document references to the AKSR and record that show the origin of Am oxide during the period of waste generation, as available.

*The AKSR was revised to clarify the dates of foil production and waste generation. The response is adequate, but new references were added to the AKSR that weren't in Revision 0. References M011, M012, M013, and revised M005 were also provided. The references and revised text adequately address EPA's question.*

2. AKSR Section 4.4, page 13, last paragraph: Expound on the defense uses/applications of NRD products including the dates of defense product use/generation, the specific facilities they were sent to, and other information that supports this aspect of the defense determination.

*The AKSR was revised to address this aspect of the defense determination. Reference M011 was provided that includes information from a sealed source registry for two chemical agent detectors that used NRD <sup>241</sup>Am foils; CCP indicates these are evidence of defense use of NRD foils. The reference and revised text adequately address EPA's question.*

3. AKSR Section 4.6.2: Clarify why the LA OS 00 03 NRD OSRP sealed sources waste stream is not considered a similar CH waste stream, particularly with respect to <sup>241</sup>Am (radiological) composition. Does the OSRP waste stream contain sealed sources created by sites other than NRD? If so, please provide references regarding this because during EPA's LANL Continued Compliance Inspection, site representatives indicated that all waste in this stream was from NRD and the drum list provided to EPA showed only containers associated with NRD.

*The AKSR was revised to indicate that Waste Stream LA-OS-00-03 is a similar CH waste stream. Reference[s] M013 was also provided which is a radionuclide data query generated from WDS for select containers from Waste Stream LA-OS-00-03. These data show that <sup>241</sup>Am is by far the predominant radionuclide (% curie), with minor <sup>241</sup>Pu, which is consistent with Waste Stream ID-NRD.1. The reference and revised text adequately address EPA's question.*

4. AKSR Sections 5.4.1, 5.4.1.1 & 5.4.1.2: Section 5.4.1 states that inorganic matrices and soils/gravel are not expected, but Table 2 shows both to be present and in substantial percentages in at least one container. As written, Section 5.4.1.2 is not clear that Table 2 was generated based on PK RTR performed by CCP, which would clarify the apparent text/table discrepancies. The AKSR should be revised to clarify that Table 2 was generated based on CCP's own PK RTR of the waste stream. Also, clarify the origin of the inorganic matrices and soil identified in the waste CCP by RTR.

*The AKSR was revised to clarify that the "inorganic matrix" includes the vitrified waste, which explains the differences between NRD and CCP's quick scan RTR. The AKSR was also revised to state that the radiography used to determine the waste material parameter percentages in the AKSR is not the process used to certify the containers at INL. The response is adequate.*

5. AKSR Section 5.4.2, p. 24: The AKSR states that 86.4% of the LANL americium is AmO<sub>2</sub>; what is the other 13.6%? Also, clarify the purity information provided pertaining to plutonium, i.e., what is the weight percent of plutonium? Expound on this information and better explain the data and source of the data in the text of the AKSR. Reference M005 says that this order had 332 grams <sup>241</sup>Am and 1 gram Pu. Is this weight percentage typical of all AmO<sub>2</sub> provided? Additionally, clarify that Table 3 was created using CCP's PK-shipment related ISOCs NDA information.

*The AKSR was revised to clarify the various percentages and to indicate that the percentages are an example from a single reference; the AKSR states that a new reference, M012, supports the statement that all americium sources purchased exhibited the same isotopic distributions, but different gram values. Reference M012 was also provided which contains shipping papers that show NRD accepted americium oxide from both Oak Ridge and Los Alamos. The reference and revised text adequately address EPA's question.*

6. NRD also generated static control devices and other products; are wastes generated from these devices also in the stream?

*INL-CCP addressed the question during the October 3 conference call verifying that the waste generated from other production lines are not in the ID-NRD.1 waste stream. The response is adequate.*

7. The PK Attachment 6 provides an estimated WMP% from "NRD" staff; is this the same information used to generate the bullet lists shown in AKSR Section 5.4.1? It is noted that the PK and AK Attachment 6s are very different and presumably generated from different data sources. How do references M009 and C009 relate to either Attachment 6?

*INL-CCP addressed the question during the October 3 conference call, where the performance of NRD RTR was discussed; NRD performed non-WIPP certified RTR on all containers to satisfy CCP's shipping requirements, and INL-CCP representatives*

*reviewed this information and used it as AK to evaluate the waste material parameters within the waste stream. The response is adequate.*

8. Please review the reference list to be sure there are no typographical errors.

*The reference list was revised to include new references and to correct a typographical error in an existing reference. The response is adequate.*

9. Reference C010 is the main record supporting the use of  $^{241}\text{Am}$  as the “primary isotope” in the waste stream, but this reference is the Attachment 7 form without signatures or other information. Is there an interview form or other reference supporting this assertion which is used as a basis for the radiological determination? Examine the AKSR when referencing C010 to see if there are more applicable supporting references.

*Reference C010 was removed and references M012 and M013 were provided that show available information pertaining to purchased  $\text{AmO}_2$  composition (both Los Alamos and Oak Ridge), as well as the radiological composition of the sister stream LA-OS-00-03. These references are adequate.*

10. Is reference M010 the ISOCS data used as part of PK to ship the drums to Idaho? If so, do you have a spreadsheet showing how this information was summarized in Table 3?

*INL-CCP provided the requested spreadsheet and clarified that an SGS, not ISOCS, unit was used. The response is adequate.*

11. Please provide as much traceability information about the following drums as possible, from any initial NRD paperwork through CCP’s tracking system, through WDS. 1087R, 1032R, 1002R. If these are not through the full characterization process, please select three other drums. If little paperwork is available from the NRD end, feel free to select other containers that better demonstrate traceability. Original packaging information (or other documentation showing sources of waste in original containers), container repackaging (you provided a spreadsheet, but if there’s any more detailed individual container information including content descriptions, etc.), travelers, ISOCS (also provided), PTS/CTS (or equivalent) print outs, and WDS print outs.

*INL-CCP provided the requested traceability information that was available as of October 3, 2011. The response is adequate.*

**Attachment C**  
**List of Documents Reviewed**

CCP-AK-INL-023, Central Characterization Project Acceptable Knowledge Summary Report for Idaho National Laboratory NRD Mixed Heterogeneous Debris Waste Stream: ID-NRD.1, Revision 0, July 18, 2011

CCP-AK-INL-023, Central Characterization Project Acceptable Knowledge Summary Report for Idaho National Laboratory NRD Mixed Heterogeneous Debris Waste Stream: ID-NRD.1 Revision 1, September 30, 2011

CCP-Idaho National Laboratory List of Qualified Individuals, September 14, 2011, for HENC, SGRS and WAGS

CCP-INL0SGRS-11-002, Calibration Verification of the SGRS System after Detector Replacement and Energy Calibration, August 17, 2011

CCP-TP-005 Attachments 1, 4, 5, 6, 7 and 8, Revisions 22 and 23, various dates

CCP-TP-005, Acceptable Knowledge Documentation, Revision 22, Effective Date, April 21, 2011

CCP-TP-005, Acceptable Knowledge Documentation, Revision 23, Effective Date, June 30, 2011

Eugene Olesky, Health Physicist, NRD, Inc., April 23, 1984

Information sent by Julia Whitworth, November 16, 2006

INL-NDA SGRS-017, SGRS Operational Logbook 2011, initiated on June 8, 2011, specifically page 74

INL-NDA-HENC-009, HENC Operational Logbook 2011, initiated January 3, 2011, specifically pages 196-197

Non Conformance Report: NCR INL-3162-11, August 16, 2011, requiring a calibration verification on the SGRS

Operator Aid: CCP-INL-223, August 4, 2011

SGRS, HENC and WAGS BDRs listed above

Waste Stream Profile Form (Draft), Waste Stream ID-NRD.1, Irene Quintana, September 12, 2011

C002, Process Description (Abbreviated), W.G. Estill, December 5, 2006

C003, Waste Packaging, W. G. Estill, December 5, 2006

C005, Waste Containers, W. G. Estill and Randy Fitzgerald, December 5, 2006

C006, Silver Recovery, Randy Fitzgerald and W. G. Estill, December 6, 2006

C007, Contents of Iron Pipe Containers, W. G. Estill December 12, 2006

C009, Waste Material Parameters, D. Davis, NRD LLC, December 26, 2006

C013, NRD Source Purchase Orders and NRC Reports, Mark Doherty, August 5, 2008

D001 Transuranic Waste Defense Determination Approval Forms, Joel Grimm, NNSA February 17, 2006

D002 Transuranic Waste Defense Determination Approval, Mark Doherty, August 12, 2008

M001, Two Spreadsheets – Glovebox Bagout Data and Silver Recovery Bagout Data,

M005, Isotopics for Purchase - <sup>241</sup>Am, Gregg Potter, ORNL August 31, 1984

M007, Waste Material Parameters, Mark Doherty, April 26, 2011

M008, Waste Packaging Records for NRD, November 24, 2010

M009, Revised Waste Material Parameters, Mark Doherty, May 16, 2011

M010, NRD NDA Batch Data Reports, February 21, 2011

M011, Sealed Source and Device Registry, no author, undated

M012, Source Material Shipping Papers, no author, various dates

M013, LA-OS-00-03 WWIS Radionuclide Activity Data Query, WDS, September 29, 2011

P001, Preparation of Anodes for Recovery Bath, Am-241, NRD, LLC, March 1, 2005

P002, General Laboratory Manufacturing Manual (NRD, Inc. Procedures, Proprietary),

P003, <sup>241</sup>Am Foil Fabrication Procedures (Proprietary), no author, 1992

P004, NRD Inc. Manufacturing and Assembly Procedures for Radioactive Sources (Proprietary), no author, June 1996

P005 NRD TRU Waste Packaging Procedures HP-20100001, Revision 0, D. Davis, February 24, 2010