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

NOV - 1 2010

OFFICE OF
AIR AND RADIATION

Mr. William B. Mackie
Acting Manager, National TRU Program
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, NM 88221-3090

Dear Mr. Mackie:

On February 8, 2010, the Carlsbad Field Office (CBFO) requested, as a Tier 1 (T1) change, that the U.S. Environmental Protection Agency (EPA) approve remote-handled (RH) transuranic (TRU) waste stream IN-ID-NRF-153 (Naval Reactors Facility) from the Idaho National Laboratory (INL). EPA has reviewed the information provided and approves the addition of these containers from waste stream IN-ID-NRF-153 and, as a result, INL may dispose of this waste at the Waste Isolation Pilot Plant (WIPP). This approval also allows future addition of waste to this stream with a waste pedigree (radiological and physical contents) similar to the waste approved in this letter and as detailed in the report. The enclosed report (EPA Docket No. A-98-49; II-A4-135) supports EPA's approval decision based on the information reviewed.

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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EPA DOCKET NO: A-98-49, II-A4-135

WASTE CHARACTERIZATION REPORT

EPA TIER 1 EVALUATION OF THE CENTRAL CHARACTERIZATION PROJECT (CCP) REMOTE-HANDLED TRANSURANIC WASTE CHARACTERIZATION PROGRAM AT THE IDAHO NATIONAL LABORATORY (INL): ADDITION OF WASTE STREAM IN-ID-NRF-153

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

November 2010

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ATTACHMENTS

ACRONYMS

AK	acceptable knowledge
AKE	acceptable knowledge expert
AKSR	acceptable knowledge summary report
Am	americium
BDR	batch data report
CBFO	Carlsbad Area Field Office
CCP	Central Characterization Project
CFR	Code of Federal Regulations
CH	contact-handled
Ci	curie
cm	centimeter
Cm	curium
CRR	Characterization Reconciliation Report
Cs	cesium
CSSF	Correlation and Surrogate Summary Form
CTP	Confirmatory Test Plan
DOE	U.S. Department of Energy
DQO	data quality objective
DR	discrepancy resolution
DTC	dose-to-curie
ECF	Expended Core Facility
EPA	U.S. Environmental Protection Agency
Eu	europium
FGE	fissile gram equivalent
g	gram or grams
g/cm^3	grams per cubic centimeter
HFEF	Hot Fuel Examination Facility
HLW	high-level waste
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IWTS	Integrated Waste Tracking System

LANL	Los Alamos National Laboratory
LLW	low-level waste
LOQI	list of qualified individuals
LWA	*WIPP Land Withdrawal Act*
MCNP5	Monte Carlo N-Particle Transport Code RSICC Computer Code Collection, Oak Ridge National Laboratory
mR/hr/Ci	milli Roentgen per hour per Curie
mRem/hr	milliRem per hour
nCi/g	nanocurie per gram
NCR	non-conformance report
NDA	nondestructive assay
NOFORN	Not Releasable to Foreign Nationals/Governments/Non-US Citizens (Document Handling Instruction)
NRF	Naval Reactor Fuel
NWPA	*Nuclear Waste Policy Act*
ORIGEN	Oak Ridge Isotope Generation
PE Ci	plutonium equivalent Curies
Pu	plutonium
QA	quality assurance
QC	quality control
RH	remote-handled
RTR	real-time radiography
RWMC	Radiological Waste Management Complex
SNF	spent nuclear fuel
SPC	sludge pan containers
SPM	Site Project Manager
Sr	strontium
T1	Tier 1
T2	Tier 2
TMU	Total Measurement Uncertainty
TRU	transuranic
U	uranium
UCNI	Unclassified Controlled Nuclear Information

VE	visual examination
WCPIP	Waste Characterization Program Implementation Program
WDS	WIPP Waste Data System
WIPP	Waste Isolation Pilot Plant
WMC	waste matrix code
WMP	waste material parameter
WSPF	Waste Stream Profile Form
WWIS	WIPP Waste Information System

1.0 EXECUTIVE SUMMARY

This report supports the U.S. Environmental Protection Agency's (EPA's) approval of remote-handled (RH) transuranic (TRU) organic debris (S5300) waste stream IN-ID-NRF-153 from the U.S. Department of Energy's (DOE) Idaho National Laboratory (INL) Naval Reactor Fuel (NRF) facility.

On February 8, 2010, the Carlsbad Field Office (CBFO) requested that EPA review a proposed Tier 1 (T1) change for approving the RH Waste Stream IN-ID-NRF-153 consisting of 27 containers. On June 3, 2010, CBFO provided summary information on the subject waste and characterization documentation. The Central Characterization Project (CCP) is responsible for characterizing RH wastes at INL using a system of controls, which EPA approved in January 2007 (baseline inspection dated July 2006) and subsequent process- and equipment-specific Tier 1 change approvals. A summary of EPA's approvals of the INL-CCP RH TRU waste characterization program is included as Attachment A. Because there were no new equipment or processes used when characterizing this waste stream, EPA chose to conduct a desktop review of this change in Denver on August 9-10, 2010.

Section 4.0 of this report presents the results of this T1 evaluation. EPA did not identify any findings but identified one concern (not requiring a response) during this evaluation. No open issues remain relative to this T1 change. EPA determined that the procedures and processes used by INL-CCP for the characterization of Waste Stream IN-ID-NRF-153 were EPA-approved and were adequately implemented. EPA, therefore, approves Waste Stream IN-ID-NRF-153 currently in 27 30-gallon containers[1] as a T1 change to INL-CCP's RH baseline approval.

In an event that one or more of these 27 containers have to be repackaged, such additional containers can be processed for disposal by using the EPA-approved system of controls (including approved radiological scaling factors) as a T2 change. The T2 change requirements include: EPA notification of additional containers and submission of a revised acceptable knowledge summary report, radiological characterization report, and pertinent batch data reports for EPA review. In the future, when characterizing debris from INL's naval reactor facility where a different radiological characterization process and/or with different scaling factors is warranted, then EPA approval of this characterization step is necessary as a T1 change prior to disposal. Table 1 below presents changes to the tiering table to add the above modification.

[1] *Containers* is a generic term which applies to cans, canisters, drums, and any other types of waste packaging units that may be characterized individually for their radiological and physical contents.

Table 1. Tiering of RH TRU Waste Characterization Processes Implemented by INL-CCP (Approval Date Nov 1, 2010)

RH Process Elements	INL-CCP RH WC Process - T1 Changes	INL-CCP RH Process - T2 Changes[2]
Acceptable Knowledge (AK)	Addition of containers to approved waste streams if new or different radionuclide scaling factors are required Any new waste streams not approved under the **baseline or as a T1 approval** Substantive modification(s) that have the potential to affect the characterization process: CCP-AK-INL-500, CCP-AK-INL-501, or CCP-AK-INL-502 Load management for any RH waste stream	Notification to EPA when AKSRs, Radiological Characterization Report and Certification Confirmation Test Plans (i.e., CCP-AK-INL-500, CCP-AK-INL-501, and CCP-AK-INL-502) updates are approved by CBFO Notification to EPA when changes to AK documentation as a result of WCPIP revisions have been made (e.g., CRR) Notification to EPA when a CSSF is completed for each of the RH containers in this waste stream identified as CH based on measured dose rates that present NDA results for assayed containers Notification to EPA once waste stream data package for debris waste stream and any modifications to the WSPF, including the CRR and AK Summary, are completed Notification to EPA that the final DTC determination is complete for RH containers numbers 728 through 737, as identified in AK Reference P030 AK accuracy reports (prepared annually, at a minimum) Notification to EPA when additional containers are added to RH TRU Waste Stream AERHDM and the containers were characterized using the same radionuclide scaling factors* Notification to EPA of availability of a revised AKSR and source documents supporting the addition of containers to the approved waste stream* Notification to EPA when Attachment 4 of CCP-TP-005 is generated to reflect the updated AKSR Source Document Reference List **Notification of availability of additional discrepancy resolutions pertinent to RH Waste Stream IN-ID-NRF-153**
Radiological Characterization, including Dose-to-Curie (DTC)	Application of new scaling factors for isotopic determination other than those documented in CCP-AK-INL-501 Use of any alternate radiological characterization procedure other than DTC with established scaling factors as documented in CCP-TP-504 or substantive modification of the DTC procedure Use of any alternate gamma detector with the OSPREY™ system characterization procedure other than the $La_3Br(Ce)$	Notification to EPA upon completion of revisions of CCP-AK-INL-501 or CCP-TP-504 that require CBFO approval Notification to EPA of availability of a revised radiological characterization report, if required for the addition of containers to the approved waste stream* Radiological content data provided in BDRs for the population of additional containers*

Table 1. Tiering of RH TRU Waste Characterization Processes Implemented by INL-CCP (Approval Date Nov 1, 2010)

RH Process Elements	INL-CCP RH WC Process - T1 Changes	INL-CCP RH Process - T2 Changes[2]
	detector observed at INTEC in July 2010 Any new RH waste stream not approved under this baseline or addition of containers to Waste Stream ID-ANLE-S5000 that requires changing the established radionuclide scaling factors **Characterizing another NRF debris waste using different radiological characterization process and/or different scaling factors**	
Visual Examination (VE)	VE using audio/video media to characterize additional debris waste streams other than Waste Stream ID-ANLE-S5000 or waste from other Summary Waste Categories	Notification to EPA upon completion of changes to VE procedure(s) that require CBFO approval Physical content data provided in BDRs for the population of additional containers*
Real-Time Radiography (RTR)	Any new S5000 RH waste stream other than ID-ANLE-S5000, ID-MFC-S5400-RH, **and IN-ID-NRF-153** or wastes from a S3000 or S4000 RH waste stream Notification to EPA prior to addition of a new RTR unit(s)	Notification to EPA upon completion of changes to RTR procedure(s) that require CBFO approval Physical content data provided in BDRs for the population of additional containers*
WIPP Waste Data System, WDS (previously known as WWIS)	None	Changes made to WDS procedure(s) that require CBFO approval

Notes:
- This table has been modified by deleting the references to specific sections of the baseline inspection report where each T1 or T2 element is discussed.
- INL-CCP will report all T2 changes to EPA every three months.
- Notification to EPA is not necessary when document updates are editorial in nature or are required to address administrative concerns.
- *Substantive modification* refers to a change with the potential to affect INL-CCP's RH waste characterization process, e.g., the use of an inherently different type of measureme instrument or the use of the high-range probe as described in CCP-TP-504.
- Additions to the tiering table as a result of this T1 evaluation appear in **bold**.

* These marked changes apply when containers are added to Lot 1B of waste stream ID-HFEF-S5400-RH and are characterized using the same radionuclide scaling factors as were used to characterize the original approved waste stream. EPA notification is required when the site identifies the need to characterize additional containers belonging to the approved waste stream.

2.0 PURPOSE OF TIER 1 EVALUATIONS

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 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. DOE 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.

3.0 PURPOSE OF THIS REPORT

This report presents the results of EPA's evaluation of T1 changes to dispose of 27 fully-characterized containers of INL RH Waste Stream IN-ID-NRF-153 (Section 5.0, below), as described in CCP-AK-INL-560, Revision 2 at the WIPP. This report presents the technical basis and results of EPA's approval decision. EPA's approval decision regarding this waste stream, INL RH Waste Stream IN-ID-NRF-153, is conveyed to DOE separately by letter. As discussed previously, EPA will also announce the decision on its website at www.epa.gov/radiation/WIPP, in accordance with 40 CFR 194.8(b)(3).

The DOE documents that EPA reviewed for this evaluation are cited in different sections throughout the report and are listed in Attachment B. Any of these documents can be requested from the following address:

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

4.0 SCOPE OF THIS EVALUATION

This T1 evaluation encompassed the addition of the INL RH Waste Stream IN-ID-NRF-153 consisting of 27 30-gallon drums. The evaluation of this waste stream included three waste characterization areas: Acceptable Knowledge (AK), radiological characterization, and Real-Time Radiography (RTR), each of which is addressed separately in this report. Personnel who participated in the T1 evaluation are listed in Table 2, along with each person's affiliation and function during the evaluation.

Table 2. Tier 1 Evaluation Participants

Name	Affiliation & Function
Edward Feltcorn	Lead Inspector, U. S. EPA
Rajani Joglekar	Inspector, U. S. EPA
Connie Walker	Technical Evaluator – AK, SC&A
Kira Darlow	Technical Evaluator – AK, SC&A
Patrick Kelly	Technical Evaluator – Radiological Characterization, SC&A
Amir Mobasheran*	Technical Evaluator – Radiological Characterization, SC&A
Dorothy Gill*	Technical Evaluator – RTR, SC&A
James Luginbyhl	Acceptable Knowledge Expert, CCP, LANL
Steve Schafer	Acceptable Knowledge Expert, CCP
Lisa Watson	Acceptable Knowledge Expert, CCP, LANL
Irene Quintana	Site Project Manager, INL-CCP, WTS
Jene Vance	Radiological Characterization Subject Matter Expert, CCP
James Holderness	Radiological Characterization Subject Matter Expert, CCP
Thomas L. Clements, Jr.	CH2M-Washington Group International, Observer
Michael Walentine	WTS-CCP Project Management, Observer
Courtland Fesmire	U.S. DOE, Observer

*Amir Mobasheran and Dorothy Gill did not attend the evaluation in Denver, CO, but conducted reviews in support of this T1 change.

5.0 EVALUATION OF NEW WASTE STREAM IN-ID-NRF-153

Waste Stream IN-ID-NRF-153 is composed of organic debris generated through cleaning the Alpha Box in Cell 14 at the NRF Expended Core Facility (ECF). The Alpha Box was a carbon steel containment box in which fuel elements were remotely cut for performance evaluation using a slow-speed abrasive cut-off wheel to slice a specimen from the fuel element. Waste material and water were collected in an underlying sludge pan. During the cutting process, water and swarf or fuel particulates were dispersed within the Alpha Box. The inside of the Alpha Box was cleaned when a fuel type being sectioned was changed, and the combustible waste generated during cleaning was placed in either a 12- or 17-inch Rabe (plastic) bottle. Sludge pan waste was also collected and placed into Sludge Pan Containers (SPCs) between sectioning of different fuel types, so the radioactive material in the SPCs is compositionally similar to the radioactive material on the organic debris generated during cell cleaning, if both were generated at the same time (i.e., on or near the same date). Approximately 85% of the fuel chips removed during the cutting operation ended up in the sludge pan below the cut-off wheel. Approximately 15% of the

fuel chips were lost to the Alpha Box and then ended up in the combustible waste after the box was cleaned. The SPC waste is important because the radiological composition of this material has been identified by NRF as that for Waste Stream IN-ID-NRF-153. NRF and SPC wastes are closely related and are comparable.

As discussed in CCP-AK-INL-561, Revision 1, the waste stream is contaminated with mixtures of radionuclides generated from the cutting operations of five basic fuel types that were sectioned within the Alpha Box between 1975 and 1979. One or more of the five fuel types was assigned to each SPC by NRF when the sludge pan was changed, and these generally correlate with the associated Rabe containers. However, note the cell clean-out between fuels was not thorough, so waste from one fuel sectioning event could be present within subsequent clean-out waste. Regardless, the radionuclide distributions were calculated for each of the five fuel types and this information was used to determine isotopic ratios representative of individual types, as well as of the waste stream (i.e., all types) as a whole.

INL-CCP originally sampled the waste stream with the intent of developing waste-stream-specific scaling factors. However, the data obtained from sampling could not be used directly to determine scaling factors. Because the NRF radiological data were collected outside of an approved quality assurance (QA) program, INL-CCP used these sampling data to qualify the original NRF-assigned radiological composition and, hence, the subsequent scaling factors developed from these data. The Certification Plan (CCP-AK-INL-562, Revision 1) presents the Data Quality Objectives (DQOs) and qualification approaches used.

Documents, Waste Containers, and Batch Data Reports Reviewed

Several attachments, source documents, forms, and other data were provided to EPA, and the relevant sources were examined as part of this T1 inspection. The listing of all documentation examined is in Attachment B, and the list of BDRs examined is presented in Table 3.

Table 3. BDRs Examined

Drum Number	RTR BDR Number	DTC BDR Number	Radiochemistry BDR Numbers
IDINEC0100001	INLRHRTR09004	INLRHDTC100007	ALD09002R, ALD09006IR1
IDINEC0100002	INLRHRTR09004	INLRHDTC100007	ALD09002R, ALD09006IR1
IDINEC0100003	INLRHRTR09003	INLRHDTC100006	No analysis
IDINEC0100004	INLRHRTR09002, INLRHRTR09005	INLRHDTC100007	No analysis
IDINEC0100005	INLRHRTR09004	INLRHDTC100007	ALD09002R, ALD09006IR1
IDINEC0100006	INLRHRTR09003	INLRHDTC100006	
IDINEC0100007	INLRHRTR09005		ALD09002R, ALD09006IR1
IDINEC0100008	INLRHRTR09002	INLRHDTC100006	No analysis
IDINEC0100009	INLRHRTR09003	INLRHDTC100006	No analysis
IDINEC0100010	INLRHRTR09003, INLRHRTR09004	INLRHDTC100006, INLRHDTC100007	No analysis

Table 3. BDRs Examined

Drum Number	RTR BDR Number	DTC BDR Number	Radiochemistry BDR Numbers
IDINEC0100011	INLRHRTR09005	INLRHDTC100007	ALD09002R, ALD09006IR1
IDINEC0100012	INLRHRTR09004	INLRHDTC100007	ALD09002R, ALD09006IR1
IDINEC0100013	INLRHRTR09002	INLRHDTC100006	No analysis
IDINEC0200001	INLRHRTR09004	INLRHDTC100007	No analysis
IDINEC0200004	INLRHRTR09002	INLRHDTC100006	No analysis
IDINEC0200005	INLRHRTR09002	INLRHDTC100006	No analysis
IDEC0200006	INLRHRTR09003	INLRHDTC100006	No analysis
IDINEC0200007	INLRHRTR09003	INLRHDTC100007	No analysis
IDINEC0200008	INLRHRTR09005	INLRHDTC100007	ALD09002R, ALD09006IR1
IDINEC0200009	INLRHRTR09004	Not provided	ALD09002R, ALD09006IR1
IDINEC0300001	INLRHRTR09005	INLRHDTC100007	ALD09002R, ALD09006IR1
IDINEC0300002	INLRHRTR09003	INLRHDTC100006	No analysis
IDINEC0300004	INLRHRTR09004	INLRHDTC100007	No analysis
IDINEC0300005	INLRHRTR09004	INLRHDTC100007	ALD09002R, ALD09006IR1
IDINEC0300006	INLRHRTR09002	INLRHDTC100006	No analysis
IDINEC0300007	INLRHRTR09002	INLRHDTC100006	No analysis

5.1 Acceptable Knowledge

EPA examined the AK process and associated information to approve the Tier 1 request for RH Waste Stream IN-ID-NRF-153.

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
- Sampling Plan and use of AK Data
- Identification of High-Level Waste (HLW) and Spent Nuclear Fuel (SNF)
- Compiling AK documentation and assembly of required information, including the AK Summary and adequacy of the Remote-Handled Waste Characterization Program Implementation Plan (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 and use of Los Alamos National Laboratory (LANL) mass spectrometry data
- 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 resolution (DR)
- AK accuracy
- Defense determination
- Load management
- DQOs attained through AK Qualification

Technical Evaluation

(1) The definition of Waste Stream IN-ID-NRF-153 was examined and was found to be adequate.

The WCPIP, Revision 0D defines a waste stream as consisting of "waste material generated from a single process or activity, or as waste with similar physical, chemical, and radiological properties." Waste Stream IN-ID-NRF-153 was evaluated against this definition to assess if the processes and activities associated with waste generation were adequately addressed, and if the physical, chemical and radiological composition of the waste stream was adequately defined.

Waste Stream IN-ID-NRF-153 was generated between 1975 and 1979 in the Alpha Box within Cell 14 of Building 618 in the ECF at NRF. The Alpha Box was used exclusively to remotely cut sections of expended fuel elements for evaluation, and was the only location in the ECF where cutting through the fuel region of SNF was allowed. Sectioning activities generated five outputs: fuel samples; excess pieces of fuel elements not used as samples; fuel chips collected in the sludge pans and placed into SPCs; non-combustible debris such as tools, glassware, etc.; and combustible debris. Waste Stream IN-ID-NRF-153 consists of 27 30-gallon drums of combustible debris waste, 26 of which were overpacked into 55-gallon drums. The 30-gallon drums contain 37 Rabe bottles: 17 17-inch Rabe bottles and 20 12-inch Rabe bottles.[2] The Rabe bottles were generated by Alpha Box operations between April 1975 and February 1979. INL-CCP indicated that this waste stream will never be combined with any of the other five Alpha Box outputs, so it is defined by time of generation and output. Further, wastes were generated by a distinct and well-defined process.

[2] *Rabe bottles* are 12- or 17-inch tall polyethylene canisters. The 12-inch tall canister contains approximately 6 gallons and the 17-inch tall canister contains approximately 10 gallons.

The radiological composition of the waste stream is defined by the types of fuels cut within the Alpha Box, because the combustible material is contaminated with residual fines, particulates, and water thrown onto the sides of the Alpha Box during cutting activities. The fuels sectioned in the Alpha Box are well known, as are their radioactive contents. NRF kept detailed records of the sectioned fuels, and defined not only the radiological composition of these wastes (U019), but also the anticipated amount of residual radiation that would be on combustible waste vs. SPC waste. See Item 2, below, for additional information about the radiological composition of the waste stream.

The physical composition of the waste stream is well known as ascertained though original packaging records, Fast Scan information, and RTR. It is composed of cellulosics like paper, cotton, and cloth items, including wipes, diaper cloth, towels, rags, vacuum bags, cardboard, and wooden items such as rulers, file handles, and paint brushes. It also contains plastics like nylon, as well as rubber and glass and may also contain metal in limited quantities. While the Acceptable Knowledge Summary Report (AKSR) includes the caveat that the waste stream may contain "lesser amounts (less than 50% by volume in any container) of homogeneous organic and inorganic materials," review of the packaging and RTR data indicate that none of the containers include anywhere near the 50% value. Based on this information and as detailed in Item 3, below, the physical composition of the waste stream is appropriately defined (References C029, P008, and P012). Notification of revision to the AKSR is a T2 change. As part of this requirement, notification to EPA of availability of a revised AKSR and source documents supporting the addition of containers to Waste Stream IN-ID-NRF-153 is a T2 change.

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

The radiological composition of the waste stream is defined by five general fuel types:

1. Type I – Advanced Fuel (irradiated core material)
2. Type II – Standard Fuel (irradiated core material)
3. Type III – Uranium-235 (^{235}U) + Thorium (Th) Fuels
4. Type IV – Blanket Fuels
5. Type V – ^{233}U + Th Fuels

INL-CCP provided sufficient radiological information in references and the AKSR to develop scaling factors (see Section 5.2 below). INL-CCP based the radiological characterization of the waste stream on document EDF-8775, which is a NOFORN reference that included the properties of SPC waste from NRF. This document associates each SPC with radiological composition and Reference U019 associates each SPC with a fuel type. There are 91 SPCs, but not all of these are associated with Waste Stream IN-ID-NRF-153.

INL-CCP took the radiological information by SPC/fuel type in these two references and constructed radiological distributions by fuel type. The combustible debris wastes were generated at specific times, as were the SPCs. Since the radiological contamination on the combustible waste was generated upon cleaning up the associated SPC, the radiological

composition of the SPC is common to the combustible waste, with the exception of cesium-137 (^{137}Cs), as discussed in Section 5.2. INL-CCP used the waste type distributions obtained through averaging the values in Reference U109 (Table 6, Radiological Distribution of the Fuel Types in Waste Stream IN-ID-NRF-153, in the AKSR, Revision 2), and knowing which fuel type was present in each Rabe bottle, as well as estimated activities/quantities from the packaging documentation. This allowed them to assign a curie (Ci) and mass value to that container. All of the Rabe bottles were summed to generate Table 7, Waste Stream IN-ID-NRF-153 Radiological Characterization, in the AKSR, Revision 2.

The radiological characterization is based on EDF-8775 and U019, which contain Ci estimates for each Rabe bottle. The bases for these estimates were not provided to INL-CCP because NRF deemed this information to be sensitive. At the request of INL-CCP, NRF personnel provided a memorandum that stated the origin of the radionuclide values.

These data indicate that the radiological composition of Waste Stream IN-ID-NRF-153 is generally well understood, based on AK data. Notification of revisions to the Radiological Characterization Report CCP-AK-INL-561, Revision 1 is a T2 change. Addition of containers characterized using new or different radionuclide scaling factors or a different radiological characterization approach is a T1 change.

(3) Physical characteristics of the waste stream were examined, including the presence of prohibited items (liquids), and found to be adequately addressed.

Waste Stream IN-ID-NRF-153 was packaged as a "combustible" stream by the waste generator. INL-CCP examined the waste container records for each Rabe bottle, as well as the Quick Scan results for each waste drum, to determine the physical composition of the waste. Based on the evaluation of the materials and NRF waste management practices, INL-CCP concluded that the waste stream is composed of more than 80% organic debris, and is represented by Waste Matrix Code S5300, Organic Debris. The AKSR states that the waste material parameters (WMPs) for Waste Stream IN-ID-NRF-153 were estimated based on the descriptions of waste and the WMP estimates performed during the RTR prescreens performed in August 2007. The estimates showed that the waste is composed of approximately 97.1% (by weight) organic waste materials (primarily organic debris), and 2.9% inorganic materials. Examination of the associated BDRs confirmed that the physical composition of the drums corresponds to the description in the AKSR and the physical composition of the stream is adequately defined.

(4) The identification of the waste as transuranic and not high-level waste or spent nuclear fuel was examined and found to be adequate.

The AKSR states that according to the *Nuclear Waste Policy Act of 1982* (NWPA), SNF is "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing." HLW is defined by the NWPA as "the highly radioactive material resulting from the reprocessing of [SNF], 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."

INL-CCP stated that while spent fuel segments were sectioned in the Alpha Cell, Waste Stream IN-ID-NRF-153 is contaminated by residual radioactive material from sectioning of these fuels, and does not include partial or intact spent fuel elements. INL-CCP stated that the only activities performed in the Alpha Cell were destructive sectioning of fuel elements. These activities did not involve the separation or reprocessing of constituent elements from reactor fuel. Therefore, the waste is not a SNF or HLW (References P005, P006, P008, P012, and P019).

(5) Sufficiency of the Acceptable Knowledge Summary Report and implementation of the Acceptable Knowledge process were evaluated and found to be adequate.

EPA found that Section 5.4.3 did not adequately represent the radiological data obtained or evaluated by INL-CCP for Waste Stream IN-ID-NRF-153. Specifically, the section did not adequately explain the origin and nature of the various fuel types. It also did not adequately explain how tables 6 and 7 were generated [see item (2) above] in sufficient detail. Section 5.4.3.1 included references to "canisters" that inferred shipping casks, and also included radiological characterization done by NRF and the Navy that was not well explained. Uncertainty analysis was included, but not well explained.

INL-CCP prepared a freeze file[3] modification that better explained the origin of Tables 6 and 7 in the AKSR. The freeze file change also clarified the historic activities performed by NRF and INL to characterize waste placed into storage and the relative uncertainty. In addition it indicated that the characterization assigned as a result of these activities was not used by INL-CCP to evaluate the radiological composition of the waste stream based on AK. Additionally, the freeze file modification changed the word "canister" to "bottle" in conjunction with the Rabe containers.[4] With the proposed modifications, the AKSR is adequate. EPA expects a formal revision of the AKSR to be completed prior to the CCP's 2011 1st quarter submission of T2 changes to EPA for review and concurrence.

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

Data traceability was evaluated to determine whether the radiological data are traceable from the Rabe bottle to the SPC and associated fuel types by selecting four drums. The Rabe bottles in each drum were identified and cross referenced to related SPCs, which were in turn correlated to fuel types (e.g., EDF-8775, U019, and U151). Table 4 below shows traceability of the Rabe bottle, SPC, and fuel type.

Table 4. Batch Document Reports Examined

Drums	Rabe Bottle	SPC	Fuel Type	Package Dates
IDINEC0100006	NG296	15, 18, 22	III	4/13/1976
IDINEC0100004	EC 10 and 9	32, 33, 34	II, V	1/5/1977, 1/25/1977, 4/27/1977

[3] *Freeze File*: As a result of EPA inspections, if CCP must revise documents to address EPA issues, CCP makes those changes and provides a copy to EPA as objective evidence for the changes made. These revisions are then processed by CCP's document control process to generate an official version as the most current revision.

[4] *Containers* is a generic term which applies to cans, canisters, drums, and any other types of waste packaging units that may be characterized individually for their radiological and physical contents.

IDINEC0200004	NB 267	28	II	4/13/1976
IDINEC0300004	EC 1 and 2	32, 33	II	1/5/1977, 1/25/77

Traceability was also established for the containers from the point of Rabe bottle packaging, through loading into 30-gallon drums and movement to the Intermediate Level Transuranic Storage Facility and then to Idaho Nuclear Technology and Engineering Center (INTEC), to Quick or Fast Scan RTR of the containers and subsequent side-punching of containers and overpacking into 55 gallon drums (References P029, U004, U009, U012, and U088). Data evaluated showed that traceability was adequately established.

(7) Sufficiency of Acceptable Knowledge Support Documents and Related Document Tracking was evaluated and found to be adequate.

Examination of Attachment 4, reference lists in CCP-AK-INL-561, Revision 1 and CCP-AK-INL-560, Revision 2 showed inconsistencies among the various documents. For example, EDF-8775, which is a key AK document providing radiological data, was not included in either the AKSR or Attachment 4. Also, U109 and U106 were not on the Attachment 4 reference list, although both were provided as objective evidence during the inspection. EPA expects the AKSR to be updated to include all relevant references, as well as Attachment 4. Notification of revision of Attachment 4 to include all relevant references is a T2 change.

(8) Interpretation of WCPIP, with respect to contents of the Certification Plan and Confirmatory Test Plan, was evaluated, including mandatory content of the Confirmatory Test Plan and the use of gamma/alpha spectrometry and mass spectrometry data for sampled waste to support Acceptable Knowledge Qualification, and were found to be adequate.

EPA's March 26, 2004, RH WCPIP letter required that sites generate a Certification Plan that explains how RH waste characterization will take place at each site, as well as a Confirmatory Test Plan (CTP), when this plan is required as part of the AK qualification process. This were to require that the sites specify and document 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. CCP-AK-INL-562, Revision 1 explains that INL-CCP intended to use a combination of methods to qualify the AK information defining the radionuclide ratios, physical form, and absence of prohibited items associated with this waste stream.

Radiological components and the isotopic distribution were determined through confirmation of AK. INL-CCP originally intended to collect representative samples of Waste Stream IN-ID-NRF-153 and use these data to develop waste stream-specific scaling factors separate from the data provided by NRF. The sampling plan (CCP-AK-INL-565, Revision 1) was prepared in August 2009, and EPA did not review the plan prior to implementation.

INL-CCP reviewed the data (Reference C114) and found that they did not support the stated objective of the sampling plan, and scaling factors derived from the sample data could not be directly applied to radiological characterization of the waste stream. However, INL-CCP also concluded that the radiological data could instead be used to verify the NRF data (provided as classified, NOFORN, or Unclassified Controlled Nuclear Information [UCNI]), which was then

used to develop scaling factors used in conjunction with DTC. EPA agrees that the plan was not written with the objective of confirming the NRF data and also agrees that the sampling data presented in CCP-AK-INL-561, Revision 1, can be used to confirm pre-existing AK information. The CTP also indicates that other radiological characteristics, including TRU waste determination and RH determination, will be established using DTC and surface measurements. It should be noted that the sampling and analysis test plan was provided as CCP-AK-INL-565 and was summarized in the CTP.

CCP-AK-INL-562, Revision 1 states that AK information regarding the physical form, absence of residual liquids and prohibited item identification will be qualified using radiography, which will also be used to determine that packaging DQOs have been met. Prescreening containers with radiography to identify presence of any liquids and un-punctured aerosol cans; therefore, will require some remediation. The DQO for Defense Determination is met solely through documented AK compiled and reported using the procedure found in Attachment A of the WCPIP, Revision 0D.

EPA identified a statement in the CTP that required clarification. The CTP stated that systematic clean-out of the Alpha Box did not take place, but the occurrence of somewhat systematic clean-out allowing correlation of the SPF and debris waste stream is a core argument in the radiological characterization approach. INL-CCP modified the CTP to state: "Although there were cleanup efforts on the Alpha Box between the examinations of different fuel types, the cleanup was not complete, and consequently significant comingling of the contamination from different fuel types onto the debris waste is expected. Therefore, it is expected that the radionuclide distributions in the contamination will not vary significantly from drum to drum." This modification is adequate.

EPA evaluated the Certification Plan and CTP to determine whether they included the required elements as defined in the WCPIP. When evaluated as a whole, CCP-AK-INL-562, Revision 1, CCP-AK-INL-565, Revision 2, CCP-AK-INL-560, Revision 2, the freeze file change, and the supporting source documents indicate that the DQOs specified in the WCPIP have been met. Notification of revision to CCP-AK-INL-562, Revision 1 is a T2 change and EPA expects formal revision to be completed prior to INL-CCP's 2011 1st quarter submission of T2 changes to EPA for review and concurrence.

(9) Content and technical adequacy of the Waste Stream Profile Form and Characterization Reconciliation Report were evaluated and both were found to be adequate.

INL-CCP provided a draft WSPF. The document was not complete, noting, for example, the lack of a DTC BDR listing. The Draft WSPF is adequate. Notification of availability of the final WSPF is a T2 change.

The content of the CRR was examined to ensure that it 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, and was found to be adequate. Notification of availability of a final and/or revised CRR is a Tier 2 change.

(10) Use of a Correlation and Surrogate Summary Form was evaluated and found to be not applicable.

Completion of a Correlation and Surrogate Summary Form (CSSF) is required when AK information from a related CH waste stream is used in the RH waste characterization process. The INL-CCP representatives indicated that CH data were not used in this manner, so a CSSF was not required or prepared for this waste stream.

(11) Personnel were evaluated to be adequately trained.

Jim Luginbyhl is the Acceptable Knowledge Expert (AKE) who prepared the AKSR, and Larry Porter is the Site Project Manager (SPM) who signed off on the Certification Plan/CTP. Jene Vance edited the Certification Plan. The AKE and RH Qualification Cards for Messrs. Luginbyhl and Vance were examined to determine whether their training was up to date. The RH qualification cards indicated that Messrs. Vance and Luginbyhl had read the WCPIP, but there is no documentation to indicate whether these individuals were trained to EPA requirements, or were they trained with respect to radiological characterization aspects, both of which are required in the WCPIP. Mr. Vance is not an AKE, but he assembles and uses AK information as part of the radiological characterization program. Since the WCPIP is currently under revision, EPA will examine future training against the modified WCPIP. However, EPA expects to be able to see documentation that all AKEs and other individuals who prepared, edited, contributed to, or signed off on AK related documents have up-to-date training on the WCPIP and its requirements, as well as related AK procedures.

(12) Non-Conformance Reports and Discrepancy Resolution Forms were examined and found to be adequate.

Only one DR Form was presented, and it addressed the assignment of hazardous waste numbers to a previously identified non-hazardous waste stream. EPA expects additional DRs will be generated as the characterization and documentation process progresses, particularly in the areas of AK-AK radiological discrepancy analysis. Notification of the availability of additional DRs pertinent to this waste stream and all other RH waste streams is a T2 change.

Example NCRs were provided. NCR-RH-INL-0001-10 addressed measurement data indicating that 12 drums were non-TRU following implementation of DTC. These 12 drums are: IDINEC200004, IDINEC200007, IDINEC300007, IDINEC100010, IDINEC100003, IDINEC100010, IDINEC300005, IDINEC100012, IDINEC10000l, IDINEC100002, IDINEC200008 and IDINEC100011. As a result, the waste stream was reduced from 27 to 16 drums, 15 55-gallon drums and 1 30-gallon drum. This affected the determination of AK accuracy, which is discussed in (13), below.

(13) Acceptable Knowledge accuracy was assessed and found to be adequate.

The AK accuracy report states that eleven of the 27 containers were calculated to have TRU activity less than 100 nanocuries per gram (nCi/g), and therefore are not considered TRU waste.

Of the 11 containers, 5 were measured to have contact dose rates less than 200 milirem per hour (mRem/hr) and are not considered RH. The AK accuracy for waste stream IN-ID-NRF-153 is expressed as the ratio of actual TRU drums divided by the number of anticipated TRU drums or 16/27, which equals 59%.

(14) Defense status of the waste was evaluated and found to be adequate.

The *WIPP Land Withdrawal Act* (LWA) allows only defense-related waste to be disposed at the WIPP facility. The AKSR provides information and references supporting the defense-related status of Waste Stream IN-ID-NRF-153 and concludes that naval reactor fuels were the primary source of fuels sectioned in the Alpha Box. The fuel elements were from nuclear-powered warships, prototype plants, irradiated test specimens, and the Shippingport Atomic Power Station (Reference P019). The defense status of the waste is supported by the references and information examined.

(15) Load Management was assessed and does not apply to this waste stream.

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

(16) Attainment of Data Quality Objectives through Acceptable Knowledge qualification was evaluated and found to be adequate.

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 the 10 EPA WIPP-tracked radionuclides)
- Residual liquids
- Physical form, including metals and cellulose, plastic, and rubber

When evaluated as a whole, CCP-AK-INL-560, Revision 2, CCP-AK-INL-561, Revision 1, CCP-AK-INL-562, Revision 1, and other AK and supporting source documents presented in Attachment B of this report indicate that the DQOs, as specified in the WCPIP, have been met.

Summary of Results

Findings or Concerns

The EPA Inspection Team did not identify any findings relative to the addition of the containers from Waste Stream IN-ID-NRF-153, which were the subject of this T1 change evaluation.

Tiering Changes

Based on the results of this evaluation, there are no changes to the AK T1 designations, and there is one change to the AK T2 designations as identified during the Baseline Inspection and subsequent T1 evaluations. Notification of availability of additional DRs pertinent to this waste stream is a T2 change.

5.2 Radiological Characterization

EPA examined the radiological characterization process and associated information to determine whether INL-CCP demonstrated compliance with 40 CFR 194.8 requirements for INL-CCP RH Waste Stream IN-ID-NRF-153.

Radiological Characterization Overview

Waste Stream IN-ID-NRF-153 consists of combustible RH debris from the cleanup operations in the Alpha Box installed in hot cell No. 14 in the NRF ECF generated from April 1975 to 1979. Cleanup operations followed fuel cutting operations in support of reactor fuel and material type examinations at the ECF. This NRF waste stream contains the five fuel types that were examined in the ECF: Advance Fuel, Standard Fuel, ^{235}U+Th Fuel, Natural or Depleted Uranium Blanket Fuels, and ^{233}U+Th Fuel.

The fuel fines and water spray – water was used to cool the silicon carbide cut-off wheel and to reduce contamination spread – were the source of the Alpha Box contamination, resulting in the contamination of the cleanup materials used in these box operations. According to an NRF study, 15% of the fuel fine was deposited in the Alpha Box and the remaining 85% was deposited in the sludge pans beneath the cut-off wheel. After replacement, the sludge pans containing the fuel fines were placed into a total of 48 SPCs during the time period mentioned above. It was expected that the ^{137}Cs would be soluble in the water used during the cutting operations, which would affect the ratios of the radioisotopes in the fuel matrix.

The debris wastes from the cleanup operations were placed in either 12-inch-tall or 17-inch-tall Rabe bottles which were placed inside 30-gallon drums. Each 30-gallon drum contained either one 17-inch-tall Rabe bottle or two 12-inch-tall Rabe bottles. Twenty-seven 55-gallon drums were used to overpack the 30-gallon drums and these 27 55-gallon drums identified as INL-CCP Waste Stream IN-ID-NRF-153 are the subject of this T1 evaluation.

Radiological Characterization Overview

The overall approach to characterizing the IN-ID-NRF-153 waste drums is DTC in conjunction with radionuclide-specific scaling factors, a technique that EPA has observed and approved at several RH sites previously. The radionuclide-specific scaling factors were developed based on the NRF-supplied information on the estimated activity content of each SPC, as representative of

the contamination deposited on the debris waste materials. The NRF radionuclide data and their confirmation by radiochemical analyses and mass spectrometry of samples collected resulted in a single set of ^{137}Cs-based scaling factors (each having been divided by the ^{137}Cs enhancement factor of 4.17) to be applied to the entire waste stream. The NRF radiological data were activity estimates in curies of radionuclides contained in each SPC/fuel type, obtained from the mass quantity of fuel in each SPC (based on the known dimensions of the fuel elements and the width of the cut made by the cut-off wheel) and mass-to-curie reactor physics calculations performed by application of ORIGEN.

The waste sampling results were used as confirmation data to qualify the NRF radiological data, not to determine the scaling factors, as "only three of the five fuel types expected in the waste stream were detected on the waste samples" (CCP-AK-INL-560, Revision 2). The information obtained from samples was also used to determine whether and to what extent the ^{137}Cs remained in the fuel matrix (^{137}Cs partitioning). An overview of the radiological characterization process used for the IN-ID-NRF-153 wastes is provided in Figure 1, below.

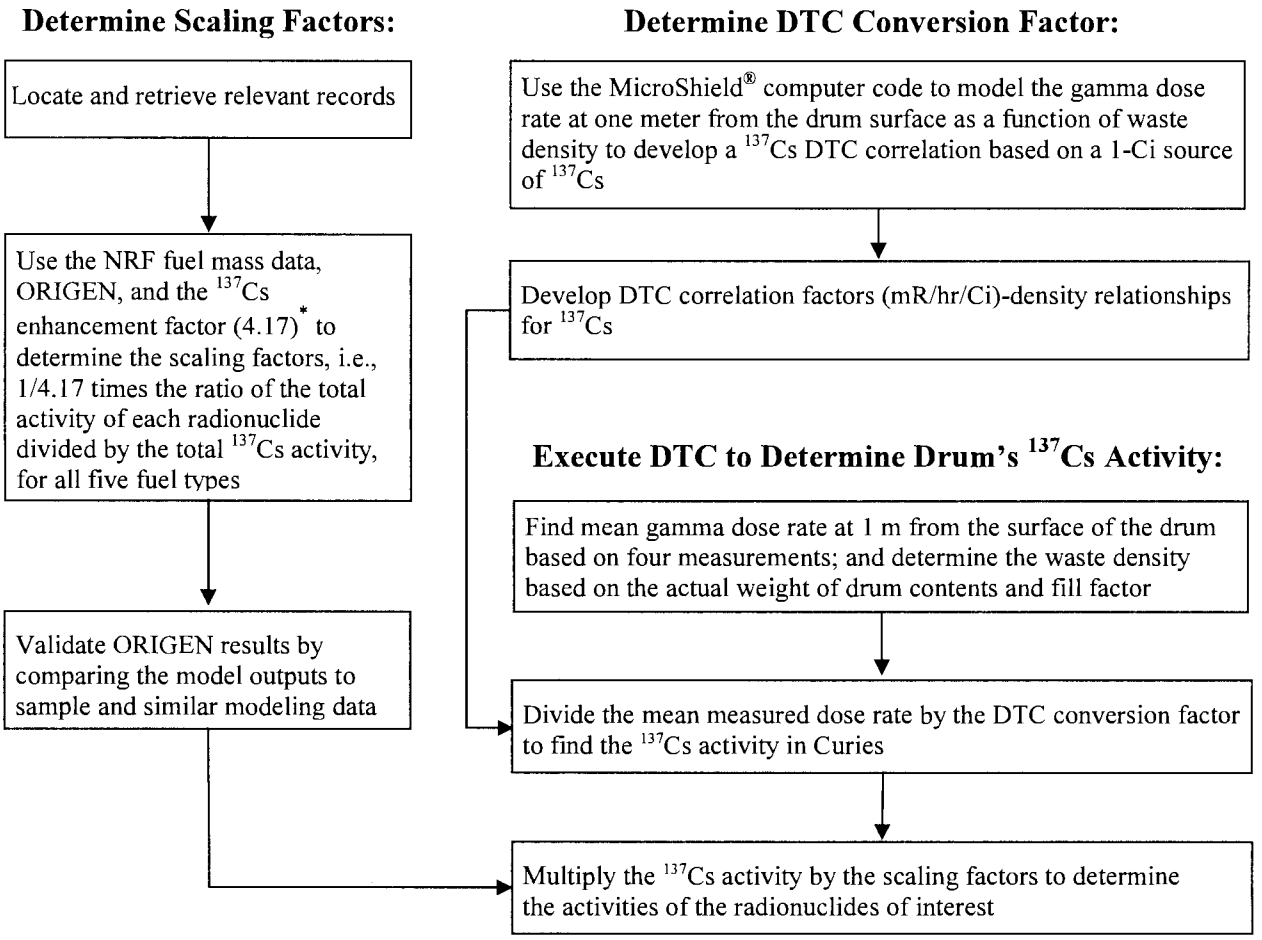

Figure 1. Flow Diagram of the Characterization Process: IN-ID-NRF-153

* The ^{137}Cs enhancement factor (Cs EF) represents the increase in the ^{137}Cs levels on the debris transferred into the Alpha Box by the cut-off wheel cooling water. ^{137}Cs EF is defined as $(^{90}Sr/^{137}Cs)_{mix}/(^{90}Sr/^{137}Cs)_{sample\ data}$ without regard to the likely mix of fuel types contributing to the sample data.

The DTC measurement aspect of this RH TRU debris waste stream, IN-ID-NRF-153, was not directly assessed during this T1 evaluation in Denver. This aspect had been evaluated initially during the INL-CCP baseline inspection and more recently during the T1 evaluation of the OSPREY gamma system at INTEC (see EPA Docket No.A-98-49; II-A4-131). There were no significant changes. EPA did evaluate the characterization methods used for the IN-ID-NRF-153 RH wastes 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.

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 EPA inspection team evaluated the correlation of the waste records for the 27 55-gallon drums of IN-ID-NRF-153 with the ^{137}Cs concentration.

The information that formed the basis of the radiological characterization process, the NRF radiological data used in combination with sample data, was reviewed. Specifically, the confirmation of the radiological data by the sample results, as documented in the technical report CCP-AK-INL-561, Revision 1, and its supporting calculation packages, as listed in Appendix A to this evaluation report, were reviewed. The curie estimates of the radioisotope contents of the 48 SPCs, corresponding to the five fuel types involved in the fuel examination program, had been determined via reactor physics calculations performed on the NRF mass estimates, using the ORIGEN computer code. These curie quantities were used to find the ^{137}Cs-based scaling factors from the NRF radiological data. The sampling results were used to determine the ^{137}Cs-based scaling factors from the 10 samples obtained from the 27 drums of waste.

While the sample-based scaling factors were not used for the characterization of the IN-ID-NRF-153 debris waste, they were used to confirm and qualify the NRF radiological data. The analysis and comparison of the two sets of scaling factors revealed the need for applying the ^{137}Cs enhancement factor to the scaling factors determined from the NRF radiological data. This was because the sampling resulted had revealed that the scaling factors obtained from sampling results were less than their counterparts obtained from the NRF radiological data by a factor of about 4.17. The lower values of the sample-based scaling factors were due to the fact that the transfer of cut-off wheel cooling water into the Alpha Box had resulted in an increased level of ^{137}Cs on the debris waste. The application of the ^{137}Cs enhancement factor to the scaling factor obtained from the NRF radiological data resulted in a new set of scaling factors. The new set of scaling factors would be used, as discussed below, along with the relationship between a waste drum's easily measurable ^{137}Cs gamma dose and waste density to determine the curie amounts of all reportable radionuclides in each waste drum. These activities are documented in INL-RH-70, INL RH-71, and INL-RH-73 through INL-RH-76 and incorporate the following information:

- Radiochemistry and mass spectrometry measurements made on all samples
- Scaling factors obtained from the sampling results
- Activity estimates of a relatively large number of radionuclides, including the actinides and fission products, contained in each of the 48 SPCs
- Scaling factors for the five fuel types derived from the NRF radiological data
- Qualification of NRF radiological information using the sampling results
- Determination of the ^{137}Cs enhancement factor

- Additional calculations to confirm modeling approach selected.

Calculation of the ^{137}Cs activity for a container allows the further calculation of the following quantities for each RH container measured:

- Activity in curies (Ci) and mass in grams (g) for each of the 10 WIPP-tracked radionuclides, i.e., ^{137}Cs, ^{241}Am, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{90}Sr, ^{233}U, ^{234}U, and ^{238}U
- Associated uncertainty for all radionuclide values listed in previous bullet
- Fissile Gram Equivalent (FGE)
- Pu Equivalent Curies (PE Ci)
- Decay heat in Watts

The constants and other values required for these calculations were taken from the appropriate sources (TRAMPAC) and were spot-checked for accuracy.

A total of nine shielding calculations were performed using MicroShield® with the 1-Curie source of ^{137}Cs uniformly distributed throughout a 55-gallon waste drum for a range of waste densities from 0.2 g/cm^3 to 1.8 g/cm^3. The results of these were then used to derive a DTC correlation as a function of density for ^{137}Cs, as shown in CCP-AK-INL-561, Revision 1, Figure 5-1. The actual DTC calculations are performed using an Excel spreadsheet where the input includes [see Section (3), below]:

- Drum identification number
- Container gross weight
- Fill height in percent
- Fill height material type (concrete, organic, or steel)
- Four external dose rate measurements

There were no concerns regarding the correlation of waste records for the 27 55-gallon drums containing the INL NRF RH TRU debris waste with ^{137}Cs concentration for this IN-ID-NRF-153 waste stream.

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

EPA evaluated the following aspects:

- Activity values were derived from modeling and statistical metrics using the mean and standard deviation values for each 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 for these IN-ID-NRF-153 wastes
- Adjustment of the source distribution inside the drums for ^{137}Cs using earlier MCNP5 calculations, calculated as a function of bulk waste density
- Potential contributions of the short-lived radionuclides to the total measured dose rate
- Appropriate decay correction according to INL-CCP procedure (CCP-TP-504, Revision 8) of all radionuclide values for purposes of model development.

  Note: Decay corrections should be made to a new shipping date.
- The ORIGEN results are used to develop radionuclide-specific scaling factors that, in turn, after dividing by the ^{137}Cs enhancement factor, are used to determine activity levels of the radionuclides of interest from ^{137}Cs activity obtained from the measured external dose rates and DTC relationship
- 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 ^{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 appropriate geometry following repackaging (55-gallon drum)
- Estimation of the variation in the scaling factor due to reasonable variation in the fuel composition, burnup, and decay period, apparently used as normal fuel parameters in the NRF ORIGEN calculations, by earlier ORIGEN analyses at SRS and LANL

The radionuclide-specific scaling factors for these IN-ID-NRF-153 wastes that were developed, as shown in Table 5, below, are taken from INL-RH-74:

Table 5. Radionuclide-Specific Scaling Factors

Radionuclide	DTC Scaling Factor
^{228}Th	1.18E-04
^{232}U	1.15E-04
^{233}U	6.83E-05
^{234}U	1.91E-05
^{235}U	6.55E-07
^{236}U	2.09E-06
^{238}U	4.23E-09
^{238}Pu	1.47E-02
^{239}Pu	4.61E-05
^{240}Pu	2.19E-05

[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.

Table 5. Radionuclide-Specific Scaling Factors

Radionuclide	DTC Scaling Factor
^{241}Pu	1.82E-03
^{242}Pu	6.47E-08
^{241}Am	2.24E-04
^{244}Cm	6.78E-05
^{154}Eu	2.94E-03
^{137}Cs	1.00E+00
^{90}Sr	2.26E-01

There are no issues related to the technical adequacy or documentation of radionuclide scaling factors for NRF RH TRU Waste Stream IN-ID-NRF-153.

(3) The technical basis of the DTC correlation and its documentation were evaluated and both aspects were acceptable.

The DTC correlation was evaluated based on DTC BDR No. INLRHDTC09006, which INL-CCP provided to EPA for review during this T1 evaluation. The correct version of the DTC Excel spreadsheet was used for the calculations, i.e., it contained the radionuclide scaling factors that were developed and documented in INL-RH-74, and Table 5, above. EPA technical personnel verified that the DTC BDR cited above included the following:

- BDR Cover Sheet, Attachment 4
- BDR Table of Contents, Attachment 5
- BDR Narrative Summary, Attachment 6
- ITR Review Checklist, Attachment 7
- Measurement Control Report, Attachment 1
- Container Data Sheet(s), Attachment 2
- Waste Container DTC Conversion Record(s), Attachment 3
- Evidence of signatures by the ITR and a SPM
- Type of waste in each container (steel, concrete, organics)
- Fill height of the container: < 25% full; 25% - 66% full; 66% - 90% full; > 90% full

There were no issues related to the DTC correlation and its documentation for these IN-ID-NRF-153 wastes.

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

The Technical Report CCP-AK-INL-561 is the main document that describes the radiological characterization process that INL-CCP used for the NRF RH TRU wastes. This document is supported by a series of 11 calculation packages, listed in Attachment 1 to the Technical Report, that were reviewed in the process of evaluating the NRF RH TRU wastes. These packages had been prepared and reviewed initially by Jene Vance, Jim Holderness, Dave Moody, and Jessie

Klingensmith to support several CCP RH TRU evaluations. The EPA evaluation team reviewed these packages in conjunction with Revision 1 of CCP-AK-INL-561 in advance of the formal T1 evaluation meeting at EPA headquarters. Several documents had been revised more recently and these revisions were evaluated during the meeting as they were provided by INL-CCP. During these discussions, the EPA evaluation team had the opportunity to discuss all technical concerns and apparent discrepancies with INL-CCP personnel and to raise a variety of technical and documentation-related questions regarding technical aspects related to the NRF RH TRU wastes. Several of these questions required revisions to CCP-AK-INL-561, and INL-CCP personnel stated that these would be incorporated in a freeze-file that would be provided following the evaluation in Denver. Upon evaluation, the EPA evaluation team found that the freeze-file changes made to CCP-AK-INL-561 adequately addressed all of EPA's questions. Upon incorporation of the freeze-file changes, the revised document adequately supported the radiological characterization process for the NRF RH TRU wastes, and the calculation packages cited above provided adequate technical support for the radiological characterization of NRF RH TRU wastes. There were no issues related to the documentation of technical aspects of the INL-CCP radiological characterization approach for the NRF RH TRU wastes.

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

The development of Total Measurement Uncertainty (TMU) for Waste Stream IN-ID-NRF-153 waste 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:

- DTC correlation – including drum weight measurement, MicroShield® code, and modeling uncertainties
- Measurement uncertainty – including dose rate uncertainty from ^{137}Cs
- Scaling factor uncertainty – including ORIGEN
- Contributions of other gamma emitters
- Drum-to-drum variation

A general treatment of TMU for this NRF RH TRU waste stream is presented in CCP-AK-INL-561 and Calculation Package INL-RH-77, Revision 1, Uncertainty Analysis of for NRF Debris. The principal sources of uncertainty are uncertainties in ^{137}Cs enhancement factor, ORIGEN benchmarking, variation in code input, and drum-to drum variability. There were no concerns regarding the technical derivation and documentation of TMU for INL-CCP Waste Stream IN-ID-NRF-153.

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

The determinations that these containers met the definitions of TRU waste and RH waste were examined during the baseline inspection based on DTC BDR Nos. INLRHDTC09006 and

INLRHDTC09007. Both the RH and TRU determination are parts of the DTC measurements that are performed at the INTEC Facility at INL, which was not assessed directly during this T1 evaluation. EPA did verify that no aspects of the DTC process had changed significantly from what EPA had observed during the baseline inspection. Additionally, EPA had evaluated the INTEC DTC process as part of the OSPREY© gamma system for assaying HFEF Lot 1B RH TRU wastes, see EPA Docket No. A-98-49; II-A4-131. The results for the containers that were reviewed as part of this T1 evaluation, as documented in the DTC BDR, indicated the following:

- All containers were clearly TRU, i.e., contained more than 100 nCi/g of transuranic radionuclides.
- All containers were clearly RH, i.e., had an external contact dose rate greater than 200 mRem/hr.

There were no technical or documentation-related concerns regarding the TRU and RH determinations for the containers in Waste Stream IN-ID-NRF-153.

Summary of Radiological Characterization

Findings or Concerns

The EPA inspection team did not identify any findings or concerns related to radiological characterization.

Tiering Changes

Based on the results of this T1 evaluation, there are no changes to the T1 and T2 designations that were assigned to radiological characterization for INL-CCP during the baseline approval. However, the Tiering Table for INL-CCP RH has been modified to reflect the need for all waste streams to have similar reporting requirements.

5.3 Real-Time Radiography

EPA reviewed four RTR BDRs to support this T1 request for addition of Waste Stream IN-ID-NRF-153. The containers reviewed were subject to RTR examination in February and March of 2009. EPA's review included RTR written procedures, audio/visual and written records, and operator training. The following is a list of the documents and records reviewed by EPA:

- BDR Numbers INLRHRTR090002, INLRHRTR090003, INLRHRTR090004 and INLRHRTR090005, both written and audio/visual records
- List of Qualified Individuals (LOQI) for the time periods covered by the BDRs listed in previous bullet
- CCP-TP-508, RH Standard Real-Time Radiography Inspection Procedure, Revision 5

- Demonstration of Capability audio/visual recordings for two of the operators responsible for RTR of the subject containers
- RH Radiography Test Drum Inventory Sheet for containers INL-RH-NDE-TEST-05, INL-RH-NDE-TEST-06 and INL-RH-NDE-TEST-07
- CCP Training Log of Inventory Test Drum Number, RH-INL

EPA randomly selected for review containers from available BDRs, as listed in Table 6.

Table 6. RTR BDRs Reviewed

BDR Number	Container Number
INLRHRTR090002	EC0300003; IDINEC0300006; IDINEC0300007, original and replicate
INLRHRTR090003	IDINEC0100003, original and independent observation
INLRHRTR090004	IDINEC0100012; IDINEC0300004
INLRHRTR090005	IDINEC0100007; IDINEC0100011

Before commencing RTR operations, the resolution of the X-ray system was verified as meeting requirements by performing an Image Test Pattern Test. The number of lines-pair/cm recorded for each day of operations met the minimum requirements of 5 lines-pair/cm. Through review of the BDRs, EPA verified that data sheets were completed and signed as required. The quality control (QC) examinations, specifically the replicate and independent observations, had been performed for all four BDRs. An NCR, NCR-RHINL-0503-10, was written for all containers in BDR INLRTR09002 because the operator recorded the waste matrix code (WMC) as S5400 instead of S5300. The NCR was processed in accordance with CCP procedures.

During the examination of container IDINEC0300006 from BDR INRHRTR09002, the operator stopped the audio/visual recording to further investigate the presence of free liquid. The operator did not describe what was done during the off-line time. EPA discussed this with INL-CCP RTR personnel and generated an EPA Concern NRF-RH-RTR-10-001C to address this issue (see Attachment C for a copy of this concern).

T1 Evaluation Concern NRF-RH-RTR-10-001C: While performing RTR on container No. IDINEC0300006, the operator went off line to further investigate the presence/absence of prohibited liquid. The operator did not state specifically or document in the written record what was done while off line. The INL-CCP SPM contacted the operator regarding this issue; the operator stated that she could not remember what she had done during that break in recording.

EPA is concerned about the completeness of RTR records. While 100% of the container was viewed, analyzed and recorded, the undocumented stopping of the recording to verify a component critical to compliance is not a desirable practice. EPA is concerned that complete records of what the operator did when characterizing a container must be generated for all containers examined. All actions of an operator that have a technical bearing on the acceptability of data used to support waste characterization (waste isolation) must be available for internal reviewers and federal inspectors. Specifically, actions that are relevant to identification of physical contents and/or prohibited items (waste characterization/isolation) must be part of the auditable record. The RTR operators must be trained to understand that these actions must be

performed in such a way that they are part of the official auditable record that documents container's characterization, i.e., can serve as objective evidence to support EPA's approval decision. As part of future continued compliance inspection(s) EPA would verify whether steps have been taken to include RTR operator's actions relevant to identification of physical contents and/or prohibited items are documented in auditable record.

Status of Concern: This concern did not require a response.

Demonstrations of Capability for audio/visual recordings were reviewed for 2 RTR operators. Using the inventory sheet supplied by INL-CCP, EPA identified that test drum INL-RH-NDE-TEST-07 had apparently been built after examination by the operators. Documentation suggests that the inventory sheet was accepted and used by INL-CCP without any internal identification of this problem. INL-CCP provided information that demonstrated that the inventory should have been dated September 8, 2008, which EPA accepted. RTR characterization activities for these drums were performed in accordance with required procedures by trained and qualified operators.

Summary of Real-Time Radiography

Findings or Concerns

The EPA inspection team did not identify any findings related to RTR. EPA identified once concern related to RTR which did not require a response. There are no open issues relative to RTR as a result of this T1 evaluation.

Tiering Changes

Based on the results of this T1 evaluation, there are no changes to the T1 and T2 designations that were assigned to RTR for INL-CCP during the baseline approval. However, the Tiering Table for INL-CCP RH has been modified to reflect the need for all waste streams to have similar reporting requirements.

6.0 SUMMARY OF RESULTS

EPA concluded that the waste characterization processes of AK, radiological characterization, and RTR proposed for use by INL-CCP to characterize RH TRU wastes from the Alpha Box within Cell 14 of Building 618 in the ECF at NRF are acceptable. There are no open issues relative to this T1 evaluation.

Findings and Concerns

The EPA inspection team did not identify any findings during the inspection. One concern related to RTR was identified during the inspection as discussed in Section 5.3. This concern did not require a response and no issues remain open relative to this T1 change.

Tiering Changes

Based on the results of this evaluation, there are a few changes to the INL RH Tiering Table included in the August 2010 dated report evaluating RH debris containers from Lot 1B of Waste Stream ID-HFEF-S5400-RH. These modifications are shown (in **bold**) in Table 1 of the *Executive Summary* above and include one change each to the AK T1 and T2 designations, one T1 change added to radiological characterization, and a Tier 1 item for RTR has been modified to reflect the need for all waste streams to have similar reporting requirements.

Approval

EPA determined that the procedures and processes used by INL-CCP for the addition of Waste Stream IN-ID-NRF-153, consisting of 27 30-gallon drums, were adequate. EPA, therefore, approves Waste Stream IN-ID-NRF-153 as a T1 change to INL-CCP's RH baseline approval.

ATTACHMENT A

APPROVAL SUMMARY FOR INL-CCP REMOTE-HANDLED WASTE CHARACTERIZATION PROGRAM

Approval Summary for INL-CCP Remote-Handled 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 Visual Examination	January 2007	A-98-49; II-A4-75
Tier 1 Change – Approval of Real Time Radiography	February 2007	A-98-49; II-A4-80
Tier 1 Change – Approval of K Cell Wastes	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-A4-98
Tier 1 Change – Approval of Visual Examination Technique	September 2009	A-98-49; II-A4-118
Tier 1 Change – Addition of Twelve Containers to Waste Stream ID-ANLE-S5000 and Addition of Waste Stream ID-HFEF-S5400-RH	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
Tier 1 Change – Approval of Waste Stream ID-INTEC-S5400-RH	August 2010	A-98-49; II-A4-130
Tier 1 Change – Addition of Lot 1B to Waste Stream ID-HFEF-S5400-RH	August 2010	A-98-49; II-A4-131

ATTACHMENT B

LISTING OF DOCUMENTS REVIEWED FOR THIS EVALUATION

Listing of Documents Reviewed for this Evaluation

CCP-AK-INL-560 Central Characterization Project Acceptable Knowledge Summary Report for Idaho National Laboratory Remote-Handled Transuranic Debris Waste from the Naval Reactors Facility, Waste Stream: IN-ID-NRF-153, Revision 2, September 30, 2009

CCP-AK-INL-561, Central Characterization Project Remote-Handled Transuranic Radiological Characterization Technical Report for Remote-Handled Transuranic Debris Waste From Idaho National Laboratory Naval Reactors Facility, Waste Stream IN-ID-NRF-153, Revision 1, May 10, 2010

CCP-AK-INL-562, Central Characterization Project RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test Plan for INL RH Waste Stream: IN-ID-NRF-153, Revision 1, November 18, 2009

CCP-AK-INL-565, Central Characterization Project Sampling and Analysis Plan for Remote-Handled Transuranic Debris from the Naval Reactors Facility at the Idaho National Laboratory, Waste Stream IN-ID-NRF-153, Revision 2, March 16, 2010

CCP-QP-005, Revision 18, CCP TRU Nonconforming Item Reporting and Control, Attachment 1 – CCP Nonconformance Report (NCR), NCR No. NCR-RHINL-0100-10, Revision 0, March 30, 2010

CCP-TP-005, Revision 12, CCP Acceptable Knowledge Documentation, Attachment 5 – Hazardous Constituents, Waste Stream IN-ID-NRF-153, April 26, 2010

CCP-TP-005, Revision 18, CCP Acceptable Knowledge Documentation, Attachment 1 – Acceptable Knowledge Documentation Checklist, Waste Stream IN-ID-NRF-153, May 27, 2010

CCP-TP-005, Revision 18, CCP Acceptable Knowledge Documentation, Attachment 4 – Acceptable Knowledge Source Document Reference List, Waste Stream IN-ID-NRF-153, August 10, 2010

CCP-TP-005, Revision 18, CCP Acceptable Knowledge Documentation, Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, Waste Stream IN-ID-NRF-153, January 28, 2009

CCP-TP-005, Revision 18, CCP Acceptable Knowledge Documentation, Attachment 8 – Waste Containers, Waste Stream IN-ID-NRF-153, February 5, 2009

CCP-TP-512, Revision 2, CCP Remote-Handled Waste Sampling, Attachment 6 – Site Project Manager Sampling Batch Data Report Checklist, BDR No. IDRH0901, July 5, 2009

CCP-TP-512, Revision 2, CCP Remote-Handled Waste Sampling, Attachment 7 - Site Project Manager Radiochemistry or ICP-MS Analytical Batch Data Report Checklist, BDR No. ALD09002R, July 22, 2009

CCP-TP-512, Revision 2, CCP Remote-Handled Waste Sampling, Attachment 7 - Site Project Manager Radiochemistry or ICP-MS Analytical Batch Data Report Checklist, BDR No. ALD09006I_R1, July 22, 2009

Characterization Reconciliation Report for IN-ID-NRF-153, Draft for Audit Purposes, Provided June 3, 2010

DOE WIPP 02-3214, Remote-Handled TRU Waste Characterization Program Implementation Plan, Revision 0D, October 30, 2003

Freeze File Modifications to CCP-AK-INL-560, Revision 2 and CCP-AK-INL562, Revision 1, provided August 11, 2010

Inter-Office Correspondence, from C. M. Gomez to M. Sensibaugh, Acceptable Knowledge Accuracy Report, Idaho National Laboratory, Waste Stream IN-ID-NRF-153, Lot 1, For Audit Purposes Only, March 26, 2010

P-TS Screenshots/Traceability Information for Drums 100004, 100006, 200004, and 300004, Provided to EPA on August 10, 2010

Training documentation, Qualification Cards and Site-Specific RH Training for J. Luginbyhl and I. Quintana, provided August 10, 2010

WCPIP Revision 0D, Attachment 4 - Waste Stream Profile Form, Waste Stream IN-ID-NRF-153, Draft for Audit Purposes, Provided June 3, 2010

All C, DR, P, and U source documents were provided for review. Full documents were reviewed by EPA for all except UCNI, Classified, or NOFORN documents, for which only Attachment 3 summaries were provided and reviewed. The list below is a subset of the provided source documents representing some of the more pertinent references examined. Any UCNI, Classified, or NOFORN documents show below were either examined only through Attachment 3 Summary review, or were examined during the audit with no copies of the documents provided to the EPA.

C004, Letter to M. DiBattista from J. Raros, Re: Remote-Handled (RH) Transuranic (TRU) Acceptance Knowledge (AK) Collection -Request for NRF Action, J. Roros, IBO-07/084, September 6, 2007

C006, Letter to G. B. Bragg from J. E. Schmucher, Re: ECF Transuranic Waste Shipments to the INEL Radioactive Waste Management Complex (RWMC) (UCNI), J. E. Schmucker, NRFE-TS-2421, September 27, 1979

C009, Letter to Mr. D. J. Miller from G. D. Carpenter, Re: Transuranic Curie Content of Enriched Uranium Fuels TWR No. 09865 pp. 93-100 (NOFORN), G. D. Carpenter, WAPD-MT(IP)-552, October 12, 1978

C010, Letter to T. H. Alff, Re: Transuranic Curie Content of Partially Enriched Uranium Fuels, R. L. Underwood, WAPD-MT(IP)-1069, December 18, 1979

C011, Interview of N. Spackman and S. Lundt, Re: Flow Diagram for Alpha Box Operations, James Luginbyhl, March 20, 2008

C012, Letter to D. R. Hyster from W. F. Irvine, Re: Request for Fuel Shipment Approval, W. F. Irvine, NRFE-0-6679, March 2, 1981

C016, Memorandum to Harker/Wade, Re: Alpha Box Waste Material Identification, J. F. Ruggiero, October 12, 1976

C019, Letter to P. W. Eselgroth, Re: Information to Support Previous Request, H. F. Daugherty, NRFE-O-5878, January 9, 1979

C020, Memorandum to J. Ruggiero, Re: Trans U Content of EC 10, 11, and 12, Ken Barr, December 2, 1977

C021, Letter to Manager, Pittsburgh Naval Reactors Office, Re: Approval Request of NRF Alpha-Box Waste Accountability Facilities, R. F. Beyer, WAPD-F(NMM)-1, July 31, 1978

C022, Letter to C. H. Price, Re: Documentation of Measurement Methods for Accountable Nuclear Material Content of Transuranic Waste, ECF Examination Engineering, NRFE-EE-7565, July 6, 1978

C026, Correspondence to C. H. Price, Re: Documentation of Measurement Methods for Accountable Nuclear Material Content of Scrap, ECF Examination Engineering, NRFE-EE-7541, March 31, 1978

C027, Correspondence to C. H. Price, Re: Documentation of Measurement Methods for Accountable Nuclear Material Content of Scrap, ECF Examination Engineering, NRFE-EE-7559, June 15, 1978

C029, Interview of J. F. Ruggiero, Re: History of NRF Combustible TRU Waste, James Luginbyhl, January 22, 2008

C030, Telephone Conference With ECF Examination Engineering on Combustible Transuranic Waste from the ECF Hot Cell Alpha Box, J. F. Ruggiero, NRFE-EE-7906T, January 21, 1982

C113, Memo to Irene Quintana, Re: Analysis of Sample Data for RH Debris Waste Generated from the NRF at INL, J. Holderness, June 26, 2009

C114, Memo to Irene Quintana, Re: Analysis of Sample Data for RH Debris Waste Generated from the NRF at INL, J. Vance, August 23, 2009

DR001, Attachment 11, Acceptable Knowledge Source Document Discrepancy Resolution (Hazardous Waste Numbers), James Luginbyhl, DR001, May 15, 2008

P001, Letter to T. Clements from T. N. Miller, Re: Attachment 1: Cover Letter and Attachment 2: A Short History of the Expended Core Facility (1953 to June 1990) (NOFORN), T. N. Miller, NRF-E(RME)-779, November 26, 2007

P002, Diagrams of ECF Container: Trash Disposal Rabe Bottle, ECF Hot Cell Alpha Box Waste Canister Assembly, and a Sketch of 12 inch Rabe Bottle, D. Corrigan, 927F315/974D600, July 26, 1994

P003, Expended Core Facility Maintenance and Operations Guide (NOFORN), Technical Manual 7959, June 1, 1958

P004, RWMIS Integrated Waste Tracking System (IWTS) Historical Disposed Shipment Detail Listing, HIST_ST127B14, August 20, 2002

P005, Transmittal of the Evaluation of Naval Reactors Facility Radioactive Waste Disposed Of at the Radioactive Waste Management Complex, S. L. Dunn, NR: IBO-057023, February 3, 2005

P007, Alpha Box Support Operations, NRF 1661.22, Revision 9, March 1, 1983

P008, Alpha Box Operations and Maintenance, NRF 1661.22, Revision 9, February 7, 1986

P009, Integrated Waste Tracking System Historical Information on Naval Reactor Facility (NRF) Waste Disposal, August 20, 2002

P011, NRF Procedure 1201.4, Section 10-Nuclear Material Measurements and Analysis (UCNI), NRF 1201.4, Revision 11, February 1, 1982

P015, Management of Alpha Box Waste, NRF 1661.22, March 1, 1982

P016, The NRF Environmental Monitoring Program, NRF 2455, December 1, 2006

P018, Canister Remediation Prioritization (NOFORN), B. F. Kammenzind, TRR-ECF(FP291)FP0103 6-TR1, December 12, 2003

P019, Attachment B: Description of Naval Spent Nuclear Fuel Receipt and Handling at the Expended Core Facility at the Idaho National Engineering Laboratory, WAPD-OT(E)-107

P021, Internal Technical Report Waste Characterization for INEL Remote-Handled/Special-Case Stored Transuranic Wastes, Dennis A. Peterson, WM-PD-85-014, November 1, 1985

P022, Radiological Properties of Remote-Handled Transuranic Waste Inventory at the Radioactive Waste Management Complex, Cecilia R. Hoffman, EDF-4687, May 20, 2005

P023, Baseline Estimate of the Volume of Remote-Handled Transuranic Waste Stored at the Radioactive Waste Management Complex, Cecilia R. Hoffman, EDF-4379, March 16, 2005

P024, Characterization and Shipping Records for Remote Handled (RH) Transuranic (TRU) Waste Stored at the Radioactive Waste Managment Complex (RWMC); Volumes XI, H. D. Killian and S. K. Mcdermott, 3460-94-084, September 1, 1994

P027, AK Summary Documentation RH TRU Repackaging, Ken Krivanek, RPT-456, October 1, 2007

P028, Email from Raj Bhatt, Re: Fast Scan Report Discrepancies, Ral Bhatt, July 18, 2007

P029, ILTSF Drum Retrieval Completion Report, Fairfield Service Group, ICP/EXT-05-00886, January 2006

U001, Attachment-Table I-Pu Curie Conversion Factors and Figures (NOFORN), WAPD-MT(IP)-1069

U002, ECF Route Card on Resin Column Beads and Fuel Chips Disposal (NOFORN), J. F. Ruggiero, 30729, January 18, 1980

U003, NRF Radioactive Waste Forms 10-27-77 through 11-4-77

U004, NRF Radioactive Waste Forms and Material Transfer Forms 11-19-78 through 3-1-79

U005, NRF Radioactive Waste Forms and Material Transfer Forms 01-01-79 through 12-31-79

U006, NRF Radioactive Waste Forms and Material Transfer Forms 01-01-78 through 12-31-78

U007, NRF Radioactive Waste Forms and Material Transfer Forms 01-01-77 through 12-31-77

U008, Form 828, RH TRU RTR Prescreen for Repackaging/AK Worksheet for NRF Drums, August 14, 2007

U009, RH TRU Overpack Log, J. Hegsted, November 21, 2007

U010, ECF Route Card -Disposition of Scrap Cannister, NB-200, J. F. Ruggiero, 20986, November 17, 1975

U011, Route Card Change Form - Load & Ship Combustible Trans-U Waste, J. F. Ruggiero, 29874, December 5, 1978

U012, ECF Route Card -Combustible Transuranic Waste Disposal-Loading & Shipment to INEL RWMC, J. F. Ruggiero, 29182, October 12, 1977

U013, NRF Onsite Radioactive Material Shipping Record

U014, Transuranic Waste Container Form and Attachments, R. K. Hines, April 10, 1981

U015, General Procedures for the Expended Core Facilty Nuclear Material Balance Area (UCNI), NRF1202, WP/169, Revision 5, August 1, 1984

U016, Pyrophoricity and Ignitability of SPC Contents

U017, ECF Route Card-Load and Ship Combustible Trans-U Waste, RC 30020, March 5, 1979

U018, Route Card Change Form-Prep Trans-U Waste Shipping Drums Change Notice No. 1, RC 30022, March 12, 1979

U019, Summation of Partial Activities of SPCs (NOFORN)

U020, Low Level Trans U Waste

U022, ECF Route Card-Dispose Alpha Box Waste, J. F. Ruggiero, RC 32195, August 8, 1986

U023, ECF Route Card-Alpha Box Waste Disposal (Poly Canisters-EC-51 through EC-60), RC 32836, November 8, 1988

U027, Alpha Box Log Volume 1 (NOFORN), March 1, 1976

U028, Alpha Box Log Volume 2 (NOFORN), March 26, 1985

U030, ECF Route Card: Unload Trans-U Waste Storage Vault-TR-U-Poly-7 (November 1976), J. F. Ruggiero, RC 29447, February 3, 1978

U032, ECF Route Card-Load and Ship Transuranic Waste 3D-Gallon Drums, J. F. Ruggiero, RC 29333, December 19, 1977

U033, Radiological Control Survey Maps and Rabe Bottle Radiation Readings, Joe Bates and S. Marriott, October 25, 1977

U060, Results of Plutonium Analysis of Core

U061, Plutonium and Uranium Content per Drum Number

U062, Combustible Transuranic Waste-ILTSF Shipment Summary

U063, Transuranic Waste Disposition (Proposed) Projection, November 4, 1977

U064, RH Waste Characterization Questionnaire

U066, Alpha Box Combustible Waste Record Sheet, February 2, 1978

U067, Transuranic Noncombustible Waste Record Sheet, January 14, 1980

U070, ANL Radiation Dose to Packaging Over 20 Year Storage Hand Calculations

U072, Review of the intermediate Level Transuranic Storage Facility Mixed Waste

U073, List of Shipments from ANL-W, NRF, TRA

U074, Drum Evaluation, WMP, Rad, James Luginbyhl, May 15, 2008

U106, SPC Load Logs for SPCs 31-85, 87-89, 71A, and 39A

U109, Data Logs for SPCs in TUVs

U149, CCP Calc Package: Sample Data Input Check, J. Vance, INL-RH-70, August 28, 2009

U150, CCP Calc Package: Scaling Factor Development for Fuel Types, J. Vance, INL-RH-71, July 11, 2009

U151, CCP Calc Package: Fuel Type Assignment to SPCs, James Holderness, INL-RH-72, August 24, 2009

U152, CCP Calc Package: Sample Scaling Factors, J. Vance, INL-RH-73, July 11, 2009

U153, CCP Calc Package: Waste Stream Scaling Factor Development for NRF Debris, J. Vance, INL-RH-74, July 11, 2009

U154, CCP Calc Package: Analysis of Fuel Type Contribution to Samples, James Holderness, INL-RH-75, August 24, 2009

U155, CCP Calc Package: Comparison of Sample Scaling Factors to NRF Scaling Factors, J. Vance, INL-RH-76, July 11, 2009

U156, CCP Calc Package: Uncertainty Analysis for NRF Debris Drums, James Holderness, INL-RH-77, August 22, 2009

U157, CCP Calc Package: INL NRF Cs-137 Dose-to-Curie Correlation for 55-Gallon Drums, Jene Vance, INL-RH-78, July 18, 2009

U158, CCP Calc Package: Determination of Reportable Isotopes - Debris, Jene Vance, INL-RH-79, Revision 1, March 3, 2010

U159, CCP Calc Package: DTC Spreadsheet for NRF Debris, James Holderness, INL-RH-80, September 24, 2009

U168, Cs-137 DTC Correlation for 55-Gal Drums with Internal Shielding, James Holderness, INL-RH-89, August 7, 2009

U169, DTC Spreadsheet for 55-Gal Drums with internal Lead Shielding, J. Vance, INL-RH-90, August 28, 2009

Spreadsheet, Draft, Summarizing Non-Classified Information Pertaining to Drum Numbers, Rabe/Canister Numbers, SPCs, Fuel Type (I-V), and Packaging Dates, provided August 11, 2010

Engineering Design File EDF-8775, Revision 1, Radiological Properties of Sludge Pan Container Waste from Naval Reactors Facility, August 27, 2009, NOFORN

ATTACHMENT C

EPA EVALUATION ISSUE TRACKING FORM – REAL-TIME RADIOGRAPHY

Inspection No. T1, Waste Stream IN-ID-NRF-153	**Issue Number:** NRF-RH-RTR-10-001C **Date:** August 11, 2010
Inspector: Dorothy E. Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** 1 **Population size (if known):** Unknown

Description of Issue: Specifically, while performing RTR on container IDINEC0300006, the operator went off line to further investigate the presence/absence of prohibited liquid. The operator did not state specifically or document in the written record what was done while off line. The CCP SPM contacted the operator regarding this issue stated that the operator could not remember what she had done during that break in recording.

EPA is concerned about the completeness of RTR records. While 100% of the container was viewed, analyzed and recorded, the undocumented stopping of the recording to verify a component critical to compliance is not a desirable practice. In a similar instance, during the Hanford-CCP baseline inspection, EPA inspectors observed a calculation of free liquid in a container that did not form part of the official record (Hanford-CCP-CH-RTR-10-001CR). While the two specific occurrences described here may not have affected the RTR data generated, EPA is concerned that complete records of what operator did when characterizing a container must be generated for all containers examined.

All actions of an operator that has a technical bearing on the acceptability of data used to support waste characterization (waste isolation) must be available for internal reviewers and federal inspectors. Specifically, actions that are relevant to identification of physical contents and/or prohibited items (waste characterization/isolation) must be part of the auditable record. The RTR operators must be trained to understand that these actions must be performed in such a way that they are part of the official auditable record that documents container's characterization, i.e., can serve as objective evidence to support EPA's approval decision.

B. Regulatory Reference: 40 CFR 194.24(c)(4) and WCPIP, Revision 2, Draft D, Section 4.1.4.3, Completeness QAO.

C. Site requirement(s): Not applicable

D. Discussed with: Irene Quintana (CCP SPM), Court Fesmire (CBFO, NTP), Mike Wallentine (CCP)

E. Additional Comments: None

F. Site Response Information:

Site Response Required? ☐ YES ☒ NO