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

NOV - 5 2014

OFFICE OF
AIR AND RADIATION

Mr. J. R. Stroble
Manager, TRU Sites and Transportation Division
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, NM 88221-3090

Dear Mr. Stroble:

On May 30, 2014, the Carlsbad Field Office (CBFO) requested that, as a Tier 1 (T1) change, the U.S. Environmental Protection Agency (EPA) approve remote-handled (RH) transuranic (TRU) waste stream ID-TRA-W345-RH (Lot 8B) at the Idaho National Laboratory (INL) for disposal at the Waste Isolation Pilot Plant (WIPP). EPA conducted a desk-top evaluation of the supporting documentation. The scope of this evaluation only covered acceptable knowledge and radiological characterization. The enclosed report (EPA Docket No. A-98-49; II-A4-194; EPA Air eDocket # EPA-HQ-OAR-2001-0012-0441) details EPA's evaluation. This approval also allows the future addition of additional waste containers to this stream with a similar waste pedigree (radiological and physical contents) and characterized using the EPA-approved processes discussed in the enclosed report.

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

cc: Electronic Distribution
Alton Harris, DOE EM
Joe Franco, CBFO
Norma Castaneda, CBFO
Marcus Pinzel, CBFO
Ed Gulbransen, CCP
Ben Roberts, DOE ID
Trais Kilphuis, NMED
Ricardo Maestas, NMED
Site Documents
Ray Lee, EPA

DOCKET NO: A-98-49; II-A4-194
EPA Air eDocket # EPA-HQ-OAR-2001-0012-0441

WASTE CHARACTERIZATION TIER 1 CHANGE REPORT

EPA TIER 1 EVALUATION OF THE CENTRAL CHARACTERIZATION PROGRAM REMOTE-HANDLED TRANSURANIC WASTE CHARACTERIZATION PROGRAM FOR THE IDAHO NATIONAL LABORATORY: ADDITION OF WASTE STREAM ID-TRA-W345-RH (LOT 8B)

U.S. Environmental Protection Agency
Radiation Protection Division
Center for Waste Management & Regulations
1200 Pennsylvania Avenue, NW
Washington, DC 20460

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TABLE OF CONTENTS

Section		Page
Abbreviations and Acronyms		ii
1.0	Introduction	4
2.0	Purpose of Tier 1 Evaluations	5
3.0	Purpose of This Report	5
4.0	Scope of The Tier 1 Evaluation	6
5.0	Evaluation Personnel	6
6.0	Technical Evaluation	6
	6.1 Acceptable Knowledge	7
	6.2 Radiological Characterization	9
7.0	Findings and Concerns	15
8.0	Conclusions	15

TABLE OF TABLES

Table 1. EPA Tier 1 Evaluation Team Members 6

TABLE OF FIGURES

Figure 1. Radiological Characterization Flow Diagram for Waste Stream ID-TRA-W345-RH . 10

Figure 2. Outline of Confirmation Test Plan 12

ATTACHMENTS

Attachment A: Approval Summary for INL-CCP RH Waste Characterization Program

Attachment B: List of Documents Reviewed by EPA during T1 Evaluation

ABBREVIATIONS AND ACRONYMS

AK	acceptable knowledge
AKSR	acceptable knowledge summary report
ANL	Argonne National Laboratory
ANLE	Argonne National Laboratory - East
BDR	batch data report
CBFO	Carlsbad Field Office
CCP	Central Characterization Program
CFR	Code of Federal Regulations
Ci	curie
Ci/g	curies per gram
cm	centimeter
Cm	curium
CTP	confirmation test plan
DOE	U.S. Department of Energy
DQO	Data Quality Objective
DTC	dose-to-curie
EBR	Experimental Breeder Reactor
EPA	U.S. Environmental Protection Agency
g/cc	grams per cubic centimeter
HFEF	Hot Fuel Examination Facility
HLW	high-level waste
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
m	meter
MCNP5	Monte Carlo N-Particle Transport Code RSICC Computer Code Collection, Oak Ridge National Laboratory
MFC	Materials and Fuels Complex
mR/hr	milliroentgen per hour
nCi/g	nanocuries per gram
rem	Roentgen equivalent man
RH	remote-handled
SC&A	S. Cohen and Associates (SC&A, Inc.)

SNF	spent nuclear fuel
T1	Tier 1
T2	Tier 2
TMU	total measurement uncertainty
TRA	Test Reactor Area
TRU	transuranic
WCPIP	Waste Characterization Program Implementation Plan
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

This report supports the U.S. Environmental Protection Agency's (EPA's) approval of a Tier 1 (T1) change that adds Waste Stream ID-TRA-W345-RH (Lot 8B) to the approved remote-handled (RH) transuranic (TRU) waste characterization program at the U.S. Department of Energy's (DOE's) Idaho National Laboratory (INL). In January 2007, EPA approved the Central Characterization Program (CCP)[1] to characterize RH TRU waste at INL. Using the EPA-approved waste characterization processes discussed in this report, INL-CCP may characterize Waste Stream ID-TRA-W345-RH debris waste for disposal at the Waste Isolation Pilot Plant (WIPP).

EPA conducted a continued compliance inspection of INL-CCP in May 2014, concluding that INL-CCP continues to adequately implement the RH TRU waste characterization processes, procedures and equipment at INL that EPA approved in the January 2007 baseline approval and in subsequent tiering changes listed in Attachment A. On May 30, 2014, the Carlsbad Field Office (CBFO) requested EPA approval of a T1 change to add Waste Stream ID-TRA-W345-RH (Lot 8B) (hereafter referred to as "Waste Stream ID-TRA-W345-RH") to the INL-CCP RH waste characterization program. EPA limited the scope of this T1 evaluation to the components of acceptable knowledge (AK) and radiological characterization specific to the addition of Waste Stream ID-TRA-W345-RH. Because INL-CCP did not use new equipment or processes to characterize the subject waste, EPA conducted a desktop review of this change in June–October 2014.

EPA did not identify any findings or concerns during this evaluation. Attachment B is a list of all documentation reviewed, including batch data reports (BDRs) and calculation packages.

As a result of this evaluation, EPA did not make any changes to the INL-CCP RH T1 and Tier 2 (T2) designations established following the baseline approval and modified subsequently as needed as a result of EPA's approval of previous INL-CCP RH T1 change requests and EPA's annual continued compliance inspections. The tiering designations presented in Table 2 of the final report for EPA's 2014 continued compliance inspection of INL-CCP (see EPA Docket No. A-98-49; II-A4-190; July 15, 2014) remain in effect and are listed as applicable in sections 6.1 and 6.2 of this report.

Based on the information provided, EPA concluded that INL-CCP used the EPA-approved system of controls to characterize the single container in Waste Stream ID-TRA-W345-RH. This single container of TRU waste in Lot 8B is the subject of this T1 report, but EPA's approval also includes any additional drums that might be added to Waste Stream ID-TRA-W345-RH in the future, provided they are characterized using the processes used for characterizing the single container in Lot 8B as discussed in this report.

This report serves as EPA's public notification of the results of the proposed T1 change and its evaluation. This information will be provided through the EPA website and by emails to the

[1] The Central Characterization Program was formerly known as the Central Characterization Project, and both names are used in the documentation reviewed for this evaluation.

WIPPNEWS list, in accordance with Title 40 of the Code of Federal Regulations [40 CFR 194.8(b)(3)].

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 CFR 194.8 regulations and incorporated into the INL-CCP RH baseline final report (see EPA Docket No. A-98-49; II-A4-72).

Under the changes to 40 CFR 194.8 promulgated in the July 16, 2004, Federal Register notice (Vol. 69, No. 136, pages 42571–42583), EPA must perform a single baseline inspection of a TRU waste generator site's waste characterization program. 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 notification (T2) are identified in the site-specific baseline inspection reports and subsequent T1 evaluation reports. When evaluating proposed T1 changes for approval, EPA may conduct a site inspection to observe 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 any previously approved TRU waste using processes, procedures or equipment implemented as T2 changes at risk of subsequent EPA disapproval.

3.0 PURPOSE OF THIS REPORT

This report presents the results of EPA's evaluation of a T1 change to add Waste Stream ID-TRA-W345-RH to the EPA-approved waste characterization program. This report presents the technical basis for and results of EPA's approval decision. EPA's approval of the addition of Waste Stream ID-TRA-W345-RH has been conveyed to DOE separately by letter. EPA will also announce the decision on its website at www.epa.gov/radiation/wipp, in accordance with 40 CFR 194.8(b)(3).

Any of the T1 change request-specific documents mentioned in this report can be requested from the following address:

Manager, National TRU Sites and Transportation Division
Carlsbad Field Office
U.S. Department of Energy
P O Box 3090
Carlsbad, NM 88221-3090

4.0 SCOPE OF THE TIER 1 EVALUATION

The scope of EPA's T1 evaluation is the AK process and radiological characterization approach used to characterize Waste Stream ID-TRA-W345-RH. Sections 6.1–6.2 of this report detail the technical elements assessed during this evaluation.

5.0 EVALUATION PERSONNEL

The EPA evaluation team members consisted of the personnel listed in Table 1 with their affiliations and functions. EPA relied primarily on reviews of documents and information provided by INL-CCP. When additional information or clarifications were needed, EPA had discussions with Irene Joo, the CCP RH Project Manager, who served as the point of contact for this T1 evaluation.

Table 1. EPA Tier 1 Evaluation Team Members

Name	Affiliation & Function
Rajani Joglekar	Lead Inspector, U.S. EPA
Ed Feltcorn	Inspector, U.S. EPA
Kira Darlow	Technical Evaluator – Acceptable Knowledge, SC&A
Rose Gogliotti	Technical Evaluator – Radiological Characterization, SC&A
Patrick Kelly	Technical Evaluator – Radiological Characterization, SC&A
Amir Mobasheran	Technical Evaluator – Radiological Characterization, SC&A

6.0 TECHNICAL EVALUATION

Waste-Generating Activities and Waste Overview

Waste Stream ID-TRA-W345-RH consists of a single container of heterogeneous debris that was generated during the examination of cross section samples in the Alpha Laboratories at the Test Reactor Area (TRA; now known as the Advanced Test Reactor Complex). The debris is curium-244 (^{244}Cm) oxide source material, which this report refers to as "^{244}Cm," "^{244}Cm oxide neutron sources," "cross section samples" and "neutron cross section samples," consistent with the nomenclature that INL-CCP documents use to describe it. INL-CCP Packaging documentation indicates that the drum contained 1,112 curies (Ci) of ^{244}Cm at the time of packaging. INL-CCP confirmed this initial inventory value and qualified the value for use in the radiological characterization program as documented in CCP-CN-INL-635, Revision 0, and section 6.2, below.

In June 1973, INL initially packaged the waste with lead shot inside three capped pipe components within a six-inch diameter steel pipe in the center of a concrete annulus approximately 8 inches thick. INL placed the pipe and concrete shielding in a 55-gallon drum, and overpacked the 55-gallon drum in an 85-gallon drum. From August 1973 to June 2009, INL stored the 85-gallon drum at the Radioactive Waste Management Complex. In June 2009, INL transferred the drum to the Idaho Nuclear Technology and Engineering Center (INTEC) for repackaging and RH waste characterization.

Packaging Configuration

The initial 85-gallon drum waste packaging described above is not the current packaging configuration for this drum. However, it is important because INL-CCP performed dose-to-curie (DTC) for AK confirmation on the drum in this configuration. Much of the documentation refers to the 85-gallon drum because INL originally thought it would be the final configuration.

During repackaging, INL-CCP opened the pipe components and emptied their contents into a single 1-gallon can. The can and the empty pipe components are centered in a 30-gallon drum, which is overpacked into a 55-gallon drum. The 55-gallon drum is the final disposal configuration for the waste. INL-CCP segregated the original drums and cement and did not include them in Waste Stream ID-TRA-W345-RH.

Documents Provided

EPA evaluated the INL-CCP documentation that supported the addition of Waste Stream ID-TRA-W345-RH. INL-CCP provided CCP-AK-INL-630, Revision 0; CCP-RC-INL-631, Revision 0; CCP-CP-INL-632, Revision 0; and CCP-CN-INL-635, Revision 0, to EPA for review.

The DOE documents that EPA reviewed for this evaluation, including BDRs and calculation packages, are cited in different sections throughout the report and are listed in Attachment B.

6.1 Acceptable Knowledge

EPA examined INL-CCP's programmatic requirements, the AK process and associated information during the continued compliance inspection in May 2014 (see EPA Docket No. A-98-49; II-A4-190; July 15, 2014). Specifically, EPA evaluated applicable CCP procedures; training for all personnel involved with RH TRU characterization; the processes of AK compilation, AK verification, AK accuracy assessment and AK discrepancy resolution; completion and adequacy of required forms and reports; and the INL-CCP waste stream certification process. Therefore, EPA limited the scope of this evaluation to the technical adequacy of the information supporting the addition of Waste Stream ID-TRA-W345-RH.

Waste Characterization Element Description

EPA limited this T1 evaluation to the technical elements listed below.

- Waste stream definition, including waste generation and radiological and physical characteristics.
- Verification that the subject waste is of defense origin and is not high-level waste (HLW) or spent nuclear fuel (SNF).

Technical Evaluation

EPA evaluated the adequacy of AK information specific to Waste Stream ID-TRA-W345-RH, as described in the AK Summary Report (AKSR) (CCP-AK-INL-630, Revision 0) and associated source documents.

(1) EPA examined the waste stream determination for Waste Stream ID-TRA-W345-RH and found it to be adequate.

A waste stream is defined as waste material that is generated from a single process/activity and is similar in material, physical form, and radiological properties. As described in the overview portion of section 6.0, above, INL generated the debris waste in Waste Stream ID-TRA-W345-RH during examination of ^{244}Cm oxide to study neutron cross sections at the TRA Alpha Laboratory in 1973. The waste contained 1,112 Ci of ^{244}Cm when INL originally packaged it in July 1973. The AK mentions other radionuclides that may be present in trace quantities, but does not include any other quantities. The commonality of waste generation process and physical/radiological waste characteristics is adequately demonstrated.

(2) EPA examined the waste stream information that supports the absence of spent nuclear fuel or high-level waste in this waste stream and found it to be adequate.

The WIPP Land Withdrawal Act prohibits the disposal of SNF and HLW as defined by the Nuclear Waste Policy Act at the WIPP. Waste Stream ID-TRA-W345-RH includes debris generated from sample preparation and analysis of ^{244}Cm oxide neutron sources at the TRA Alpha Laboratory. The operations related to ^{244}Cm oxide did not involve reprocessing of constituent elements from reactor fuel (References U4055, U4056 and U7001). Therefore, Waste Stream ID-TRA-W345-RH does not contain SNF or HLW.

(3) EPA examined the information supporting that the waste stream is defense in origin and found it to be adequate.

AK indicates that the cross-section samples discussed above originated from the Materials Test Reactor at TRA, the Experimental Breeder Reactor (EBR) – II at Argonne National Laboratory-West, and weapon tests at the Nevada Test Site. All three reactors had defense missions. (References P5197, U4055 and U7001). In addition, DOE assumes that Waste Stream ID-TRA-W345-RH is commingled with other radioactive samples processed in the Alpha Laboratory for research and development activities supporting arms control/nonproliferation, fusion safety (as part of an international program), and development of HLW separations technologies (References P5054, P5071 and P5235).

Summary of Acceptable Knowledge Findings and Concerns

The EPA evaluation team did not identify any AK-related findings or concerns relative to the addition of Waste Stream ID-TRA-W345-RH during this T1 change evaluation.

Acceptable Knowledge Approval

Based on the results of this evaluation, EPA approves the addition of Waste Stream ID-TRA-W345-RH and finds that all requirements have been met. There are no changes to the AK T1 or T2 designations. Characterization of any new waste stream not approved under the baseline or subsequent T1 evaluations or addition of containers to an approved waste stream that requires changing the established radionuclide scaling factors remains a T1 change. T1 and T2 changes that EPA initiated during previous approvals remain in effect.

6.2 Radiological Characterization

EPA examined INL-CCP's programmatic requirements, the DTC process and associated information during the continued compliance inspection in May 2014 (see EPA Docket No. A-98-49; II-A4-190; July 15, 2014). Specifically, EPA evaluated training for all personnel involved with RH TRU characterization, the INL-CCP measurement control program for RH TRU instruments for radiological characterization and the INL-CCP RH TRU procedures and technical documents for the same. Therefore, EPA limited the scope of this evaluation to the technical adequacy of the information supporting the addition of Waste Stream ID-TRA-W345-RH.

Waste Characterization Element Description

EPA evaluated the radiological characterization of INL-CCP RH Waste Stream ID-TRA-W345-RH in terms of its technical adequacy, 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 RH evaluation, the EPA team evaluated the following elements of the INL-CCP radiological characterization program:

- Overall radiological characterization.
- Adequacy of confirmatory testing approach, using MCNP5 modeling and neutron DTC measurements.
- Calculation of the radionuclide content of associated radionuclides.
- RH and TRU determination.
- Uncertainty analysis.

Each of these is discussed in the sections that follow.

Technical Evaluation

EPA evaluated the adequacy of the radiological characterization process specific to Waste Stream ID-TRA-W345-RH, as described in the Radiological Characterization Technical Report (CCP-RC-INL-631, Revision 0) and calculation packages.

(1) EPA evaluated the overall radiological characterization process and its documentation and found them to be adequate.

The radiological characterization process for Waste Stream ID-TRA-W345-RH uses a neutron-based DTC method to confirm the ^{244}Cm content as reported in AK. EPA prepared a flow diagram to reflect this process, shown in Figure 1 below. EPA determined that the radiological characterization process for Waste Stream ID-TRA-W345-RH was technically adequate and appropriately documented. There were no concerns regarding the overall radiological characterization process and its documentation.

Consistent with the T1 and T2 designations that were established during the baseline approval, any new RH waste stream not approved to date or the addition of containers to Waste Stream ID-TRA-W345-RH that requires a radiological characterization process different from what is documented in CCP-RC-INL-631, Revision 0, remains a T1 change. Similarly, any change to CCP-RC-INL-631 that requires CBFO approval remains a T2 change.

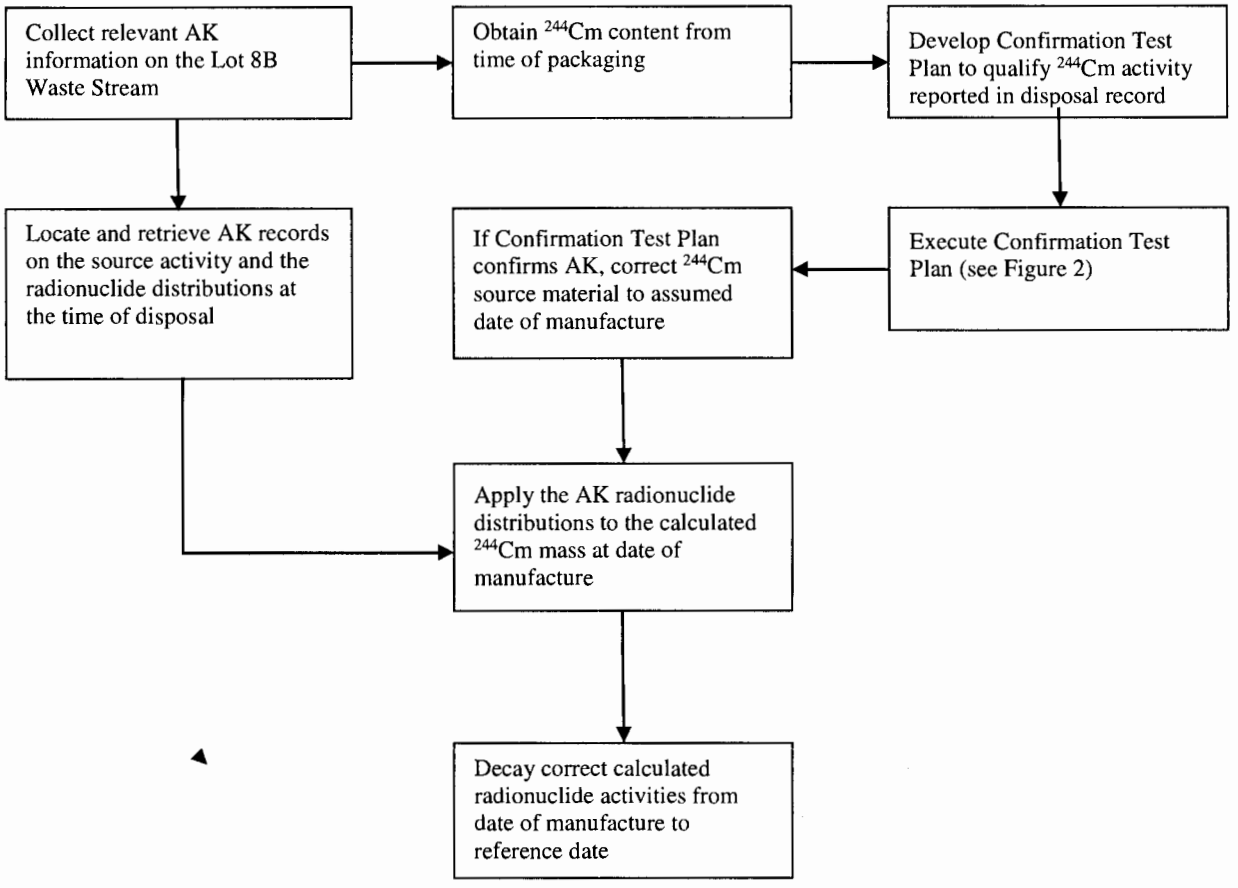

Figure 1. Radiological Characterization Flow Diagram for Waste Stream ID-TRA-W345-RH

(2) EPA found the confirmatory testing approach to be technically adequate and appropriately documented.

The loading records from AK indicate that 1,112 Ci of ^{244}Cm were packaged into the Lot 8B drum on June 25, 1973. This value was reported prior to the implementation of Section 5.3 of DOE/WIPP-02-3214, the Remote-Handled Waste Characterization Program Implementation Plan or WCPIP. The WCPIP requires that information that is used to satisfy Data Quality Objectives (DQOs) must be qualified by one of four approved methods. INL-CCP used confirmatory testing, one of the four approved methods, to quantify the drum's ^{244}Cm content at the time of loading.

INL-CCP developed a confirmation test plan (CTP), CCP-CN-INL-635, and EPA prepared a flow diagram to reflect this process, shown in Figure 2, below. The CTP outlines a neutron-based DTC approach where neutron dose[2] rates are taken at distances of 1-meter (m) and 30-centimeters (cm) at 90-degree rotational increments around the drum. The averages of each set of measurements were used to determine the drum's ^{244}Cm content. The DTC approach is discussed in additional detail in Item (3), below.

Although not part of the CTP, INL-CCP determined that there were three capped pipe components within the six-inch diameter steel pipe. INL-CCP unpacked the three capped pipe components and took contact dose measurements on each. Using MCNP5, INL-CCP estimated the ^{244}Cm content of each component, the values were decay corrected[3] and summed for comparison to the drum loading and DTC records. These steps are shown in Figure 2 as dashed lines because they were not included in the original testing plan.

The CTP specifies that the DTC-derived ^{244}Cm content would be corrected to the date of the initial drum loading, and the corrected value would be compared to the initial AK ^{244}Cm value of 1,112 Ci. The CTP states that the comparison would be acceptable if the two values compared within 32%. This criterion is based on: a measurement uncertainty of 25%; an MCNP5 modeling uncertainty of 10%; a source date uncertainty of 10%; and, a concrete composition uncertainty of 15%. These values were combined in quadrature[4] to derive the acceptance criterion of 32%.

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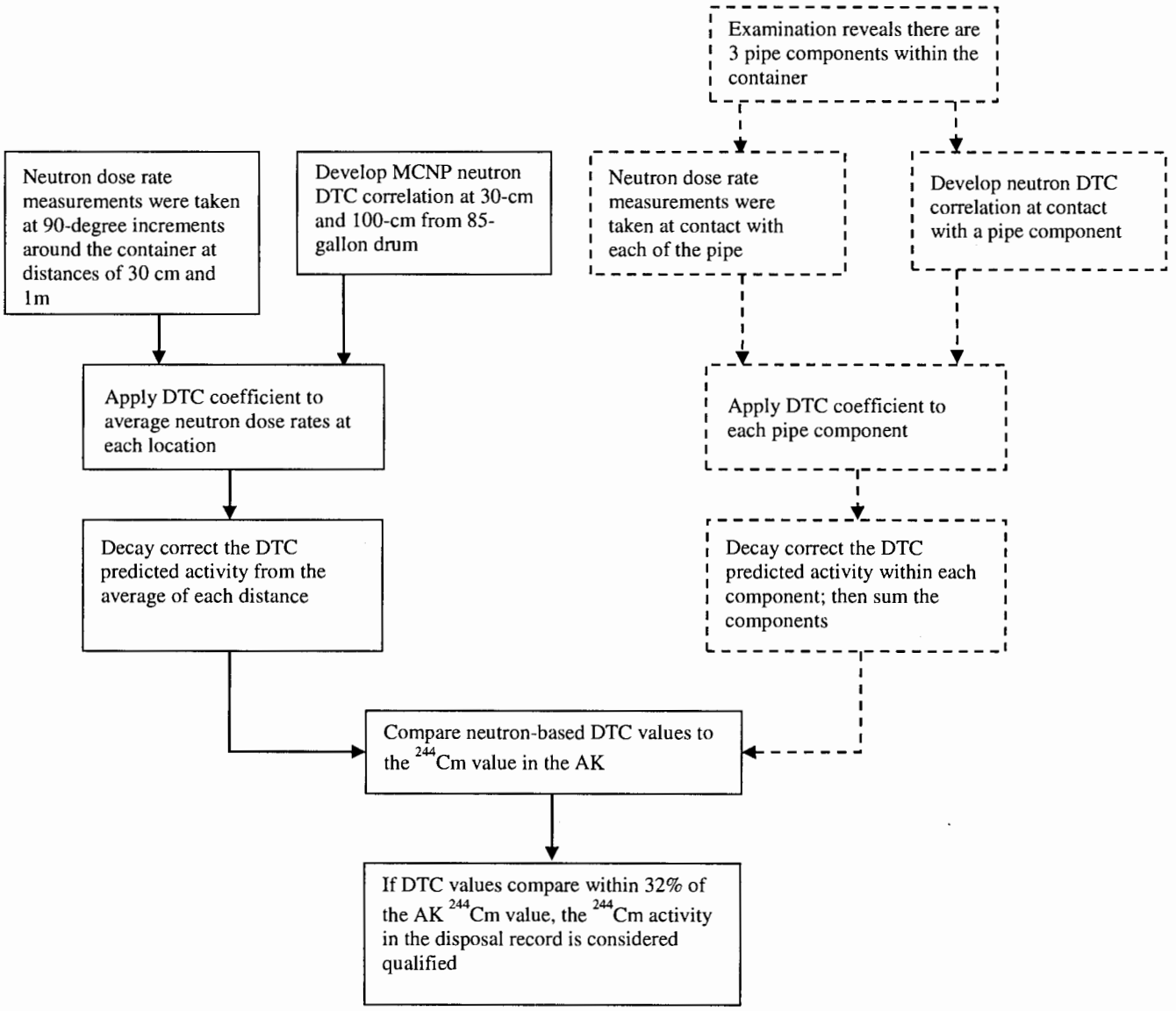
[2] *Rem* or *millirem* is a unit of dose equivalent, which is often called *dose* or when it is expressed per unit time, a *dose rate*. The criterion for RH determination is expressed in terms of a dose rate in rem, which, while technically incorrect, is commonly used. In this report, the terms *dose* and *dose rate* are used in place of the technically correct term *dose equivalent* or *dose equivalent rate*, and the terms *R* and *rem* are used interchangably. The actual differences among these values for the purpose of this report are negligible.

[3] The *decay correction* is a calculation to determine the drum's ^{244}Cm content on the date stated in the AK records. It should more correctly be called a *reverse decay correction* since the quantity being calculated is the ^{244}Cm content prior to decay over the time period from 1971 until the present. For purposes of this report, the term *decay correction* refers to the calculation of the drum's ^{244}Cm activity in 1971, by applying the appropriate decay kinetics to the drum's current ^{244}Cm value.

[4] Adding in quadrature is a standard statistical technique that allows one to combine the square root of the sum of each value squared, resulting in a lower value than what would be obtained if the values were simply added. For example, taking the square root of $(25\%)^2$ plus $(10\%)^2$ plus $(10\%)^2$ plus $(15\%)^2$ equals 32%, which is less than the value obtained by simply summing the individual uncertainty values (i.e., 60%).

The three decay-corrected DTC-derived measurements were 1,045 Ci at 30 cm, 1,240 Ci at 100 cm and 780 Ci at contact. The average of these measurements was 1,022 Ci. All four values were within 32% of the initial value of 1,112 Ci. Based on these data, INL-CCP concluded that the reported disposal record ^{244}Cm content was confirmed.

EPA reviewed the CTP and calculation package INL-RH-158, which documented the details of the confirmation process and found them to be technically adequate. There were no concerns regarding the technical adequacy and documentation of the confirmatory testing for the Lot 8B drum.



Dashed lines indicate steps added to the original confirmation testing plan due to the repackaging process.

Figure 2. Outline of Confirmation Test Plan

(3) EPA found the dose-to-curie modeling and execution to be technically adequate and appropriately documented.

The Lot 8B waste differs from the majority of INL-CCP RH TRU waste streams characterized using the DTC method in that ^{244}Cm is a neutron-emitting radionuclide. Typically, the DTC approach measures the gamma radiation associated with cesium-137 and applies radionuclide-specific scaling factors to derive values for those radionuclides, as described in the DTC procedure CCP-TP-504. Accordingly, the DTC measurements for Lot 8B were not taken using CCP-RH-504; the DTC approach is outlined in CCP-RC-INL-631 and CCP-CN-INL-635, and documented in detail in INL-RH-157, Revision 0, as discussed below.

INL-CCP modeled three waste configurations using MCNP5 to derive neutron-based DTC coefficients. The first and second models assumed measurements of an 85-gallon drum containing the ^{244}Cm source material, steel pipe, concrete annulus and a 55-gallon drum at distances of 30-cm and 100-cm from the 85-gallon drum's surface. The modeling assumed measurements were taken at a vertical height of 10 inches below the top of the container. The remaining model was assumed to be in contact with a source pipe component. All three components were slightly different in size, and INL-CCP averaged the three components. The pipe was assumed to be carbon steel [density 7.86 grams per cubic centimeter (g/cc)] and its contents were assumed to be lead (11.35 g/cc). Modeling for all three configurations is documented in INL-RH-157, Revision 0.

Four measurements were taken from the 30-cm and 100-cm distances at each of the 90-degree increments and the measurements were averaged. Additionally, a contact measurement was taken for each of the pipe components. Each of the five values (three pipe component values, 30-cm average, and 100-cm average) were decay corrected to the date of the disposal record. The decay-corrected pipe components were summed to estimate the total ^{244}Cm content at packaging. The pipe components, 30-cm average ^{244}Cm and 100-cm average ^{244}Cm content were then compared to the disposal record values of 1,112 Ci according to the criterion specified in Item (2), above.

There were no concerns regarding the neutron-based DTC modeling and execution for the Lot 8B waste.

(4) EPA evaluated the assumed contributions of associated radionuclides and found them to be adequate.

INL-CCP retrieved an Aerojet Nuclear Company Progress Report dated October 1971 from AK which gave the radionuclide distributions in the ^{244}Cm source material for three samples as shown in Table 4-1, of CCP-RC-INL-631. The radionuclide content of the ^{244}Cm was calculated using the average distraction from these samples. The ^{244}Cm activity at the date of disposal was then decay corrected to the assumed date of manufacture, January 15, 1968, resulting in a calculated activity of 1,272 Ci. The mass of ^{244}Cm at the date of manufacture was then estimated using the specific activity of 81.8 Ci/g. INL-CCP applied the estimated radionuclide distribution to the sample and decay corrected all values to a reference date of December 30, 2013. These values are reported on the Waste Container Radiological Characterization Record for the Lot 8B Drum No. 10087564C.

There were no concerns regarding the contributions of other radionuclides for the Lot 8B waste.

(5) EPA evaluated the remote-handled determinations and found them to be adequate.

EPA reviewed a Radiological Survey Report for Drum No.10087564C and found a maximum contact gamma dose rate of 300 mR/hr and a maximum contact neutron dose rate of 200 mR/hr. Based on these, INL-CCP determined that the drum met the 200 mRem/hr criterion for RH waste. There were no concerns regarding the RH determination for the Lot 8B waste.

(6) EPA evaluated the transuranic determinations and found them to be adequate.

Attachment 1 to CCP-RC-INL-631, Revision 0, contains revised Waste Container Radiological Characterization Records for Drum No. 10087564C. The container has a TRU alpha activity concentration of 1.40E+5 nanocuries per gram (nCi/g), clearly in excess of 100 nCi/g required of TRU waste. There were no concerns regarding the TRU determination for the Lot 8B waste.

(7) EPA evaluated the technical basis and documentation of total measurement uncertainty and found them to be adequate.

The development of total measurement uncertainty (TMU) for Waste Stream ID-TRA-W345-RH is based on the propagation of uncertainties present in the determination of the waste stream's radiological constituents. These aspects are assumed to be independent, allowing them to be added in quadrature. The TMU determination included contributions of the following:

- Uncertainty in manufacture date – Assumes an earlier date of manufacture
- Uncertainties in sample data – Based on the variability of samples used in the cross section measurements
- Uncertainties in reported quantity of ^{244}Cm – Based on the differences between the reported values and the average of three DTC values

A general treatment of TMU for Waste Stream ID-TRA-W345-RH is presented in CCP-RC-INL-631, Revision 0 and the detailed treatment is provided in INL-RH-160. The overall uncertainties are consistent with what EPA has observed for RH determinations at other RH TRU generator sites. Table 6-10 of CCP-RC-INL-631, Revision 0, provides an example of the TMU calculation for the Lot 8B drum.

There were no concerns regarding the technical adequacy and documentation of TMU for the Lot 8B waste.

Summary of Radiological Characterization Findings and Concerns

EPA did not identify any radiological characterization-related findings or concerns relative to the addition of Waste Stream ID-TRA-W345-RH during this T1 change evaluation.

Radiological Characterization Approval

Based on the results of this evaluation, EPA approves the addition of Waste Stream ID-TRA-W345-RH and finds that all requirements have been met. Based on this evaluation, there are no changes to the radiological characterization T1 or T2 designations. Characterization of any new waste stream not approved under the baseline or subsequent T1 evaluations or addition of containers to an approved waste stream that requires changing the established radionuclide scaling factors remains a T1 change. T1 and T2 changes that were initiated during the baseline approval remain in effect.

7.0 FINDINGS AND CONCERNS

Summary of Findings and Concerns

The EPA inspection team did not identify any findings or concerns relative to the addition of Waste Stream ID-TRA-W345-RH during this T1 change evaluation.

8.0 CONCLUSIONS

Changes to Tiering

As a result of this evaluation, EPA did not make any changes to the INL-CCP RH T1 and T2 designations that were established during the baseline approval and modified during subsequent T1 evaluations and continued compliance inspections. The tiering designations presented in Table 2 of the final report for EPA's 2014 continued compliance inspection of INL-CCP (see EPA Docket No. A-98-49; II-A4-190; July 15, 2014) remain in effect and are listed as applicable in sections 6.1 and 6.2.

Approval

EPA's evaluation of programmatic elements during EPA's May 2014 Continued Compliance inspection of IN-CCP TRU waste characterization program supplementing this evaluation of specific elements, EPA concluded that the AK waste characterization process and radiological characterization approach used to characterize RH TRU Waste Stream ID-TRA-W345-RH are adequate, as evidenced by the records evaluated. There are no open issues relative to this T1 evaluation.

Based on the results of this evaluation, EPA approves this T1 change to add Waste Stream ID-TRA-W345-RH, consistent with the limitations specified in this report. INL-CCP may continue to characterize previously approved RH TRU waste consistent with the restrictions specified with the approvals listed in Appendix A to this report.

ATTACHMENT A

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

Approved Activity	EPA Inspection Number, Approval Dates	EPA Docket Number
INL-CCP RH Baseline Approval	EPA-INL-CCP-RH-6.06-8, January 12, 2007	A-98-49; II-A4-72
T1 Change – Approval of WIPP Waste Information System	January 17, 2007	A-98-49; II-A4-74
T1 Change – Approval of Visual Examination	January 25, 2007	A-98-49; II-A4-75
T1 Change – Approval of Real-Time Radiography	February 12, 2007	A-98-49; II-A4-80
T1 Change – Approval of K Cell Wastes	January 1, 2008	A-98-49; II-A4-97
T1 Change – Approval of High-Range Gamma Probe for DTC	April 11, 2008	A-98-49; II-A4-98
T1 Change – Approval of Visual Examination Technique	September 22, 2009	A-98-49; II-A4-118
T1 Change – Addition of Twelve Containers to Waste Stream ID-ANLE-S5000 and Addition of Waste Stream ID-HFEF-S5400-RH	February 1, 2010	A-98-49; II-A4-122
T1 Change – Approval of Waste Stream ID-MFC-S5400-RH	June 8, 2010	A-98-49; II-A4-126
T1 Change – Approval of Waste Stream ID-INTEC-S5400-RH	August 17, 2010	A-98-49; II-A4-130
T1 Change – Addition of Lot 1B to Waste Stream ID-HFEF-S5400-RH	August 23, 2010	A-98-49; II-A4-131
T1 Change – Approval of Waste Stream IN-ID-NRF-153	November 1, 2010	A-98-49; II-A4-135
T1 Change – Approval of Waste Stream ID-RTC-S3000	November 1, 2010	A-98-49; II-A4-137
2010 Continued Compliance Inspection	March 16, 2011	A-98-49; II-A4-142
T1 Change – Addition of Lot 4A to Waste Stream ID-HFEF-S5400-RH	March 23, 2011	A-98-49; II-A4-145
T1 Change – Approval of Waste Stream IN-ID-NRF-SPC	March 12, 2012	A-98-49; II-A4-159
T1 Change – Addition of Lot 2 to Waste Stream ID-ANLE-S5000	July 25, 2012	A-98-49; II-A4-163
2013 Continued Compliance Inspection	July 16, 2013	A-98-49; II-A4-175
T1 Change – Approval of Waste Stream ID-EBR-S5000	April 16, 2014	A-98-49; II-A4-183
T1 Change – Addition of Lot 5C to Waste Stream ID-HFEF-S5400-RH	July 15, 2014	A-98-49; II-A4-185
T1 Change – Approval of Waste Stream ID-MFC-SOLID-RH	September 10, 2014	A-98-49; II-A4-188
2014 Continued Compliance Inspection	July 15, 2014	A-98-49; II-A4-190

ATTACHMENT B

LIST OF DOCUMENTS REVIEWED BY EPA DURING T1 EVALUATION

CCP-AK-INL-630, Central Characterization Program Acceptable Knowledge Summary Report for Remote-Handled Transuranic Debris from Test Reactor Area at the Idaho National Laboratory, Waste Stream: ID-TRA-W345-RH, Revision 0, July 25, 2013

CCP-RC-INL-631, Central Characterization Program Remote-Handled Transuranic Radiological Characterization Technical Report for Remote-Handled Transuranic Debris Waste from Test Reactor Area at the Idaho National Laboratory, Waste Stream: ID-TRA-W345-RH, Revision 0, May 7, 2014

CCP-CP-INL-632, Central Characterization Program RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance for Remote-Handled Transuranic Debris Waste from Test Reactor Area at the Idaho National Laboratory, Waste Stream: ID-TRA-W345-RH, Revision 0, November 7, 2013

CCP-CN-INL-635, Central Characterization Program Source Material Inventory Confirmation Test Plan for Remote-Handled Transuranic Debris Waste from Test Reactor Area at the Idaho National Laboratory Waste Stream: ID-TRA-W345-RH, Revision 0, October 29, 2013

P5054, Defense-Related Waste Determination for Legacy Transuranic Waste at the ldaho National Laboratory Test Reactor Area Warm and Hot Waste Systems, Idaho Completion Project, ICP/EXT-04-00729, Revision 0, April 2005

P5071, National Reactor Testing Station, U. S. Atomic Energy Commission, July 1967

P5197, Proving the Principle, Susan M. Stacy, DOE/ID-10799, 2000

P5235, A Comprehensive Inventory of Radiological and Nonradiological Contaminants in Waste Buried in the Subsurface Disposal Area of the INEL RWMC During the Years 1952–1983, Idaho National Engineering laboratory, EGG-WM-10903 and INEL-95/0310, Revision 0 and Revision 1, June 1994 and August 1995

U4055, Waste Determination and Disposition Form, INTECT-052-09, 5919N, date not given

U4056, Integrated Waste Tracking System Container Profile, Container No. 10087564, not dated

U7001, Additional RH Drum Characterization Information Discussion, date unknown