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

AUG 17 2010

OFFICE OF
AIR AND RADIATION

Donald C. Gadbury
Manager, National TRU Program
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, NM 88221-3090

Dear Mr. Gadbury:

On October 21, 2009, the Carlsbad Field Office (CBFO) requested that the U.S. Environmental Protection Agency (EPA) approve three remote-handled (RH) waste streams at Idaho national Laboratory (INL) as Tier 1 changes. On February 1, 2010, EPA approved two of the three RH waste streams as a Tier 1 change (EPA Docket No. A-98-49; II-A4-122). This approval is for the third retrievably stored, RH transuranic (TRU) debris waste stream ID-INTEC-RH. As a result, INL may dispose of this waste at the Waste Isolation Pilot Plant (WIPP). The enclosed report (EPA Docket No. A-98-49; II-A4-129) supports EPA's approval decision. As a part of this review, EPA also evaluated and approves the following: an RH waste sampling process implemented at the Argonne National Laboratory-East (ANL-E) and a radiochemical analysis procedure for RH waste implemented at the INL.

The Central Characterization Project (CCP) characterized this waste using remote-handled waste characterization processes approved by EPA in February 2007. In addition, the CCP used sampling and radiochemical analysis processes similar to those implemented at ANL-E and INL, respectively. EPA determined that the procedures and processes used by INL-CCP staff for characterizing this waste were adequate. As a result of our evaluation, no changes to the tiering table are necessary. The tiering table (revised May 12, 2010), contained in the EPA report (EPA Docket No: A-98-49, II-A4-126), supporting an approval of the INL RH waste stream (ID-MFC-S5400-RH), continues to apply to all RH waste streams at INL.

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

Sincerely,

Tom Peake

Tom Peake, Director
Center for Waste Management and Regulations

Enclosure

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DOCKET NO: A-98-49; II-A4-130

WASTE CHARACTERIZATION REPORT

EPA TIER 1 EVALUATION OF THE CENTRAL CHARACTERIZATION PROJECT (CCP) REMOTE-HANDLED TRANSURANIC WASTE CHARACTERIZATION PROGRAM FOR IDAHO NATIONAL LABORATORY (INL): WASTE STREAM ID-INTEC-RH

December 8-9, 2009, January 12-13, 2010, and February 17, 2010

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

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TABLE OF CONTENTS

ATTACHMENTS

ACRONYMS

AERHDH	Argonne East Remote-Handled Debris Waste
AK	acceptable knowledge
AKE	acceptable knowledge expert
AKSR	acceptable knowledge summary report
ALARA	as low as reasonably achievable
Am	americium
ANL	Argonne National Laboratory
ANL-E	Argonne National Laboratory– East
BDR	batch data report
CBFO	Carlsbad Area Field Office
CCP	Central Characterization Project
CFR	Code of Federal Regulations
CH	contact-handled
Ci	curie
COC	chain-of-custody
CRR	Characterization Reconciliation Report
Cs	cesium
CSSF	Correlation and Surrogate Summary Form
CTAC	Carlsbad Technical Assistance Contractor
CTP	Confirmatory Test Plan
CWI	CH2M-WG Idaho, LLC
DOE	U.S. Department of Energy
DQO	data quality objective
DR	discrepancy resolution
DTC	dose-to-curie
EPA	U.S. Environmental Protection Agency
FR	*Federal Register*
g	gram
g/cm^3	grams per cubic centimeter
HAER	Historic American Engineering Record

HFEF	Hot Fuel Examination Facility
HLW	high-level waste
ICP-MS	Inductively Coupled Plasma – Mass Spectrometry
ID	Idaho
ILTSF	Intermediate Level Transuranic Storage Facility
INL	Idaho National Laboratory
INEEL	Idaho National Engineering and Environmental Laboratory
INEL	Idaho National Engineering Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ITR	Independent Technical Reviewer
IWMF	INTEC Waste Management Facility
L	liter
LLW	low-level waste
LOQI	List of qualified individuals
LWR	light-water reactor
m	meter
m^3	cubic meters
MCNP5	Monte Carlo N-Particle Transport Code RSICC Computer Code Collection, Oak Ridge National Laboratory
MFC	Materials and Fuel Complex
MFP	mixed fission products
ml	milliliter
mR/hr/Ci	milli Roentgen per hour per curie
NCR	non-conformance report
NDA	nondestructive assay
NOD	Nuclear Operations Division
OJT/SME (SP)	On the job training/Subject Matter Expert
ORIGEN	Oak Ridge Isotope Generation
ORNL	Oak Ridge National Laboratory
Pu	plutonium
PUREX	plutonium-uranium extraction
QA	quality assurance
QAO	quality assurance objective

RAF	Remote Analytical Facility
RCRA	Resource Conservation and Recovery Act
RH	remote-handled
RPD	Relative Percent Difference
RTR	real-time radiography
RWMC	Radiological Waste Management Complex
SCG	Summary Category Group
SNF	spent nuclear fuel
SPM	Site Project Manager
Sr	strontium
STR	Site Technical Representative
T1	Tier 1
T2	Tier 2
TAN	Test Area North
TBD	to be determined
TID	Tamper Indicating Device
TMU	total measurement uncertainty
TRU	transuranic
U	uranium
VE	visual examination
WCPIP	Waste Characterization Program Implementation Program
WIPP	Waste Isolation Pilot Plant
WIR	waste incidental to reprocessing
WMP	waste material parameter
WSPF	Waste Stream Profile Form
WTS	Washington TRU Solutions
WWIS	WIPP Waste Information System

1.0 EXECUTIVE SUMMARY

This report supports the U.S. Environmental Protection Agency's (EPA's) approval of the retrievably-stored, remote-handled (RH) transuranic (TRU) debris (S5000) waste stream ID-INTEC-RH from the U.S. Department of Energy's (DOE's) Idaho National Laboratory (INL). It also supports EPA's approval of an RH waste sampling process implemented at the Argonne National Laboratory-East (ANL-E) and a radiochemical analysis procedure implemented at INL.

On October 2, 2009, the Carlsbad Field Office (CBFO) requested that EPA review a proposed Tier 1 (T1) change addressing the following three INL RH waste streams:

- The addition of twelve containers to an approved RH TRU waste stream, Waste Stream ID-ANLE-S5000. EPA approved this waste stream in January 2007 as part of the baseline approval; however, the addition of containers is a T1 change.
- New RH Waste Stream ID-HFEF[1]-S5400-RH, Lot 1A with 28 casks
- New RH Waste Stream ID-INTEC[2]-RH, consisting of two containers

On December 8-9, 2009, EPA met in Washington, DC, with the Central Characterization Project (CCP) personnel at INL responsible for characterizing the subject waste streams to discuss the waste characterization approach and information gathered to prepare acceptable knowledge documentation and quantify radiological and physical contents of the three waste streams. In February 2010, the EPA approved the first two waste streams as two separate T1 changes (See EPA Report A-98-49; II-A4-122). EPA, however, did not approve the last waste stream, as EPA needed to evaluate waste sampling and radiochemical analysis methods used to generate radiological information necessary for developing scaling factors. EPA inspected these two processes earlier this year, and this report presents the results of these evaluations as the basis for approval.

The INL RH baseline approval specified a certain number of containers and stipulated that any addition of new containers to the approved waste stream requires CBFO to submit a T1 change request and obtain EPA approval prior to disposal of any such wastes at the Waste Isolation Pilot Plant (WIPP). The CCP is responsible for characterizing the above waste stream using the system of controls that EPA evaluated during the baseline inspection conducted in July 2006 and approved in January 2007. A summary of EPA's approval of the INL RH TRU waste characterization program is included as Attachment A.

The INL-CCP had used radiological data for generating scaling factors in support of the ID-INTEC-RH waste stream that required sampling the two INTEC waste containers and performing radiochemical analysis using processes/procedures not previously evaluated or approved by EPA. EPA raised one AK concern which was adequately addressed. This

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[1] HFEF is the Hot Fuel Examination Facility at the Materials and Fuel Complex, formerly known as Argonne National Laboratory-West, which is now part of INL.

[2] INTEC is the Idaho Nuclear Technology and Engineering Center.

inspection report, therefore, presents the results of the T1 evaluation of Waste Stream ID-INTEC-RH.

EPA determined that all processes/procedures implemented for waste sampling and analysis must be first evaluated for technical adequacy before EPA can assess use of the scaling factors and approve the subject waste stream. EPA completed the on-site evaluation of the INL analytical laboratory and sample collection and analysis at ANL-E[3] and INL in February and January 2010, respectively (see Appendices C and D for the results of these evaluations). EPA did not identify any concerns during the evaluation of sample collection at ANL-E or sample analysis at INL, and no issues remain open relative to this T1 change. EPA determined that the procedures and processes used by INL-CCP for the addition of new RH Waste Stream ID-INTEC-RH were technically adequate. By virtue of having inspected both the sample collection process and ANL-E and the INL analytical laboratory, EPA's approval of Waste Stream ID-INTEC-RH as a T1 change includes approving these two processes for use in supporting the development of radionuclide scaling factors for RH TRU wastes.

2.0 PURPOSE OF TIER 1 EVALUATION

Certain changes to the waste characterization activities from the date of the site's baseline inspection must be reported to, and, if applicable, approved by EPA according to the tiering requirements set forth in 40 *Code of Federal Regulations* (CFR) 194.8 regulations and incorporated in the INL-CCP RH Baseline Final Report cited in Attachment A.

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 is 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). Changes requiring EPA notification and approval prior to implementation (T1), and those requiring post-implementation (T2) notification, are identified in the site-specific baseline inspection reports. When evaluating proposed T1 changes for approval, EPA may conduct a site inspection to observe first-hand the implementation of the change, or can opt to conduct a "desktop" review of information provided specific to a change. CBFO may choose to characterize and dispose of, at risk of subsequent EPA disapproval, any previously approved TRU waste using processes/procedures/equipment implemented as T2 changes. EPA reviews T2 changes on a quarterly basis and EPA may conduct continued compliance inspections to evaluate implemented T2 changes to verify adequacy.

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[3] ANL-E is the former name of the DOE site that is now called Argonne National Laboratory (ANL).

3.0 SCOPE OF THE TIER 1 EVALUATION

This T1 evaluation encompassed INL RH Waste Stream ID-INTEC-RH. The RH wastes that were the subject of this T1 evaluation are heterogeneous debris that INL-CCP plans to characterize for disposal at WIPP. The evaluation of Waste Stream ID-INTEC-RH included two waste characterization areas, Acceptable Knowledge (AK) and radiological characterization, each of which is addressed separately in this report. Additionally, EPA evaluated processes and procedures implemented to sample RH debris waste and analyze them to measure their radionuclide content as separate visits to ANL on February 17, 2010, and the INTEC Laboratory at INL on January 14, 2010, respectively (see Appendices C and D, respectively). Personnel who participated in the primary T1 evaluation are listed in Table 1, along with each person's affiliation and function during the evaluation.

Table 1. T1 Evaluation Participants

Name	Affiliation & Function
Rajani Joglekar	EPA Headquarters, Lead Inspector
Ed Feltcorn	EPA Headquarters, Inspector
Lindsey Bender	EPA Headquarter, Inspector
Connie Walker	SC&A, Technical Evaluator – AK
Patrick Kelly	SC&A, Technical Evaluator – Radiological Characterization
Amir Mobasheran	SC&A, Technical Evaluator – Radiological Characterization
Kevin Peters	CCP, AK
Scott Smith	CCP, AK
Mark Doherty	CCP, AK
Irene Quintana	CCP, SPM
Jene Vance*	CCP, Technical Support for Radiological Characterization
David Moody	CCP, Technical Support for Radiological Characterization
Jessie Klingensmith	CCP, Technical Support for Radiological Characterization
Mike Sensibaugh	CCP, Technical Support for Radiological Characterization
Thomas Clements	CWI-INL, Observer
Joe Harvill	WTS/CCP, Observer
Kira Darlow	SC&A, Observer
Jim Oliver	CTAC, Observer

*Jene Vance did not attend the evaluation in Washington, DC, but was involved in several discussions with EPA technical personnel by telephone prior to the Washington meeting in December.

4.0 EVALUATION OF NEW RH WASTE STREAM ID-INTEC-RH

Waste Stream ID-INTEC-RH consists of two 30-gallon drums of RH TRU heterogeneous debris wastes overpacked in 55-gallon drums (approximately 0.4 m^3) and stored and characterized at the INTEC facility at INL. The wastes themselves consist of bags, bottles, containers, equipment/tools, hardware, hoses, rags or towels, etc. These materials were generated from an experimental actinide partitioning study conducted in the A-Line of the Remote Analytical Facility (RAF) and packaged in October 1978. A total of two 30-gallon drums of RH TRU waste was generated and these drums are the subject of this T1 evaluation.

4.1 Acceptable Knowledge

EPA examined the AK process and associated information to determine whether INL CCP demonstrated compliance with 40 CFR 194.8 requirements for RH Waste Stream ID-INTEC-RH.

Waste Characterization Element Description

As part of the inspection, EPA reviewed the following with respect to the use of AK for waste characterization:

- Definition and identification of the waste stream
- Radiological characteristics of the waste
- Physical composition of the waste
- Identification of high-level waste (HLW), TRU versus low-level waste (LLW), and spent nuclear fuel (SNF)
- Compiling AK documentation and assembly of required information, including the AK Summary and adequacy of Waste Characterization Program Implementation Program (WCPIP) AK process implementation
- AK data traceability
- AK source document sufficiency
- WCPIP Interpretation including AK qualification, and Certification Plan/Confirmatory Test Plan (CTP) preparation/adequacy
- Characterization Reconciliation Report (CRR) adequacy
- Correlation and Surrogate Summary Form (CSSF) and Contact-Handled (CH)-RH correlation
- Personnel training
- Waste Stream Profile Form (WSPF) adequacy and compliance with WCPIP requirements
- Non Conformance Reports (NCRs) and AK discrepancy resolutions (DR)
- AK accuracy
- Defense determination
- Load management
- Data Quality Objectives (DQOs) attained through AK Qualification

Documents, Waste Containers, and Batch Data Reports Reviewed

Several attachments, source documents, required forms, and other data were provided to EPA and were examined as part of this T1 inspection. The full listing is presented in Attachment B, and the list of BDRs examined is presented in Table 2 below.

Table 2. Batch Data Reports Examined

Drum Number	VE BDR Number	DTC BDR
IDIC000000427	RHINLVW090001	RHINLDTC09004
IDIC000000460	RHINLVW090001	RHINLDTC09004

Waste Stream ID-INTEC-RH was generated in the RAF, located in Building CPP-627 at INTEC of the INL. The waste is stored at INTEC pending characterization, certification and canisterization activities. RH TRU waste repackaging operations are conducted at INTEC in Building CPP-659, the New Waste Calcining Facility. Most of the DQOs for this waste stream were achieved through AK, although solid sampling and analysis data were obtained to support the development of radionuclide scaling factors.

The AK evaluation presented in this section assesses the AK process and activities related to the determination of physical and radiological waste composition, up to, but not including, model parameter determination and input and determination of scaling factors.

Technical Evaluation

(1) Waste Stream ID-INTEC-RH was examined with respect to waste stream definition and was found to be adequately defined.

The WCPIP defines a waste stream as "waste material generated from a single process or activity, or as waste with similar physical, chemical, and radiological properties." INL-CCP describes the ID-INTEC-RH Waste Stream as follows:

> *Waste stream ID-INTEC-RH consists of two 30-gallon drums overpacked in 55-gallon drums (approximately 0.4 cubic meters) of RH TRU heterogeneous debris waste generated from an experimental actinide partitioning study conducted in the A-Line of the RAF and packaged in October 1978. The waste is primarily contaminated with fissile materials and mixed fission products (MFP). Based on the generator reported radionuclides, U-238 and U-235 are the two most prevalent radionuclides by mass. Pu-241, Cs-137, and Pu-238 account for more than 99 percent of the total activity for the reported isotopes....*

To determine that the waste stream was appropriately defined, several references were reviewed and the AK expert (AKE) was interviewed to determine the waste generation processes, as well as physical and radiological characteristics of the waste. Data reviewed indicate that the waste was generated during a very specific process. The RAF was used for an actinide partitioning study conducted in June of 1978, wherein 35 small two-inch pieces of H.B. Robinson Fuel Rod E-14 were sectioned and transferred from Test Area North (TAN) to one of the A-line cells

(presumably Cell 9) for study. The purpose of the study was to develop an actinide partitioning scheme for radioactive liquid waste to meet higher recovery levels of plutonium (Pu), neptunium, americium (Am), curium, and uranium (U). The AK Summary Report (AKSR) CCP-AK-INL-500, Revision 0 provides detailed information regarding several aspects of the actinide partitioning. From a radiological perspective, INL-CCP representatives stated that almost all radiological constituents within the waste stream were obtained from the single H.B. Robinson Fuel Rod E-14, which was composed almost entirely of ^{238}U by weight. In contrast, over 87% of the activity is attributable to ^{241}Pu, with lesser quantities of ^{238}U and cesium-137 (^{137}Cs). Several source documents (e.g., P019, P020, U001) were examined to verify that the radiological composition of the solidified material in the two drums is consistent with the AKSR.

INL-CCP stated that the debris within this stream contained extraneous vials and other debris that may have come from general cell activities unrelated to the E-14 dissolution. This analysis affected how INL-CCP chose to obtain additional radiological information (e.g. swipe samples from debris), as well as the SNF-HLW analysis [see Item (4), below]. With respect to the physical composition of the waste, AK data suggest that the waste steam includes both solidified organic sludges, as well as debris. INL-CCP stated that although solidified organics are present in the waste, the debris component composes over 50% of the material in each drum, and therefore the drum is considered an S5000 waste. The AKSR and related references provided information to adequately define the waste stream, assuming it is limited to the two containers presented in the AKSR. Applicability of the S5000 summary category group (SCG) assignment to the waste stream is addressed in Item (3), below.

(2) The radiological characteristics of the waste stream were evaluated and were found to be adequate.

INL-CCP assumes that Waste Stream ID-INTEC-RH obtained its radiological signature from a single H.B. Robinson Fuel Rod, number E-14. The AKSR states that dissolution of this fuel rod was associated with an actinide partitioning study that was conducted in the RAF, wherein half-inch pieces of the sectioned Fuel Rod E-14 (assembly B-05) underwent dissolution. After dissolution, the solution was extracted to remove U and Pu using the PUREX[4] process, and the resulting organic phase from this extraction was solidified in the RAF and placed in the two containers of this waste stream. INL-CCP used information presented in AK source documents (e.g., P019, P020, P022) to determine container-specific radiological information and to assign the distributions presented in Table 4 of the AKSR. As shown in this table, the predominant radionuclides by weight are ^{238}U (98.75%) and ^{235}U (0.49%), while the predominant radionuclides by activity are ^{241}Pu (87.64%) and ^{137}Cs (8.61%) (P019).

AKE analyzed available AK data, including historical inventory data, measured E-14 fuel pin concentration data, historic isotopic distribution information, ORIGEN calculations, mass balance data, burn-up data, and other information, to develop a recommended 2008 radionuclide list (by mass and activity), as well as proposed scaling factors (U001). INL-CCP stated that the calculations, assumptions, and uncertainties associated with this report were technically

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[4] PUREX is the name of a plutonium-uranium extraction process that was widely used in the production of nuclear materials for the weapons program throughout the DOE complex.

incorrect, so waste sampling was performed to gather the best data for scaling factor development.

The AKSR did not address the 10 EPA-tracked radionuclides in detail commensurate with AKSRs for other RH sites. EPA examined the information presented and concluded that the data presented were sufficient, because the waste stream is limited to two containers and the data obtained are representative of the anticipated radionuclide distribution based on sampling and analysis.

(3) The physical characteristics of the waste stream were evaluated and were found to be adequately described.

The AKSR states that, "Waste Stream ID-INTEC-RH consists predominantly of organic and inorganic debris." However, the AKSR also states, "[As-generated] container specific documentation for each of the drums [in Waste Stream ID-INTEC-RH] is limited. Waste packaging logs are not available and radiography of the drums is not possible since x-rays cannot penetrate the lead lining. Preliminary examination of the waste was conducted and the drum contents appear consistent with the actinide partitioning study." Several AK source documents state only that the contents of the containers are sludges, SNF, solidified material, or a similar identifier, implying that the waste stream was originally assigned to the S3000 SCG, not the S5000 SCG. However, other references, including historic repackaging information (U035), showed that the stream contains significant quantities of debris, as follows:

Drum IDIC000000427 waste consists of:

(1) 4-liter (L) Poly Nalgene bottle (half filled with reddish brown solid residue)

(1) 1,000-milliliter (ml) Poly bottle (empty and broken)

(4) Rags/Terri wipes and miscellaneous yellow plastic from bag

(3) Blue rubber tubing (1-2 feet in length)

(2) Red rubber tubing (1-2 feet in length)

(1) Clear rubber tubing (2 feet in length)

(2) Lead bricks (Note: The 4-L bottle was located on top of the two lead bricks for shielding purposes)

(4) 1/4-inch lead disks (two on the top and two on the bottom of the drum). No official measurements were taken on the lead disks

(2) 1/4 inch thick lead liner inside the drum

Drum IDIC000000460 waste consists of:

(1) 4-L Poly Nalgene bottle with no markings on the bottle (Containing solid white residue). The bottle was brittle and broke during repackaging.

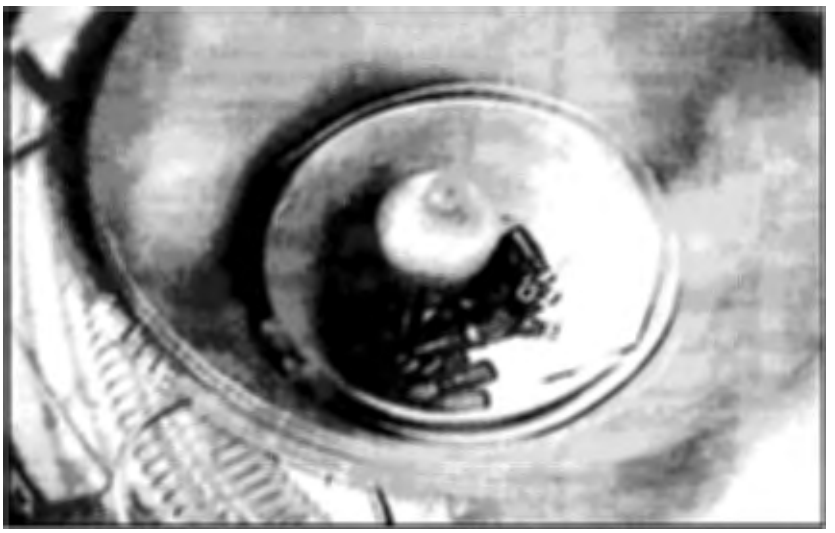
(19) 40-ml empty glass bottles (brown in color) with septum lids. NOTE: Markings were present on several of the bottles, such as 0620 WC114, 06150410 WC114.

(4) 1/4-inch lead disks (two on the top and two on the bottom of the drum). Note: Operator assumes there are two disks on the bottom; was not verified by the Operator to have two disks on the bottom. Operator could only see the lead disk and assumed from the thickness that two lead disks were present.

(1) Plastic drum liner and plastic bag.

(2) ¼-inch thick lead liner inside the drum. Operator verified the lead thickness to be 1/4-inch.

The photograph below, which was included in INL-CCP-AK-551, Revision 0, shows the general configuration of material in Drum IDIC000000460.



INL-CCP used the above information, among other data, and concluded that the waste stream is composed of greater than 50 percent heterogeneous organic and inorganic debris, thus warranting the assignment of waste matrix code S5400, Heterogeneous Debris. INL-CCP also states in the AKSR that "[although the waste stream] is comprised of more than 50 percent heterogeneous debris, any drum may include nearly any percentage of the waste material parameters [WMPs] listed in Section 5.4.1.2, except that no individual drum will contain greater than 50 percent homogeneous solids (References C013, U031, U032, U033, and U035)." Data examined did not indicate the presence of residual liquids.

Although the SCG is defined by the volume percent of material, the mass percent calculations presented in the AKSR associated with WMP analyses show that the waste stream is composed of over 95% inorganic waste by mass, the vast majority of which is metals. Actual organic matrices (sludges) compose about 1.5 % of the stream by mass. The WMP calculations in the AKSR were based upon data available in the AK record.

EPA's analyses showed that physical attributes of the waste can be ascertained through the AK record, and specifically those records obtained during recent repackaging. These data, together

with the INL-CCP VE results, verify that each of the containers falls under the S5000 SCG [see Item (5), below, for additional information].

(4) The identification of HLW, TRU versus LLW, and SNF was examined and was found to be adequate.

EPA examined the information presented in the AKSR pertaining to the identification of SNF and HLW. The discussion addressed the presence/absence of SNF and HLW in Section 5.4.5 and cited several references that address SNF/HLW determination. INL-CCP AK personnel indicated that the discussion was intended to address two components of the waste stream: the organic solids (from an actinide partitioning study) and small vials/debris waste in the drums that originated from other sources. The AKSR addresses SNF and HLW, but does not clearly distinguish between the two different components that are addressed using different arguments. EPA expects that this discussion will be expanded in revisions of the AKSR to better delineate these aspects. INL-CCP stated that LLW is not expected, which was verified during dose-to-curie (DTC) measurement activities.

(5) Sufficiency of the AKSR and implementation of AK as required in Attachment A of the WCPIP were evaluated and were found to be adequate.

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

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

Attachment A mandates a process that should be followed to collect and analyze AK data, similar to that used for CH waste. Both the content of the AKSR and the sufficiency of AK implementation were assessed.

The AKSR includes the required data, and the AK process used to obtain and evaluate the data was comparable to the CH process. Since the current AKSR meets basic requirements of the WCPIP, modifications to the AKSR, particularly with respect to radiological information, would be of interest to EPA. Notification of changes to the AKSR is a T2 change.

(6) Data traceability was examined and was found to be adequate.

Data traceability was examined for drum Nos. IDIC000000427 and IDIC000000460 (referred to as drum Nos. 427 and 460, respectively) to establish the historical AK record for each drum.

Select references were examined to obtain drum history, starting with older reference data and ending with current INL-CCP BDRs. Reference U028 (1978) is an early document that contains drum transfer information pertaining to drum transfer to the Radioactive Waste Management Complex (RWMC) at INL. The Radioactive Waste Form shows that two drums were generated in October 1978 in Building 627, and were composed of "spent nuclear fuel." These drums were then apparently transferred to the RWMC. Reference P018 is the Intermediate Level Transuranic Storage Facility Drum Retrieval Report, which indicates that drum 427 was retrieved from vault 6A in September 2005, and was subsequently placed in ISC/SO # TRU ISC-0155 at the ILTSF Storage Pad. Drum 460 was retrieved from vault 9A in September 2009 and was placed in ISC/SO # TRU ISC-0151.

References P004 and P007 provide profiles for drum Nos. 460 and 427, respectively, included in the site's "Integrated Waste Tracking System." These forms show general container information, including drum data and historic radiological information. INL-CCP indicated that both these drums underwent "fast scan" after the retrieval event and were also opened for preliminary visual examination. Reference U033 indicates that the drums underwent fast scan in June 2007, where the presence of lead lining in the drums was noted. Subsequently, the drums were repackaged. Reference U035 presents the results of the drum repackaging, which identified the contents of the two drums. Drum No. 427 included a 4-L Poly Nalgene bottle filled with reddish brown solid residue), a 1,000-ml poly bottle that was empty and broken, as well as various rags, wipes, tubing, and lead bricks and disks. Drum No. 460 contained a 4-L Poly Nalgene bottle with no markings on the bottle that contained solid white residue—the bottle was brittle and apparently broke during the process. The drum also contained empty glass bottles and lead disks.

Lastly, drums underwent VE and DTC processes as documented in BDRs RHINLVW090001 and RHINLDTC09004 (2009). VE data for drum No. 427 indicates it is composed of 80% organics by volume (not by mass, as used in the waste material parameter calculations), and includes various waste materials such as plastic bagging, plastic tubing, paper towels, metal/copper wire, lead sheeting, lead brick, and some solidified organic sludge in a 4-liter bottle. Similarly, VE data for drum 460 is also composed of 80% organic waste, and includes a plastic spoon, 4-L bottle in pieces, plastic bags, lead discs and lead sheeting, and 15 small and broken glass bottles. Note that these data suggest the waste is 80% organic material (debris) by volume, while the WMP calculations showed that the stream is composed primarily of metals (lead) by weight. As a result of this analysis, EPA verified that the drums were traceable from the building of origin through waste retrieval/storage events, to final waste characterization activities.

(7) Sufficiency of AK Source Documents and Related Document Tracking was evaluated and found to be adequate.

AK supporting documents are presented in the AKSR reference listing and Attachment 4 of CCP-TP-005. INL-CCP representatives provided an updated version of Attachment 4 that included all AK references, specifically those presented in the CCP-AK-INL-551, Revision 0. The AKSR did not include all applicable references within its own reference list, but this is

typical because the AKSR is a dynamic document. EPA will examine the reference listing in CCP-INL-550, Revision 0 as part of the T2 analysis of changes to the AKSR.

(8) Interpretation of WCPIP, with respect to contents of the Certification Plan and CTP, was evaluated, including content and technical adequacy of the CTP and was found to be adequate.

EPA's RH approval letter indicated that sites must generate a Certification Plan that explains how RH waste characterization will take place at each site, as well as a CTP when this plan is required as part of AK Qualification. EPA's intent was that the sites present, somewhere, exactly how characterization is to take place on a waste stream basis, followed by a detailed plan explaining implementation of confirmatory testing when this is to take place.

The WCPIP requires the following to be included in the CTP:

- A description of the waste stream or waste stream lots to which the plan applies
- A description of the confirmatory testing proposed, including the percentage of waste containers that will be subject to confirmatory testing
- An explicit description of the waste characterization DQOs and quality assurance objectives (QAOs) that will be satisfied with the data being qualified
- A description of the DQOs and QAOs that will not be confirmed with the data being qualified and an explanation of how compliance with those DQOs and QAOs will be demonstrated
- A description of how the tested subpopulation will be representative of the waste stream or waste stream lot

INL-CCP elected to combine the Certification Plan and CTP in CCP-AK-INL-552, Revision 0. The document includes the above bulleted items. Also in this document, INL-CCP states the following with respect to the characterization process:

> *Acceptable Knowledge (AK) will be used to document that each RH TRU waste Data Quality Objective (DQO), with the exception of the payload container based parameters, have been met ...This Plan will identify the strategy that the Central Characterization Project (CCP) will use to qualify the AK information available for Waste Stream ID-INTEC-RH.*

CCP-AK-INL-552, Revision 0 states that the WCPIP allows combinations of strategies to qualify AK and indicates that the following DQOs were addressed using the listed qualification methodologies:

- Defense Determination (which can be determined only through AK and does not require qualification as per the WCPIP)
- TRU Waste Determination which is to be qualified by DTC which uses characterization data obtained through solid sampling and swipe sampling for scaling factor determination

- RH Waste Determination, which is to be qualified using measurement data
- Activity Determination, which is to be qualified by DTC (measurement)
- Residual Liquids, qualified by performance of VE on each container
- Physical Form, qualified by performance of VE

The combination of strategies used by INL-CCP concurs with the requirements of the WCPIP. Notification of modifications to CCP-AK-INL-552, Revision 0 is a T2 change.

EPA determined through evaluation that the sampling and analysis performed to obtain scaling factors were conducted by INL-CCP using characterization processes described in the WCPIP that had not been approved by EPA. EPA concluded that since INL-CCP has used unapproved processes to generate radiological data, EPA could not consider this waste stream for approval until processes similar to those used by INL-CCP had been evaluated. INL-CCP informed EPA that the processes used for RH waste sampling at the Argonne National Laboratory and radiochemistry work done at INL on other RH waste streams are representative of what was implemented for the subject waste stream. EPA decided to observe the ANL and INL implemented processes for RH waste and performed inspections on February 16-17, 2010 at ANL (See Attachment C) and on January 14, 2010 at INL (See Attachment D).

(9) Content and technical adequacy of the CRR were evaluated and found to be adequate.

The content of the CRR was examined to see whether this report reflected requirements of CCP-TP-506, *CCP Preparation of the Remote-Handled Transuranic Waste Acceptable Knowledge Characterization Reconciliation Report.* Specifically, the CRR was evaluated to determine the completeness and adequacy of its contents as required in the WCPIP, including, but not limited to:

- Specification of applicable site and waste stream
- A listing of each DQO
- Data from the AK record that addresses each DQO
- AK source document references that support/provide the data
- A listing of AK record DRs, if any, that are relevant to each DQO
- Documentation, including specific references, of how the AK data for each DQO were qualified, such as batch data reports, corroborative data, proceedings of a peer review, etc.
- Radiography and/or visual examination summary to document that liquids greater than 1 percent are absent from the waste and to confirm AK concerning the physical properties of the waste
- A summary presentation of radiological measurement data used to meet the DQOs and to confirm AK
- A complete AK summary

- A complete listing of all container identification numbers used to generate the WSPF, cross-referenced to each batch data report
- A listing of AK discrepancies generated by an AK qualification process and the corresponding resolutions
- Signature of the Site Project Manager (SPM)

INL-CCP provided an Excel version of the CRR that included the above information, but did not include the signature of the SPM. INL-CCP provided a full copy of the CRR (pdf version) following the inspection that met the requirements of the WCPIP. Although not anticipated because of the limited waste stream size, notification of availability of a revised CRR is a Tier 2 change.

(10) Use of a CSSF was evaluated and was found to not apply to these wastes.

Completion of a CSSF is required when AK from a related CH waste stream is used in the RH waste characterization process. The INL-CCP representative indicated that CH data were not used in this manner, so a CSSF was not prepared for this waste stream.

(11) Personnel training was evaluated and was found to be adequate.

Scott Smith (AKE) prepared the AKSR, and Mark Doherty (SPM) prepared the Certification Plan/CTP. The AKE Qualification Cards were examined to determine whether both individuals' training was up to date. Neither document indicated that the AKEs had read required materials pertinent to INL. Apparently, the process has changed so that the Qualification Cards are not kept up-to-date; instead an e-mail verification method is used to ensure each individual receives and completes site-specific reading. Documentation that both individuals have read the required AK Source Documents was sent to EPA via e-mail following the inspection. It should be noted that documentation examined did not indicate that individuals are trained to EPA requirements, nor are they trained with respect to radiological characterization aspects, both of which are required in the WCPIP. Since the WCPIP is currently under revision, EPA will examine future training against the modified WCPIP.

(12) The WSPF was examined and was found to be adequate.

INL-CCP representatives provided a draft of the WSPF, without required signatures or attachments. The WSPF included a section, which stated that "testing" was not applicable, but the stream underwent sampling and analysis during scaling factor development, so this portion of the form will likely be completed when the WSPF is formalized beyond the draft phase. Notification of availability of the final WSPF is a T2 change.

(13) NCRs and DR Forms were examined and found to be adequate.

INL-CCP stated that no DR Forms related to EPA compliance issues have been prepared for this waste stream. However, a DR related to *Resource Conservation and Recovery Act* (RCRA) compliance was available for review. This DR dealt with historic management of the waste

stream as non-hazardous, and INL-CCP's determination that the stream should be RCRA-hazardous (D008-lead, and D018-benzene). The form was complete and showed that INL-CCP prepares appropriate documentation to capture identified discrepancies and their resolution.

(14) AK accuracy was assessed and found to be adequate.

AK accuracy was assessed with respect to the required contents as presented in the WCPIP. The WCPIP requires AK accuracy to be assessed in three areas: reassignment of the waste to a different SCG; reassignment of the waste to a different waste stream; and stream-specific assessment of radiological parameter accuracy. INL-CCP provided a draft AK Accuracy Report that indicated no discrepancies were noted and which listed verification of AK-based DQOs. Although not explicitly stated, presentation of the DQOs in this manner shows that the SCG assignment was not modified, the drums were not placed in a different waste stream, and some of the general radiological parameters (i.e., TRU and RH determination) were met through implementation of the WCPIP and comparison to the AK Record. Notification of availability of a final AK Accuracy Report for this stream is a T2 change.

(15) Defense determination arguments were examined and found to be adequate.

The radiological characteristics of the ID-INTEC-RH waste stream originated primarily from H.B. Robinson Fuel Pin E-14. This fuel was not defense-related, but CCP makes the argument that the actinide separation tests performed on this pin would serve a broad purpose, including those related to defense. INL-CCP also argued that the waste was contaminated with other radiological materials from the cell that were defense related, but little support for this argument was provided. As a result, EPA had the following concern:

> **EPA Concern INL-RH-AK-09-001CR, Item 2:** EPA AK Concern 1The AK Summary Defense Determination assumes that the cell(s) in which the HB Robinson Fuel Rod E-14 studies took place are also contaminated with material from other defense-related activities. However, the AK Summary does not reference documents that sufficiently describe the other defense-related activities. This information is required to show that the INTEC waste is co-contaminated by defense waste.
>
> *CCP Response:* CCP responded with a new text that would be added when the Section 4.1.4 of the AKSR is revised. The revised paragraph states that the subject waste stream is commingled with other defense waste (References C012, C016, and U035). INL-CCP concluded that AK indicates that the fuels processed were defense fuels, including Navy reactor fuel. Incidental contamination of the materials in the waste stream from these fuels occurred since decontamination of the cells was not conducted before actinide portioning study in the same cell. In addition, incidental contamination occurred at the waste end of the cell prior to waste packaging. Also, commingling of waste occurred when empty sample bottles from routine Remote Analytical Facility were packaged with the actinide separation waste.
>
> **Status of Concern:** The AKSR defense determination assumes that the cell(s) in which the HB Robinson Fuel Rod E-14 studies took place are also contaminated with material

from other defense-related activities due to incidental contamination and commingling with defense materials. The argument based on incidental contamination and commingling is possible based on data in the AK Record, so CCP adequately addressed EPA's concern. The concern is closed.

(16) Load management was assessed and was found to not apply to these wastes.

INL-CCP representatives indicated that load management will not be performed for this waste stream. Implementation of load management is a T1 change.

(17) Attainment of DQOs through AK qualification was evaluated.

As a result of the analysis presented in Items 1-16, above, EPA was able to assess how each DQO will be addressed. The following DQOs must be addressed as per the WCPIP:

- Defense determination
- TRU waste determination
- RH waste determination
- Activity determination (total and activity per canister, including quantification and identification of 10 EPA radionuclides)
- Residual liquids
- Physical form, including metals, cellulose, plastic and rubber

When evaluated as a whole, the CCP-AK-INL-500, CCP-AK-INL-551, CCP-AK-INL-552, and supporting source documents presented in Attachment A of this report indicate that DQOs, as specified in the WCPIP, have been met.

Concerns and Findings

The EPA Inspection Team identified one AK concern and no AK finding relative to the two containers in the ID-INTEC-RH waste stream, which were the subject of this T1 change evaluation. The AK concern was adequately addressed.

Tiering Changes

No new T1 or T2 changes have been added as a result of this evaluation.

Conclusions

During this T1 change evaluation, EPA examined whether several technical elements associated with Waste Stream ID-INTEC-RH were technically valid. Based on the results of this evaluation, EPA is approving the T1 request for Waste Stream ID-INTEC-RH, consistent with the limitations discussed above.

4.2 Radiological Characterization

RH Characterization Overview

The nature of RH TRU wastes presents difficulties with respect to obtaining meaningful measurement data. As has been the case at all the RH TRU waste characterization sites that EPA has previously approved, RH radiological characterization relies on the development of scaling factors that correlate an easily measured parameter like a waste container's external exposure (dose) rate with isotopic distributions for specific TRU radionuclides. The development of radionuclide scaling factors for INTEC wastes is essentially the same as what EPA evaluated and approved during the INL-CCP baseline inspection.

The characterization methods used for the INL-CCP INTEC RH wastes were evaluated in terms of the technical adequacy of the approach as supported by the program's documents, procedures, and controls, and the knowledge and understanding of the personnel involved in the RH waste characterization program. During this T1 evaluation, EPA examined the following elements of the INL-CCP radiological characterization program:

- Development of a DTC correlation as a function of waste density using MCNP5 based on each drum's measured external exposure (dose) rate, assuming the main contributors to the external exposure was ^{137}Cs
- Derivation of radionuclide scaling factors for quantification of the 10 WIPP-tracked radionuclides as supported by calculation packages and the destructive assay of swipe and waste samples

The radiological characterization process is summarized in Figure 1, below.

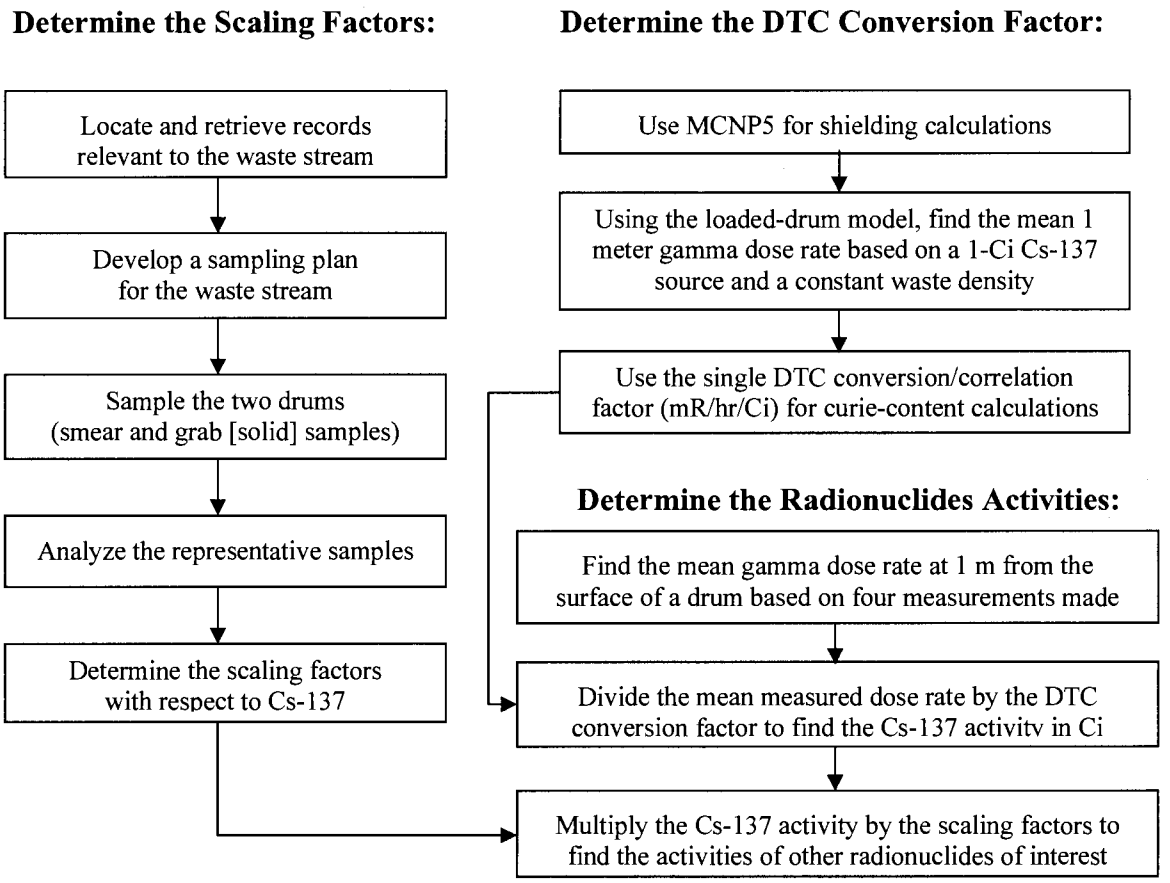


Figure 1: Flow Diagram of Characterization Process for INTEC RH-TRU Drums

The development of the ^{137}Cs scaling factors was supported primarily by the application of Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) and radiometric (alpha and gamma spectrometry) results from the collection and analysis of one smear and two grab samples from each of the two drums of INTEC waste. These activities are summarized in CCP-AK-INL-551 and presented in detail in calculation packages INL-RH-91, INL-RH-92 and INL-RH-93. Evaluations of the sample collection and analyses can be found in Attachments C and D of this report.

Documents Reviewed

The list provided in Attachment B includes all documents related to the INL-CCP RH TRU radiological characterization program that were examined to support this T1 evaluation.

Technical Evaluation

(1) The development of radionuclide scaling factors was evaluated and was found to be technically adequate and appropriately documented.

EPA evaluated the following:

- Activity values derived from modeling and statistical metrics, namely mean and standard deviation values for each measured radionuclide
- The appropriateness of the choice of physical constants and radionuclide-specific attributes (specific activity, physical half-life, decay heat, neutron cross-sections, photon transition probabilities, etc.) and the technical correctness of the values assigned to each attribute
- Isotopic activity values are correlated to the radionuclides whose physical half-lives are such that they could be responsible for the measured external dose rate, i.e., ^{137}Cs, cobalt-60 and europium-152
- Contributions of the short-lived radionuclides (i.e., physical half-lives less than two years) to the total measured dose rate
- The calculated results are used to develop the scaling factors and convert the measured external dose rates obtained via DTC to radionuclide-specific activity levels
- Activity and uncertainty values determined for the ten WIPP-Tracked radionuclides [^{233}U, ^{234}U, ^{238}U, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{137}Cs and strontium-90 (^{90}Sr)]
- The determination of the contribution of all radionuclides to the radiological hazard[5]
- Shielding and other calculations supporting the scaling factors performed using MCNP5 to derive the appropriate DTC relationships as a function of waste density for the geometry appropriate to the two drums of INTEC waste

The details of the scaling factor development relied heavily on the analysis of the analytical results of the smear and waste samples. CCP-AK-INL-551 presents an overview of this approach, including the application of each analytical technique to specific radionuclide(s). For example: alpha spectrometry data were used to support development of the ^{238}Pu scaling factors; ICP-MS data were used to support the scaling factors for ^{239}Pu, ^{240}Pu and the U isotopes, since they cannot be adequately separated by alpha spectrometry; and the scaling factor for ^{90}Sr was based on chemical separation and counting by gas proportional counting. These activities are summarized in CCP-AK-INL-551 and more fully documented in INL-RH-91 and INL-RH-93. There are no issues related to the technical adequacy or documentation of radionuclide scaling factors for the two drums of INTEC wastes.

[5] Although the determination of a waste container's radiological hazard is not an EPA requirement, this information may be useful in understanding other aspects of a container's radiological characterization.

(2) The technical basis of the DTC correlation and its documentation were evaluated and found to be unchanged from what EPA had inspected and approved previously, and both aspects were acceptable.

The DTC correlation was based on the following assumptions:

- The waste drum is 100 percent full with waste
- The radionuclides of interest are dispersed uniformly throughout the waste
- The waste matrix's density is assumed to be unity (one), because photon attenuation is more influenced by material density, as opposed to specific composition or atomic number
- Waste densities range from 0.1 grams per cubic centimeter (g/cm^3) to 2.1 g/cm^3, but an assumed value of 1.2 g/cm^3 was assumed for DTC calculations (corresponding to a net sample mass of 4.8 kilograms)

CCP-AK-INL-551 addressed waste packaging issues and other concerns that were specific to the INTEC waste. Most notable of these were the effects of two layers of quarter-inch lead shielding (see CCP-AK-INL-551, Figure 5.1), detailed in calculation package INL-RH-97. There are no issues related to the technical adequacy or documentation of radionuclide scaling factors for the two drums of INTEC wastes.

(3) Technical aspects and documentation of the radiological characterization process were evaluated and found to be acceptable.

CCP-AK-INL-551 is the main document that describes the radiological characterization process that INL-CCP used for the INTEC wastes. This document is supported by a series of calculation packages, which were reviewed in the process of evaluating these wastes. These packages had been prepared and reviewed initially by Jene Vance, Jim Holderness, Dave Moody, Jesse Klingensmith and Larry Porter to support the INTEC wastes, as well as several RH baselines that had been previously evaluated by EPA. These packages documented the following:

- Application and verification of Microshield®
- Evaluation of all potential contributors to a container's dose rate including contributions of short-lived radionuclides
- Potential sources of uncertainty for the INTEC wastes
- Statistical treatment of the radiometric data in support of radionuclide-specific scaling factors
- Information input checks for INTEC wastes
- Technical development of scaling factors
- Technical derivation of the DTC approach and documentation of the DTC spreadsheet

The EPA evaluation team reviewed these packages and Revision 0 of CCP-AK-INL-551 in advance of the formal T1 evaluation meeting at EPA headquarters. Several documents had been reviewed previously to support other RH TRU programs. During EPA's review and subsequent discussions with the authors, the EPA evaluation team had the opportunity to discuss technical concerns and apparent discrepancies with INL-CCP personnel and to question INL-CCP personnel regarding a variety of technical aspects related to these wastes. None of the calculation packages required serious modifications. The EPA evaluation team found that CCP-AK-INL-551 adequately documented the radiological characterization process for INTEC wastes, and the calculation packages described above and listed in Attachment B adequately supported the activities upon which the radiological characterization of the two drums of INTEC wastes was based. There were no issues related to the documentation of technical aspects of the INL-CCP radiological characterization approach for the INTEC wastes.

(4) The collection and analysis of samples were evaluated and were found to be adequate.

The collection of the one swipe and two bulk material samples from each of the two INTEC containers and their analyses were evaluated as separate activities in support of this T1 change. The results of these evaluations are presented in Attachments C and D of this report. There were no concerns relative to the sample collection or analyses of the two INTEC samples in support of the development of radionuclide-specific scaling factors.

(5) The technical basis and derivation of Total Measurement Uncertainty (TMU) were evaluated and were found to be adequate.

The development of TMU for the two drums of INTEC wastes is based on the propagation of uncertainties present in all aspects of the determination of the radiological constituents of RH TRU waste. These aspects are assumed to be independent, which allows them to be added in quadrature. The TMU determination included contributions of the following:

- Drum weight measurement
- Dose rate measurement uncertainty
- Scaling factor uncertainty, which includes the contribution of sample collection and analysis
- MCNP5 code and modeling issues
- Contributions of other gamma emitters
- Uncertainty in reported campaign inventories

The treatment of TMU is summarized in CCP-AK-INL-551 and presented in further detail in Calculation Package No. INL-RH-96, INTEC Debris Waste Uncertainty Analysis. The principal source of uncertainty (50% for a density of 1.2 g/cm^3) for all radionuclides is the variability in the waste configuration uncertainty i.e., the physical location and size of the waste-bearing bottles and the dispersion of material within the drum. However, the Pu isotopes and ^{90}Sr have individual contributions that exceed 50%, based on the uncertainty from partitioning these radionuclides that was derived from the variability of the ICP-MS data. There were no concerns regarding the technical derivation and documentation of TMU for the INL-CCP INTEC RH wastes.

(6) RH and TRU determinations were assessed and were found to be adequate.

The determination that the RH containers meet the definition of TRU wastes and RH waste were examined during the baseline inspection. Both of these aspects are directly involved with the DTC measurement at the INTEC, as was observed during the baseline inspection. These were not assessed directly during this T1 evaluation, but EPA did verify that no aspects of these two determinations had changed. There were no technical or documentation-related concerns regarding the TRU and RH determinations for INL INTEC wastes.

Summary of Radiological Characterization Findings and Concerns

The EPA inspection team did not identify any findings or concerns related to radiological characterization. There are no open concerns related to radiological characterization resulting from this T1 evaluation.

Tiering Changes

Based on the results of this T1 evaluation, there are no changes to the T1 and T2 designations assigned to radiological characterization during the baseline approval.

5.0 FINDINGS AND CONCERNS

Summary of Concerns and Findings

The EPA inspection team identified one AK concern which is closed. No findings were made related to AK or radiological characterization. There are no open concerns resulting from this T1 evaluation.

6.0 CONCLUSIONS

EPA concluded that the waste characterization processes of AK and radiological characterization proposed for use to characterize RH TRU (ID- INTEC-RH) wastes from INL-CCP are adequate. There are no open issues relative to this T1 evaluation.

6.1 Approval

The T1 change that was evaluated consisted of the waste characterization techniques of AK and radiological characterization as applied to Waste Stream ID-INTEC-RH. Based on the results of this evaluation, EPA approves these components of the T1 change. INL-CCP is approved to characterize these RH TRU wastes, consistent with the limitations specified in this report.

6.2 Tiering Changes

Based on the results of this T1 evaluation, there are no substantive changes to the T1 or T2 designations assigned to AK or radiological characterization during the baseline approval.

ATTACHMENT A

APPROVAL SUMMARY FOR INL RH WASTE CHARACTERIZATION PROGRAM

Specific INL RH Approval	Date	EPA Docket Number
INL RH Baseline Approval	January 2007	A-98-49; II-A4-72
Tier 1 Change – Approval of Real Time Radiography	February 2007	A-98-49; II-A4-80
Tier 1 Change – Approval of K Cell Waste	January 2008	A-98-49; II-A4-97
Tier 1 Change – Approval of High Range Gamma Probe for DTC	April 2008	A-98-49; II-A4-72
Tier 1 Change – Approval of Visual Examination Technique	September 2009	A-98-49; II-A4-118
Tier 1 Change – Approval of M-4 Cell Waste and Waste Stream ID-HFEF-S5400-RH, Lot 1A	January 2010	A-98-49; II-A4-122
Tier 1 Change – Approval of Waste Stream ID-MFC-S5400-RH	June 2010	A-98-49; II-A4-126

ATTACHMENT B

LISTING OF DOCUMENTS REVIEWED

- CCP Waste Stream Characterization Checklist, Waste Stream Number: ID-INTEC-RH, Lot #, provided December 7, 2009
- CCP-AK-INL-550, Central Characterization Project Acceptable Knowledge Summary Report for Stored Remote-Handled Transuranic Debris from the Idaho Nuclear Technology and Engineering Center at the Idaho National Laboratory, Waste Stream ID-INTEC-RH, Revision 0, January 8, 2009
- CCP-AK-INL-551, Central Characterization Project Radiological Characterization Technical Report for the Idaho Nuclear Technology and Engineering Center (INTEC) Remote-Handled Transuranic Debris Waste, Revision 0, October 20, 2009
- CCP-AK-INL-552, Central Characterization Project RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test Plan for INL Waste Stream: ID-INTEC-RH, Revision 0, April 2, 2009
- CCP-TP-005 Attachment 1, Acceptable Knowledge Documentation Checklist, ID-INTEC-RH, provided December 8, 2009
- CCP-TP-005 Attachment 4, Acceptable Knowledge Source Document Reference List, INTEC, provided December 8, 2009
- CCP-TP-005 Attachment 6, Waste Form, Waste Material Parameter, Prohibited Items and Packaging, and related WMP memorandum, INTEC, provided December 8, 2009
- CCP-TP-504, CCP Dose-to-Curie Survey Procedure for Remote-Handled Transuranic Waste, Revision 7, Effective Date: August 20, 2008
- Characterization Reconciliation Report Waste Stream ID-INTEC-RH (spreadsheet and pdf signed cover sheet), provided December 7, 2009
- DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, Revision 6.3, effective date February 5, 2009
- DOE/WIPP-02-3214, Remote-Handled TRU Waste Characterization Program Implementation Plan, Revision 0D
- Draft Waste Stream Profile Form, Waste Stream ID-INTEC-RH, provided December 7 and December 23, 2009
- Inter-Office Correspondence, Draft, From C. M. Gomez, to M. Sensibaugh, Re: Acceptable Knowledge Accuracy Report: Idaho Nuclear Technology and Engineering Center at Idaho Nuclear Technology and Engineering Center at Idaho National Laboratory, Waste Stream Number ID-INTEC-RH, Lot 1, October 12, 2009

- Memorandum to Irene Quintana, CCP Project Manager from J. Klingensmith, Re: Analysis of Sample Data for RH TRU Debris Waste Generated from the INTEC at INL, December 2, 2009
- C001, E-mails to John D. Baker and John H. Meikrantz, Re: INTEC RH TRU Waste Information, John A. McCray, August 8, 2005
- C010, E-mail to Lea Ann Allen, Re: Fast Scan Report, Raj Bhatt, July 18, 2007
- C011, EDF for the Review of ILTSF Mixed Waste, SMB-02-91, S. M. Burns, January 17, 1991
- C012, INTEC Interview, Scott Smith, April 17, 2008
- C013, INTEC Follow-up Interview, Scott Smith, TBD
- C014, E-mails to Raj Bhatt, Douglas B. Hendricks, John D. Harris, Casey W. McCray, Joe Saye, Re: WIR Determination from Jason C. Orme, November 3, 2008
- C015, Memo to Irene Quintana, Re: Analysis of Sample Data for RH TRU Debris Waste Generated from the INTEC at INL, J. Klingensmith, December 2, 2009
- C016, Memo from Scott Smith, AKE to CCP Records, Defense Determination for INTEC RH TRU Waste, December 16, 2009
- DR001, Waste Stream ID-INTEC-RH, Historical and Current RCRA Characterization and Assignment of EPA Hazardous Waste Numbers, Undated
- P001, Carolina Power & Light Co. (H.B. Robinson Steam Electric Plant, Unit No. 2), Exemption Amendment, L-S Document 485327, 59 FR 12993, Docket Number 50-261, March 18, 1994
- P004, Integrated Waste Tracking System Container Profile, IDIC000000460 Solidified Fuel Sludge, Matthew Allen, Paul R. Smith, Joel R. Hitz, July 9, 2007
- P007, Integrated Waste Tracking System Container Profile, IDIC000000460 Solidified Fuel Sludge, Matthew Allen, Paul R. Smith, Joel R. Hitz, July 9, 2007
- P015, Characterization of Transuranic Solid Waste from a Plutonium Processing Facility, LA-5993-MS, Ray Mulkin, June 1975
- P018, ILTSF Drum Retrieval Completion Report, ICP/EXT-05-00886, Revision 0, Idaho Completion Project, January 2006
- P019, Waste Characterization for INEL Remote-Handled/Special-Case Stored Transuranic Waste, WM-PD-85-014, Dennis A. Peterson, November 1985
- P020, Engineering Design File, Radiological Properties of Remote-Handled Transuranic Waste Inventory, EDF-4687, Revision 0 and Revision 1, Cecilia Hoffman, April 26, 2004 and May 20, 2005
- P022, Applied Nuclear Data Research and Development, LA-9647-PR, E.D. Arthur, et al., April 1983

- P025, Engineering Design File, Crosswalk for the Remote-Handled Transuranic Waste Inventory, EDF-4699, Revision 1, Cecilia Hoffman, December 13, 2004
- P039, Characteristics of Commercial Nuclear Materials Stored in the TAN Pool, INEL/INT-98-00767, R.K. McCardell, September 1998
- P041, INEL Waste Management Plan for FY-1978 Idaho National Engineering Laboratory, IDO-10051, Nuclear Fuel Cycle Division, August 1977
- P043, Study of Bidentate Compounds for Separation of Actinides from Commercial LWR Reprocessing Waste, ICP-1180, L.D. McIsaac, J.D. Baker, J.F. Krupa, R.E. LaPointe, D.H. Meikrantz, N.C. Schroeder, May 1979
- P045, Engineering Evaluation/Cost Analysis for the Decontamination and Decommissioning of Building CPP-627, the Remote Analytical Facility, DOE/NE-ID-11157, Revision 1, INEEL, April 2004
- P046, Process Description and Operating History for the CPP-601/-640/-627 Fuel Reprocessing Complex at the Idaho National Engineering and Environmental Laboratory, INEEL/EXT-99-00400, E.P. Wagner, June 1999
- P048, Characteristics of Nuclear Materials Stored in the MTR Canal, Volume I, INEEL/INT-98-00768, 3rd Draft, R.K. McCardell, October 1998
- P049, Characteristics of Nuclear Materials Stored in the MTR Canal, Volume II, INEEL/INT-98-00768, 3rd Draft, R.K. McCardell, October 1998
- P051, Characterization and Shipping Records for Remote-Handled (RH) Transuranic (TRU) Waste Stored at the Radioactive Waste Management Complex (RWMC) – (Part 4, page 38), 3460-94-084, H.D. Killian and S.K. McDermott, September 1994
- P056, AK Summary Documentation AK TRU Packaging, RPT-456, DRAFT, Revision 0, Idaho Cleanup Project, October and November 2007
- P057, Engineering Design File, CPP-1617 Fire Area Evaluation, EDF-4684, Nancy Makey, April 26, 2004
- P058, Technical Procedure, CPP-1617 Waste Handling and Operations, TPR-7318, Radioactive Waste Management Complex at INTEC, February 1, 2007
- P059, Estimated Radiological Inventory Sent from the Idaho Nuclear Technology and Engineering Center to the Subsurface Disposal Area from 1952 through 1993, ICP/EXT-03-00967 (Revision 0), INEEL-EXT-05-00967 (Revision 1), James A. Vail, Michael L. Carboneau, Glen R. Longhurst, March 2004 and December 2005
- P060, Safety Analysis Report for the INTEC Waste Management Facility (IWMF), SAR-103 Addendum A, Idaho Cleanup Project, December 20, 2006
- P061, Decontamination Cell Operation, TPR-7298, Revision 7, Idaho Cleanup Project, June 4, 2008
- P062, Packet of Material Safety Data Sheets (includes Nochar, Fiberset, Primafloc C-3, and diatomaceous earth), Various dates

- P063, Engineering Design File, Baseline Estimate of the Volume of Remote-Handled Transuranic Waste Stored at the Radioactive Waste Management Complex, EDF-4379, Revision 0, Cecilia R. Hoffman, March 29, 2004
- P068, A Survey of NRTS Waste Management Practices, Volume II, ICP-1042, Allied Chemical Corporation, September 1971
- P069, Removal Action Work Plan for the Decontamination and Decommissioning of Building CPP-627, Remote Analytical Facility, DOE/NE-ID-11158, Revision 0, INEEL, June 2004
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ATTACHMENT C

APPROVAL SUMMARY FOR IDAHO NATIONAL LABORATORY REMOTE-HANDLED WASTE SAMPLING AT ARGONNE NATIONAL LABORATORY

1.0 SUMMARY AND SCOPE

On February 16-17, 2010, the U.S. Environmental Protection Agency (EPA) conducted a follow-up Tier 1 (T1) change evaluation of the collection of remote-handled (RH) transuranic (TRU) debris waste samples at Argonne National Laboratory (ANL). This evaluation was performed in accordance with 40 *Code of Federal Regulations* 194.8(b) to evaluate the adequacy, implementation and effectiveness of technical processes implemented by the Central Characterization Project (CCP) at ANL (ANL-CCP). EPA's evaluation included a review of: sampling technique(s) to obtain representative waste samples, personnel qualifications/training (by review of records and conducting interviews), laboratory chain of custody, quality assurance/quality control records and non conformance procedures. The scope of this T1 follow-up evaluation included the collection of samples from Idaho National Laboratory (INL)-CCP waste stream ID-INTEC-RH that were analyzed at the Idaho Nuclear Technology and Engineering Center (INTEC) Laboratory at INL. Since the sampling event at INL was limited and EPA was not able to observe it directly, the sampling of RH debris from ANL was used as a surrogate for the INTEC RH debris waste sampling. By observing sample collection of RH TRU debris waste at ANL, EPA was able to evaluate and approve this technique for generating radiometric data to support the development of radionuclide-specific scaling factors. The sampling and analysis of the two containers at INTEC provided analytical data that were used in large part to generate radionuclide-specific scaling factors that were then part of the Dose-to-Curie (DTC) process whereby INL-CCP certified these containers for shipment to the Waste Isolation Pilot Plant (WIPP).

As discussed earlier in the report, EPA found it necessary to evaluate the sampling and radiometric analyses of an RH waste stream similar to the INTEC waste. This led to EPA's evaluation and approval of the sample collection activities at ANL as described in this attachment and the sample analyses conducted at the INTEC Laboratory at INL, as described in Attachment D.

With this report, EPA approves the collection and analysis of RH TRU debris waste samples for the purpose of generating analytical data to support the development of radionuclide-specific scaling factors to characterize RH TRU wastes for WIPP. EPA's evaluation was limited in scope to the collection of RH TRU samples in a hot cell using manipulators and applies to the collection of liquid, solid, or swipe (smear) samples. While the sampling that was observed occurred at ANL, EPA considers this activity to be representative of RH TRU sampling and EPA will evaluate sample collection at other Department of Energy facilities at its discretion in the future.

2.0 PARTICIPANTS IN THE TIER 1 EVALUATION

EPA observed the sample collection activities at ANL described in this report. All individuals who were present for the evaluation are listed in Table C-1, below.

Table C-1. ANL Sampling Evaluation Participants

Name	Affiliation & Function
Lindsey Bender	EPA Headquarters, Lead Inspector
Patrick Kelly	SC&A, Technical Evaluator
Irene Quintana	CCP-WTS, SPM
Kaushik Joshi	DOE Argonne Site Office, Observer
Andrew Gabal	DOE Argonne Site Office, Observer
Spenser Pattee	CCP-WTS, Waste Sampler
Daniel Pancake	ANL-NOD
F. Wesley Root	CCP-WTS
Mike Sensibaugh	CCP-WTS
Ronnie Lee	WTS/CCP, Observer
John Falkenberg	ANL, Sample Collector (Hot Cell Manipulator)
Ken Wesolowshi	ANL, Sample Collector (Hot Cell Manipulator)
Vivian Sullivan	ANL-Analytical Chemistry Laboratory
James Rhoades	DOE CBFO, Observer
Devin Hodge	NOD Project Manager, Observer

3.0 EVALUATION OF RH TRU DEBRIS WASTE SAMPLING

The EPA evaluation team toured the 205 K Wing, a small hot cell facility at ANL. Its primary function currently is to support the packaging of RH TRU wastes for WIPP. Hot Cell B contained the fluid to be sampled, and the external radiation field within the cell was as high as 200 rem per hr. The activities observed included collecting liquid samples from a large container within the hot cell. All sample collection was performed by two operators using manipulators: John Falkenberg and Ken Wesolowshi. Both individuals were listed on the current List of Qualified Individuals (LOQI) and training for both operators was appropriately documented. All sample collection-related activities were recorded in Operational Logbook RH-ANLE-WS.001, 2010, K Wing Hot Cells Building 205, ANL. Prior to beginning sample collection, the operators confirmed that they had the current revisions of the following documents:

- CCP-TP-509
- CCP-TP-512, CCP Remote-Handled Waste Sampling
- CCP-AK-ANLE-500, Central Characterization Project Acceptable Knowledge Summary Report for Argonne Remote-Handled Debris Waste, Waste Stream: AERHDM
- CCP-AK-ANL-505A, Central Characterization Project Sampling and Analysis Plan for Argonne Remote-Handled Waste, Waste Stream: AERHDM

EPA observed that the operators noted that they were collecting liquid samples by transferring fluid from a large container to small nalgene sample bottles. The collection was not volumetric,

meaning there was no attempt to transfer a predetermined volume of fluid. The only goals were to fill a sample bottle past a certain height to ensure there was adequate volume for all required analyses and to ensure that the external radiation from each sample container was less than 5 millirem per hour at 30 centimeters to comply with an internal as low as reasonably achievable (i.e., ALARA) criterion. The large container holding the fluid to be sampled was connected to a pump and tygon-type tubing to transfer the sample. The operators were adept at manipulating all aspects of the equipment to effectively transfer fluid from the large container to each sample bottle. As required, the operators initiated an Attachment 1 form from CCP-TP-512 for each sampling event. EPA also observed that the operators initiated a Chain-of-Custody (COC) form for each sample. A Tamper Indicating Device (TID) was not affixed to the sample for logistical and ALARA reasons, and the operators stated that the TIDs would be affixed the following day. The samples that were collected were transferred from the hot cell to a secure storage area under COC.

4.0 CONCERNS OR FINDINGS

There were no concerns or finding relative to the collection of RH TRU debris waste samples at ANL and there are no open issues relative to this activity.

5.0 APPROVAL OF RH TRU DEBRIS WASTE SAMPLING

Based on the results of this evaluation, EPA approves the collection of RH TRU debris samples for the purpose of supporting radionuclide-specific scaling factors.

ATTACHMENT D

APPROVAL SUMMARY FOR IDAHO NATIONAL LABORATORY REMOTE-HANDLED WASTE SAMPLING ANALYSIS AT IDAHO NATIONAL LABORATORY

1.0 SUMMARY AND SCOPE

This report supports the U.S. Environmental Protection Agency's (EPA's) approval of retrievably-stored, remote-handled (RH) transuranic (TRU) debris (S5000) from a new waste stream from the Idaho National Laboratory (INL). Specifically, this approval supports the addition of new RH Waste Stream ID-INTEC-RH.

As discussed earlier in the report, EPA found it necessary to evaluate the sampling and radiometric analyses of RH waste stream similar to the INTEC waste. This led to EPA's evaluation and approval of the sample analyses conducted at the INTEC laboratory at INL as described in this attachment, and the sample collection activities at Argonne National Laboratory (ANL) as described in Attachment C.

On January 14, 2010, EPA conducted a follow-up T1 change evaluation of the collection and analysis of RH TRU debris waste samples at the INTEC Laboratory at INL. This evaluation was performed in accordance with 40 *Code of Federal Regulations* 194.8(b) to evaluate the adequacy, implementation and effectiveness of technical processes implemented by the Central Characterization Project (CCP) at INL (INL-CCP). EPA's evaluation included review of sampling technique(s) to obtain representative waste samples, personnel qualifications/training (by review of records and conducting interviews), laboratory chain of custody, quality assurance/quality control records, non conformance procedures, analytical procedures for the separation and measurement of radionuclides, and records of instrument calibration. The scope of this T1 follow-up evaluation included the collection of samples and analysis of samples from INL-CCP waste stream ID-INTEC-RH. Since the sampling event at INL was limited and EPA was not able to observe it directly, EPA evaluated the records that documented the sampling. Additionally, EPA evaluated the collection of RH TRU debris samples from ANL as a surrogate for the INTEC RH debris waste sampling, as described in Attachment C to this report. The sampling and analysis of the two containers at INTEC provided analytical data that were used in large part to generate radionuclide-specific scaling factors that were then part of the Dose-to-Curie (DTC) process whereby INL-CCP certified these containers for shipment to the Waste Isolation Pilot Plant (WIPP).

With this report, EPA approves the two containers of RH TRU waste from waste stream ID-INTEC-RH. In addition, EPA approves the INTEC Laboratory for the analysis of RH TRU debris waste samples for the purpose of generating analytical data to support the development of radionuclide-specific scaling factors to characterize RH TRU wastes for WIPP.

2.0 PARTICIPANTS IN THE TIER 1 EVALUATION

EPA observed the records that documented the sampling of waste stream ID-INTEC-RH and the INTEC analytical laboratory where the samples were analyzed. All individuals who were present for the evaluation are listed in Table D-1, below.

Table D-1. INTEC-INL Sampling and Analysis Evaluation Participants

Name	Affiliation & Function
Lindsey Bender	EPA Headquarters, Lead Inspector
Patrick Kelly	SC&A, Technical Evaluator
Dorothy Gill	SC&A, Technical Evaluator
R.J. Nick Wade	CTAC-CBFO
Irene Quintana	INL, QA
Fred Dunhour	DOE Argonne Site Office, Observer
Tom Clements	CWI-RH/CH Programs
Shelly Sailer	CWI, Laboratory QA Officer
Jeff Lang	INTEC Laboratory manager
Mark Sherik	RH TRU Programs
Mike Sensibaugh	CCP-WTS
Tom Johnson	CH TRU STR
James Rhoades	DOE-CBFO

3.0 EVALUATION OF RH TRU DEBRIS WASTE SAMPLING AND ANALYSIS

3.1 Sampling

The sampling of the two INTEC canisters occurred on March 11 and 12, 2009, and EPA did not observe this event. EPA did evaluate the records that documented the sampling at the INTEC Laboratory as part of this T1 evaluation on January 14, 2010, and found them to be adequate.

Documents and Records reviewed:

- CCP-AK-INL-555, CCP Sampling and Analysis Plan for TRU Debris from INTEC at INL, Revision 0
- CCP-TP-512, CCP Remote-Handled Waste Sampling, Revisions 1 and 2
- Sampling personnel training records
- CCP RH Program - INL List of Qualified Individuals (LOQI) for the dates the samples were collected: 3-11-2009, 1:03 PM; 3-12-2009, 1:44 PM; 3-23-2009, 8:38 AM; 3-30-2009, 10:43 AM; 1-6-2010, 10:06 AM
- Sampling Batch Data Report (BDR) No. IDRH0903
- Supporting Data Package No. ALD09003R
- Supporting Data Package No. ALD09008I

On March 11 and 12, 2009, containers IDIC000000427 and IDIC000000460 were sampled in accordance with the CCP-AK-INL-555, CCP Sampling and Analysis Plan for TRU Debris from INTEC at INL and CCP-TP-512, CCP Remote-Handled Waste Sampling. The individuals collecting the samples were all listed on the current LOQI, as indicated above. A total of 5 solid and 4 smear samples were taken, including a co-located (duplicate) sample and field blanks. Chain-of-Custody (COC) forms were generated on each day of sampling and Tamper Indicating Devices (TIDs) were used to secure each sample. These samples were delivered, and custody transferred, to the laboratory on March 16, 2009. The COC forms requested gamma spectrometry, alpha spectrometry, and Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) analyses for the samples. All records were in order and EPA did not identify any concerns or findings associated with sampling of the drums IDIC000000427 and IDIC000000460 from waste stream ID-INTEC-RH. A copy of the checklist used in this evaluation is included as Addendum 1 to this attachment.

3.2 Analysis

EPA evaluated the INTEC Laboratory by examining personnel qualifications/training (by review of records and conducting interviews), quality assurance/quality control records, analytical procedures for the separation and measurement of radionuclides, and records of instrument calibration, and found it to be adequate.

Documents and Records reviewed:

- MCP, Analytical Sample Management, Revision 9,
- ACMM-3200, Selective Actinide Separation by Phase Extraction, Revision 15
- ACMM-2803, Determination of Elements and Isotopes by Inductively Coupled Plasma Mass Spectrometry, Revision 2
- ACLP.3-30, Calibration and Use of the Perkin Elmer 3100R Liquid Scintillation Counter, Revision 2
- ACMM-3946, Determination of Plutonium-241 by Liquid Scintillation Counting, Revision 3
- ACLP-3.40, Calibration and Use of Alpha Spectrometers Using Alphavision, Revision 2
- ACMM-3993, Gamma Spectroscopy, Revision 9
- ACLP-3.15, Germanium and LEPS Detector Calibration and Performance Testing Using the SUN SPARCstation 2, Revision 0
- ACLP-3.20, Calibration and Use of Tennelec Gas Flow Proportional Counters, Revision 2,
- ACMM-3384, Radiochemistry Determination By Solid Phase Extraction and Gas-Flow Proportional Counting, Revision 6
- BDRs ALD09007I, ALS09008I, ALD09007I_SDP, and ALD09008I_SPD, ALD09003R, ALD09004R, ALD09003R_SDP, ALD09004R_SDP
- Various logbooks for sample preparation and analysis by ICP-MS

During the January 14, 2010 on-site visit, EPA performed the following:

- Verified the completeness and adequacy of preparative and analytical procedures used to analyze the two samples from waste stream ID-INTEC-RH
- Verified that the procedures in use at the time of the on-site visit were the current revisions
- Interviewed analysts to verify technical and compliance-related knowledge and training
- Reviewed BDRs to verify sample preparation, instrument calibration, sample results, and acceptable quality control samples
- Verified that data had been reviewed at the Independent Technical Reviewer (ITR) and Site Project Manager (SPM) level
- Reviewed training records (LOQI)

EPA did not identify any issues associated with the analysis of the two samples taken from drum Nos. IDIC000000427 and IDIC000000460 from INL-CCL waste stream ID-INTEC-RH.

4.0 CONCERNS OR FINDINGS

There were no concerns or findings relative to the collection and analysis of RH TRU debris waste samples from INL-CCP waste stream ID-INTEC-RH, and there are no open issues relative to this activity.

5.0 APPROVAL OF RH TRU DEBRIS WASTE SAMPLING

Based on the results of this evaluation, EPA approves RH TRU waste stream ID-INTEC-RH and the collection and analysis of RH TRU debris samples by the INTEC laboratory for the purpose of supporting radionuclide-specific scaling factors.

ADDENDUM 1 - SAMPLING CHECKLIST

CCP-INL-AK-555, REVISION 0, CCP SAMPLING AND ANALYSIS PLAN FOR RH TRU CHECKLIST

EPA Inspection No.: INL T1 **Sampling Checklist** **Inspection Date: January 14, 2010**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Objective Evidence/Comments
Establishment of DQOs	Section 1.1.1.1	DQOs from WCPIP Precision – duplicate RPD Accuracy – sampling cross contamination Representativeness – use of sampling plan Completeness - # valid samples Comparability – compliance with WCPIP	The sampling plan (CCP-AK-INL-555) requires the DQOs stated in the WCPIP to be met. The SPM checklist reviews if accuracy, precision, representativeness, completeness and comparability DQOs were met for each sampling batch. The DQOs are met if: • Equipment blanks are free of contamination (accuracy) • RPD criteria are met (precision) • Use of an approved sampling plan (representativeness) • Completeness is ≥90% (completeness) • Use of an approved sampling procedure (comparability) The sampling procedure used for the 2 drums in this waste stream was CCP-TP-512, Revision 1, CCP Remote-Handled Waste Sampling. At the time of the SPM review, Revision 2 of this procedure was in force, having been approved for use on April 16, 2009. Objective evidence: 1. CCP-AK-INL-555, Revision 0, CCP Sampling and Analysis Plan for TRU Debris from INTEC at INL 2. CCP-TP-512, Revisions 1 and 2, CCP Remote-Handled Waste Sampling
Sampling	Sections 2.0 and 3.0	• Smear sampling (in plastic container) • Scoop sample of solid (2-5 g, plastic container) • Each container sampled 3 times each	Waste Stream ID-INTEC-RH consists of two 55-gallon drums with 30-gallon inner containers. Container IDIC000000427 was sampled on March 11, 2009, and container IDIC000000460 was sampled on March 12, 2009. The sampling batch numbers for these samples were IDRH0901 and IDRH0903.

EPA Inspection No.: INL T1 **Sampling Checklist** **Inspection Date: January 14, 2010**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Objective Evidence/Comments
			Samples were taken as required by the sampling plan and included field blanks, smears and solids. Two solid samples and 1 smear were taken from each container, and a solid collocated sample was taken from container IDIC000000427. Objective evidence: 1. CCP-AK-INL-555, Revision 0, CCP Sampling and Analysis Plan for TRU Debris from INTEC at INL 2. CCP-TP-512, Revisions 1 and 2, CCP Remote-Handled Waste Sampling 3. Sampling BDR IDRH0903
Quality control	Section 4.2 Attachment 1	• Duplicates (collocated), 1 per batch • Smear samples of equipment • Sampling sequence: FB (smear) FB (smear) 1st drum: 3 samples either smear or solid, FD 2nd drum: 3 samples either smear or solid	The two samples in waste streams, IDIC000000460 and IDIC000000427 were sampled on consecutive days and included in 1 sampling BDR IDRH0903. Separate Chain-of-Custody (COC) forms were generated for each sampling event. The COC numbers were COCIDRH09031 and COCIDRH09032. The sampling sequence for container IDIC000000427 was: FB smear, manipulator FB smear, scoop Smear (from drum – bottom) Solid (from 4-liter plastic container) Solid (from 4-liter plastic container) Solid (from 4-liter plastic container, collocated) In accordance with the sampling plan, the collocated sample (duplicate) should have been identified with a "D" suffix on the identification number. The "D" was omitted and CCP initiated NCR-RHINL-0201-09 to address this issue. The NCR was correctly documented and its final disposition was "use as is." NCR-RHINL-0507-09 was initiated by CCP because sample ID03110903 was misidentified as a solid. The

EPA Inspection No.: INL T1 **Sampling Checklist** **Inspection Date: January 14, 2010**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Objective Evidence/Comments
			NCR was properly documented and the mistake was corrected on the applicable records. Container IDIC000000460 was appropriately sampled on March 12, 2009, with the following sampling sequence: Smear (from drum bottom, glass container) Solid (from 4-liter plastic container) Solid (from 4-liter plastic container) Sample Tracking Forms, Attachment 1 of CCP-TP-512, were used to record sampling information, and these were included in the sampling BDR. Samples were secured using TIDs and the TID numbers were recorded on the tracking forms and COC. All forms reviewed had been completed as required. Objective evidence: 1. CCP-AK-INL-555, Revision 0, CCP Sampling and Analysis Plan for TRU Debris from INTEC at INL 2. CCP-TP-512, Revisions 1 and 2, CCP Remote-Handled Waste Sampling 3. Sampling BDR IDRH0903 4. NCR-RHINL-0201-09 5. NCR-RHINL-0507-09
COC and sample handling	Section 4.3	• COC form from CCP-TP-512 for sampling • Laboratory COC procedure after transfer to lab	Chain-of-Custody (COC) forms were used for these samples, COC numbers COCIDRH09031 and COCIDRH09032. Samples were transferred to the laboratory on March 16, 2009. Analyses requested on the COC forms were gamma, alpha and ICP-MS. Upon receipt in the laboratory, the samples were logged in and assigned laboratory tracking numbers. Although formal COC procedures were used for the samples, analysts were required to sign a log before accessing samples. Sample management was performed in accordance with the laboratory quality assurance plan, QAP-103.

EPA Inspection No.: INL T1 **Sampling Checklist** **Inspection Date: January 14, 2010**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Objective Evidence/Comments
			Objective evidence: 1. CCP-AK-INL-555, Revision 0, CCP Sampling and Analysis Plan for TRU Debris from INTEC at INL 2. CCP-TP-512, Revisions 1 and 2, CCP Remote-Handled Waste Sampling 3. Sampling BDR IDRH0903 4. QAP-103, Analytical Laboratories Quality Assurance Plan for Environmental Testing
Batch Data Reporting	Section 4.4	• Sample #s – IDMMDDYY followed by consecutive # beginning "01" • Data reporting requirements from WCPIP, Section 3.5.3 • CCP-TP-512 – review, verification and validation of data	Samples were labeled as required by the sampling plan, except that a "D" suffix was not applied to the collocated sample. NCR-RHINL-0201-09 was generated to address this issue. The NCR was correctly documented and its final disposition was "use as is." The sampling BDR provided to EPA for review, BDR # IDRH0903, contained all the required attachments from the sampling procedure (CCP-TP-512, Attachments 1-5). The BDR was reviewed at data generation and project levels as required and the completed checklists were included in the BDR. Objective evidence: 1. Sampling BDR IDRH0903 2. NCR-RHINL-0201-09 3. CCP-TP-512, Revisions 1 and 2, CCP Remote-Handled Waste Sampling
Non-conformances			BDR IDRH0903 has 2 NCRs: NCR-RHINL-0201-09 was initiated to address incorrect numbering of the collocated sample from container IDIC000000427. The NCR was correctly documented and its final disposition was "use as is." NCR-RHINL-0507-09 was initiated by CCP because sample ID03110903 was misidentified as a solid. The NCR was properly documented and the mistake was corrected on the applicable records on August 13, 2009. Objective evidence:

CCP-INL-AK-555, REVISION 0, CCP SAMPLING AND ANALYSIS PLAN FOR RH TRU CHECKLIST

EPA Inspection No.: INL T1 **Sampling Checklist** **Inspection Date: January 14, 2010**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Objective Evidence/Comments
			1. CCP-AK-INL-555, Revision 0, CCP Sampling and Analysis Plan for TRU Debris from INTEC at INL 2. CCP-TP-512, Revisions 1 and 2, CCP Remote-Handled Waste Sampling 3. Sampling BDR IDRH0903 4. NCR-RHINL-0201-09 5. NCR-RHINL-0507-09
Sampling procedure	Section 4.5	• CCP-TP-512	This procedure provides instructions for sampling, sample transfer and sampling BDR preparation and review. EPA's review of this procedure determined it contained adequate instructions and information to ensure sampling was performed in a technically correct manner. Objective evidence: 1. CCP-TP-512, Revisions 1 and 2, CCP Remote-Handled Waste Sampling
Training	Section 4.5	• Trained personnel (CCP-TP-512 & CCP-INL-AK-555)	CCP's current List of Qualified Individuals (LOQI) was reviewed on March 11 and 12, 2009, to ensure only trained and qualified personnel were used to perform sampling. EPA determined from review of training records that personnel responsible for sampling for BDR IDRH0903 were appropriately trained. EPA also reviewed the LOQI for 1/6/10, and the qualified individuals remained as on the 2009 list but with the addition of another OJT/SME (SP) Objective evidence: 1. LOQI, dated 3/12/09, 3/30/09 and 1/6/10