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WASTE CHARACTERIZATION INSPECTION REPORT

FINAL APPROVAL

EPA BASELINE INSPECTION NO. EPA-SNL-CCP-RH-06.11-8 OF THE CENTRAL CHARACTERIZATION PROJECT REMOTE-HANDLED TRANSURANIC WASTE CHARACTERIZATION PROGRAM FOR THE SANDIA NATIONAL LABORATORY: March 8, 2011; May 10, 2011; June 7-8, 2011

U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
Center for Waste Management and Regulations
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ACRONYMS AND INITIALIZATIONS

ACRR	Annular Core Research Reactor
AK	acceptable knowledge
AKE	acceptable knowledge expert
AKSR	acceptable knowledge summary report
Am	americium
Ba	barium
BDR	batch data report
CBFO	Carlsbad Area Field Office
CCP	Central Characterization Project
CFR	Code of Federal Regulations
CH	contact-handled
Ci	curie
CIS	Characterization Information Summary
Co	cobalt
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
DU	Depleted Uranium
EPA	U.S. Environmental Protection Agency
Eu	europium
EU	Enriched Uranium
FR	*Federal Register*
g	gram or grams
g/cm^3	grams per cubic centimeter
HCF	hot cell facility

HLW	high-level waste
HIP	high pressure container
ICP	Idaho Cleanup Project
ICP-MS	Inductively Coupled Plasma-Mass Spectrometry
in	inch or inches
IDL	instrument detection limit
INL	Idaho National Laboratory
ITR	Independent Technical Reviewer
kg	kilogram or kilograms
ICP-MS	Inductively Coupled Plasma-Mass Spectrometry
LANL	Los Alamos National Laboratory
LCS	laboratory control sample
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
MP	melt progression
mR/hr/Ci	milli Roentgen per hour per Curie
mrem/hr	millirem per hour
MT	Material Types
nCi/g	nanocurie per gram
NCR	non-conformance report
NDE	non-destructive examination
NPR	New Production Reactor
NWPA	*Nuclear Waste Policy Act*
OM	other metal
ORIA	Office of Radiation and Indoor Air
Pu	plutonium
PKE	Process Knowledge Evaluation
QA	quality assurance
QAO	quality assurance objectives
QAPD	Quality Assurance Program Document

QC	quality control
RC	radiological characterization
RH	remote-handled
RTR	real-time radiography
RWNMDD	Regulated Waste Nuclear Material Disposition Department
SAP	sampling and analysis plan
SCB	steel containment box
SCG	summary category group
SNF	spent nuclear fuel
SNL	Sandia National Laboratories
SPM	Site Project Manager
SQS	Small Quantity Sites
Sr	strontium
T1	Tier 1
T2	Tier 2
TA	technical area
Th	thorium
TMU	Total Measurement Uncertainty
TRU	transuranic
U	uranium
VE	visual examination
VEE	visual examination expert
VEO	visual examination official
WAC	waste acceptance criteria
WCPIP	Waste Characterization Program Implementation Plan
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
Y	yttrium

1.0 EXECUTIVE SUMMARY

This report discusses the U.S. Environmental Protection Agency's final approval of a single remote-handled (RH) transuranic (TRU) debris waste stream characterized using the waste characterization program implemented by the Central Characterization Project (CCP) at Sandia National Laboratories (SNL), in Albuquerque, New Mexico.[1] In accordance with 40 CFR 194.8(b), the EPA conducted Baseline Inspection No. EPA-SNL-CCP-RH-06.11-8 of the CCP's waste characterization program for RH TRU waste at the U.S. Department of Energy's (DOE) SNL located in Albuquerque, New Mexico.

EPA issued a proposed approval decision notice on October 6, 2011 (76 FR 62062-62066). Along with this proposed approval, EPA announced a 45-day public comment period which closed on November 21, 2011. EPA did not receive any comments. As a result, EPA is finalizing the proposed approval of SNL-CCP's RH TRU waste characterization program for debris waste (S5000) along with the conditions and limitations identified in Table 1 and as discussed in this report. DOE is approved to emplace SNL-CCP RH TRU debris waste stream SNL-HCF-S5400-RH discussed in this report in the Waste Isolation Pilot Plant (WIPP).

The inspection took place in three steps: observation of the Visual Examination (VE) and sampling process at SNL on March 8, 2011; dose-to-curie (DTC) measurements on May 10, 2011 at SNL; and, the formal baseline inspection on June 7-8, 2011, held in Golden, Colorado. The inspection's scope included one RH waste stream, SNL-HCF-S5400-RH, consisting of research and experimental debris generated at SNL from 1973 through 1992. This inspection evaluated: acceptable knowledge (AK) records; DTC, in conjunction with radionuclide-specific scaling factors supported by radiochemical analyses of smear[2] samples from the parcels[3]; and VE to confirm the physical and radiological contents of waste containers.[4] EPA identified one concern during this inspection related to the lack of objective evidence showing training of AK personnel, as discussed in Section 8.1, (13) of this report. A copy of the EPA Inspection Issue Tracking Form that captures the finding is included in Attachment C of this report. The EPA inspection team completed their review of the documents submitted in response to the EPA concern and determined that the response is adequate. EPA considers this issue to be closed and no issues resulting from this baseline inspection remain open at this time.

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[1] SNL also has a site in California and reference to SNL in this report is an exclusive reference to SNL, New Mexico, unless otherwise stated.

[2] A *smear*, *wipe* or *swipe* is a non-quantitative test for the presence of removable radioactive materials in which a surface or area is wiped with a filter paper or other substance, which is then assayed for specific radionuclides using destructive or nondestructive techniques. The SNL-CCP sampling efforts used Q-Tips or cotton swabs for this purpose, as used in this report.

[3] SNL is the only site within the DOE TRU Complex that uses parcel as a term for a waste package instead of the term container, commonly used to describe a waste package. More than one parcel may be put into a 30-gallon drum which in turn goes into a 55-gallon container for WIPP disposal. Therefore, throughout the report, the term "parcel" is used to be consistent with its use by the site.

[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.

Table 1. Tiering of RH TRU Waste Characterization Processes Implemented by SNL-CCP

(Based on June 6-8, 2011 Baseline Inspection)

RH Waste Characterization Process Elements	SNL-CCP RH Waste Characterization Process - T1 Changes	SNL-CCP RH Waste Characterization Process - T2 Changes*
Acceptable Knowledge (AK)	Two remaining waste groups (PKE00047 and PKE00027/54) belonging to a debris waste stream SNL-HCF-S5400-RH and any new RH waste stream not approved to date or modification of an approved waste stream to include additional containers if new or different radionuclide scaling factors are required (AK1) Substantive modification(s)** that have the potential to affect the characterization process to CCP-AK-SNL-500 or CCP-AK-SNL-502 (AK2, AK6)	Notification to EPA: • Upon completion of revisions of CCP-AK-SNL-500, CCP-AK-SNL-502, CCP-TP-005, or nonconformance and corrective action procedures that require CBFO approval*** (AK2, AK5, AK6, AK14) • When the final or revised WSPF, CRR, and related attachments are available (AK10) • When AK accuracy reports are completed, prepared annually at a minimum (AK11) • When Attachment 4 of CCP-TP-005 is generated to reflect the updated AKSR Source Document Reference List (AK6) • When Add Container Memoranda have been prepared (AK5) • When additional Discrepancy Resolution Reports have been prepared (AK4) • If a CSSF is prepared (AK11)
Radiological Characterization (RC), including Dose-To-Curie (DTC)	Application of new scaling factors for isotopic determination other than those documented in CCP-AK-SNL-501 (RC4, RC5) Use of any alternate radiological characterization procedure other than DTC with established scaling factors as documented in CCP-TP-504 and CCP-AK-SNL-501, Revision 1, respectively, or substantive modification** thereof (RC4, RC5) Any new RH waste stream not approved to date or the addition of containers to an approved waste stream that requires changing the established radionuclide scaling factors or radiological characterization process (RC1)	Notification to EPA upon completion of revisions of CCP-AK-SNL-501 or CCP-TP-504 that require CBFO approval*** (RC1, RC8) Notification to EPA of availability of a revised radiological characterization report, if required for the addition of containers to the approved waste streams (RC5)
Visual Examination (VE)	VE by reviewing existing audio/visual recordings for Summary Waste Category not covered by this approval (VE2) VE by any new process for S5000 debris wastes (VE2)	Notification to EPA upon completion of changes to VE procedure(s) that require CBFO approval*** (VE1) Addition of new S5000 debris waste streams (VE2)

Notes:

* SNL-CCP will report all T2 changes to EPA every three months.

** *Substantive modification* refers to a change with the potential to affect SNL-CCP's RH waste characterization process, e.g., the use of an inherently different type of measurement instrument or the use of probes not described in CCP-TP-504, excluding changes related to solely to safety or to address administrative concerns

*** EPA Notification is not necessary when document updates are editorial or address administrative concerns

EPA is approving the SNL-CCP implemented TRU waste characterization program to characterize RH debris waste from the waste group PKE00044 belonging to Waste Stream SNL-HCF-S5400-RH. During the baseline inspection, EPA evaluated waste characterization information for 19 parcels from this waste group and is documented in this report. The final approval includes the following:

(1) The AK process for 19 parcels of retrievably-stored TRU debris waste from the waste group PKE00044 from SNL RH Waste Stream SNL-HCF-S5400-RH

(2) The radiological characterization process documented in CCP-AK-SNL-501, Revision 1, and supported by the calculation packages referenced in this report

(3) The VE process to identify waste material parameters (WMPs) and the physical form of debris waste

SNL-CCP must continue to use the approved RH TRU waste characterization program components in accordance with the conditions and restrictions discussed in this report.

SNL-CCP may add waste parcels to the waste group PKE00044, if:

1. Additional waste's pedigree is similar to the parcels in PKE00044 as described in this report; and
2. the radionuclide scaling factors used for 19 waste parcels from PKE00044 are technically appropriate and applicable for the additional waste.

When adding waste to PKE00044, SNL-CCP must notify EPA and submit the appropriate supporting documentation that fulfills the above conditions. With EPA approval, SNL-CCP may dispose of the additional waste from PKE00044 at the WIPP facility. However, if a population of additional newly-generated waste requires new or different radionuclide scaling factors, those containers will require a Tier 1 (T1) approval prior to disposal at the WIPP. Also, in the future, if SNL-CCP uses contact-handled (CH) information to characterize any SNL-CCP RH waste, EPA's evaluation of the applicable CH program is necessary. Waste Stream SNL-HCF-S5400-RH is comprised of two other waste groups (PKE00047 with nine parcels and PKE00027/54 with four parcels) and will require separate T1 approvals as shown in Table 1.

EPA must verify compliance with 40 CFR 194.24 before waste may be emplaced in the WIPP, as specified in Condition 3 of EPA's certification of the WIPP's compliance with disposal regulations for TRU radioactive waste [63 *Federal Register* (FR) 27354 and 27405, May 18, 1998]. EPA Baseline Inspection No. EPA-SNL-CCP-RH-06.11-8 was performed in accordance with the provisions of 40 CFR 194.8(b), as issued in a July 16, 2004, FR notice (Vol. 69, No. 136, pp. 42571–42583).

2.0 PURPOSE OF INSPECTIONS

On May 18, 1998, EPA certified that the WIPP would comply with the radioactive waste disposal regulations in 40 CFR Part 191. In that certification, EPA also included Condition 3, which states that "the Secretary shall not allow shipment of any waste from…any waste

generator site other than [Los Alamos National Laboratory (LANL)] for disposal at the WIPP until the Agency has approved the processes for characterizing those waste streams for shipment using the process set forth in §194.8." The approval process described in 40 CFR 194.8 requires DOE to (1) provide EPA with information on acceptable knowledge (AK)[5] for waste streams proposed for disposal at the WIPP, and (2) implement a system of controls used to confirm that the total amount of each waste component that will be emplaced in the WIPP will not exceed limits identified in the WIPP Compliance Certification Application.

The rule applying to this baseline inspection can be found in the FR (Vol. 69, No. 136, pp. 42571–42583, July 16, 2004). Under the changes to 40 CFR 194.8 promulgated in the July 16, 2004, FR notice, EPA must perform a baseline inspection of a TRU waste generator site's waste characterization program. The purpose of the 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. An EPA inspection team conducts an on-site inspection to verify that the site's system of controls is technically adequate and properly implemented. Specifically, EPA's inspection team verifies compliance with 40 CFR 194.24(c)(4), which states the following:

> *Any compliance application shall: . . . Provide information which demonstrates that a system of controls has been and will continue to be implemented to confirm that the total amount of each waste component that will be emplaced in the disposal system will not exceed the upper limiting value or fall below the lower limiting value described in the introductory text of paragraph of this section.*[6] *The system of controls shall include, but shall not be limited to: measurement; sampling; chain of custody records; record keeping systems; waste loading schemes used; and other documentation.*

In other words, the purpose of the baseline inspection is to implement the requirements of 40 CFR 194 by assessing whether DOE sites that characterize TRU waste prior to disposal at the WIPP are capable of characterizing and tracking the waste. EPA may also conduct follow-up inspections to address issues remaining from the baseline inspection or to seek further clarification/discussion related to waste characterization processes evaluated during a baseline inspection. By approving the CCP-implemented waste characterization systems and processes at SNL-CCP for RH debris waste, EPA confirms that it has evaluated the capabilities of systems and processes implemented by the site to accomplish two tasks: (1) identification and measurement of waste components, such as plutonium (Pu), that must be tracked for

[5] As of the FR notice of July 16, 2004, EPA has replaced the term *process knowledge* with *acceptable knowledge*. Acceptable knowledge refers to any information about the process used to generate waste, material inputs to the process, and the time period during which the wastes were generated, as well as data resulting from the analysis of waste conducted prior to or separate from the waste certification process authorized by an EPA certification decision to show compliance with Condition 3 of the certification decision.

[6] The introductory text of 40 CFR 194.24(c) states, "For each waste component identified and assessed pursuant to [40 CFR 194.24(b)], the Department shall specify the limiting value (expressed as an upper or lower limit of mass, volume, curies, concentration, etc.), and the associated uncertainty (i.e., margin of error) for each limiting value, of the total inventory of such waste proposed for disposal in the disposal system."

compliance,[7] and (2) confirmation that the waste in any given container has been properly identified as belonging to the group of approved waste streams.

3.0 PURPOSE OF THIS REPORT

This report documents the basis for EPA's final approval. Explanation for a concern stemming from Baseline Inspection No. EPA-SNL-CCP-RH-06.11-8 can be found in the inspection report accompanying EPA's proposed approval of SNL's RH TRU debris waste stream available in the EPA Air Docket (see A-98-49; II-A4-152). Specifically, this report does the following:

- Describes the SNL-CCP waste characterization systems implemented for characterizing RH debris waste discussed in this report
- Delineates a specific set of containers in an RH waste stream discussed in this report
- Provides objective evidence supporting the final approval basis for all waste characterization systems
- Identifies all relevant system limitations and/or conditions for each waste characterization system and/or waste containers that are subject to this final approval
- Provides objective evidence of EPA's one concern, including its resolution and status

Any changes to the waste characterization activities from the date of the baseline inspection must be reported to and, if applicable, approved by EPA, according to Table 1. Note that each T1 and Tier 2 (T2) change listed in Table 1 is followed by a reference to the report section where the technical basis for the T1 or T2 designation is presented.

EPA will notify the public of the results of its evaluations of T1 and T2 changes established as part of the SNL-CCP final approval through the EPA Web site and by sending e-mails to the WIPPNEWS list. All T1 changes must be submitted for approval before their implementation and will be evaluated by EPA. Upon approval, EPA will post the results of the evaluations through the EPA Web site and the WIPPNEWS list, as described above. SNL-CCP must submit T2 changes that have been implemented four times a year at the end of each fiscal quarter.

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

[7] The potential contents of a single waste stream or group of waste streams determine which processes can adequately characterize the waste. For example, if AK suggests that the waste form is heterogeneous, the site should select the matrix-appropriate radiological characterization technique to obtain adequate radionuclide measurements. VE serves to confirm and quantify waste components, such as cellulosics, rubbers, plastics, and metals. Once the nature of the waste has been confirmed, characterization techniques quantify selected radionuclides in the waste. In some cases, a TRU waste generator site may be able to characterize a range of heterogeneous waste streams or only a few. A site's stated limits on the applicability of proposed waste characterization processes govern the scope of EPA's inspection.

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EPA's final approval decision regarding the SNL-CCP RH waste characterization program is conveyed to DOE separately by a letter. In accordance with 40 CFR 194.8(b)(3), this information is also available on EPA's Web site at www.epa.gov/radiation/WIPP.

4.0 SCOPE OF INSPECTION

The scope of Baseline Inspection No. EPA-SNL-CCP-RH-06.11-8 included the technical adequacy of the waste characterization systems used by SNL-CCP to characterize 19 parcels of RH TRU waste designated as PKE00044 contained in Waste Stream SNL-HCF-S5400-RH. The EPA inspection team evaluated these systems with respect to their ability to perform the following:

- Provide adequate documentation regarding the origin and classification of the RH TRU wastes proposed for disposal at WIPP using AK
- Identify and quantify the activities and associated uncertainties of the 10 WIPP-tracked radionuclides [americium-241 (^{241}Am), cesium-137 (^{137}Cs), plutonium-238 (^{238}Pu), ^{239}Pu, ^{240}Pu, ^{242}Pu, strontium-90 (^{90}Sr), uranium-233 (^{233}U), ^{234}U, and ^{238}U] and other TRU radionuclides using a combination of AK and DTC with the application of radionuclide-specific scaling factors
- Assign WMPs correctly for RH, retrievably-stored debris waste that was repackaged using VE

During an inspection, EPA does not approve characterization data; that function is the sole responsibility of the entity being evaluated, in this case, SNL-CCP. EPA evaluates the site's waste characterization processes to characterize RH TRU debris waste. The SNL-CCP evaluation consisted of reviewing training records and interviewing waste characterization personnel to assess their understanding of: (a) EPA's waste characterization and WIPP waste disposal requirements; (b) waste characterization processes implemented and available as alternatives; and, (c) SNL-CCP's documentation and record-keeping procedures.

In addition, the EPA evaluation focused on observing equipment operations and waste characterization practices at SNL controlled by site procedures, and inspecting records related to each of the waste characterization processes within the inspection's scope. An important aspect of this evaluation is the objective evidence documenting the effectiveness of the waste characterization processes. Objective evidence typically takes the form of batch data reports (BDRs), AK accuracy reports and VE records. During this inspection, EPA selected samples of each of these items, based on the number and variety of items each waste characterization process produced, consistent with standard auditing techniques. Based on evaluating the waste

characterization processes in conjunction with the objective evidence, EPA determined the technical adequacy of these processes and associated records within the inspection's scope.

DOE's Remote Handled Waste Characterization Program Implementation Plan (WCPIP), DOE WIPP-02-3124, should be an accurate representation of the processes implemented to characterize RH TRU wastes for WIPP. Based on previous RH inspections conducted up to 2010, EPA concluded that Revision 0 of the WCPIP did not adequately reflect the requirements for the processes approved by EPA. As a result, the DOE Carlsbad Field Office (CBFO) revised the WCPIP to adequately address RH waste characterization. CBFO approved the WCPIP, Revision 2 on April 21, 2011. EPA requires that all RH TRU waste characterization activities, including the preparation of documentation and the documents themselves, conducted by SNL-CCP comply with the revised WCPIP.

5.0 INSPECTION-RELATED DEFINITIONS

During the course of an inspection, EPA inspectors may encounter items or activities that require further inquiry for their potential to adversely affect waste characterization and/or isolation within the repository. The two main categories relevant to waste characterization inspections are identified below:

- *Finding*: A determination that a specific item or activity does not conform to 40 CFR 194.24(c)(4). A finding requires a response from CBFO prior to site approval.
- *Concern*: A judgment that a specific item or activity may or may not have a negative effect on compliance and, depending on the magnitude of the issue, may or may not require a response. A concern requiring a response requires a response from CBFO prior to site approval.

6.0 PERSONNEL

EPA and its support personnel conducted interviews with SNL-CCP personnel in several disciplines during two site visits to SNL and the meeting in Golden, Colorado. The members of the EPA inspection team and personnel contacted are listed in Attachment B.

7.0 PERFORMANCE OF THE INSPECTION

7.1 Sandia National Laboratories Background

SNL is located in Albuquerque, New Mexico. Its main focus has been to develop technical solutions to support national security and to counter national and international threats. Site activities support national needs in the area of nuclear weapons, nonproliferation and assessments, military technologies and applications, energy and infrastructure assurance, and homeland security.

Waste Generation Activities

CCP-AK-SNL-500 (AKSR) describes Waste Stream SNL-HCF-S5400-RH as consisting of 32 waste parcels that are packaged in 29 containers; 27 of these are shielded and two are unshielded. The 32 waste parcels were generated during decontamination operations in the SNL[8] Hot Cell Facility (HCF) from 1995–1997 (References I1030 and M1016). The HCF in the basement of Building 6580 provided support for reactor and other radiation facilities within Technical Area (TA)-V since the early 1960s. The waste originated from pre- and post-test processes associated with reactor fuel studies conducted in the HCF Steel Containment Boxes (SCBs), Zone 2A, and glove boxes 1, 2, and 3 between the late 1970s and the mid-1990s. Melt Progression (MP) experiments, Source Term (ST) experiments, the Damaged Fuel experiment, and the New Production Reactor (NPR) experiments were conducted in the SCBs and Zone 2A (Reference P1102).

All four experiments examined fuels pre- and post-irradiation in the Annular Core Research Reactor (ACRR); ST experiments were also conducted in glove boxes 1, 2, and 3. Additionally, Fuel Disruption experiments, Sandia Transit Axial Relocation experiments, and Effective Equation of State experiments were performed in glove boxes 1 and 2 (Reference P1015). The AKSR combines waste generated in the glove boxes, SCBs, and Zone 2A into a single waste stream based upon: the similarity of waste generation processes and summary category groups; common sample storage areas; equipment sharing and overall cross-contamination between glove boxes, and glove box areas (References C1004, M016, M019, P1015, P1102, and P1104).

Other SNL-CCP documents indicate that the radiological composition of waste from each area is distinct, and suggest that this distinction warrants dividing the waste into three separate waste streams. As discussed earlier, this report discusses only one waste group, PKE00044 belonging to RH Waste Stream SNL-HCF-S5400-RH. SNL-CCP determined that the radionuclide distributions in waste from the SCB/2A area and glove boxes were different because different experiments and fuel types were used in the different areas. Regulated Waste/Nuclear Material Disposition Department (RWNMDD) personnel developed and used Process Knowledge Evaluation reports (PKEs) to establish radiological characterization of each parcel based on information provided in the disposal request (DR) documentation (Reference M1016). During decontamination of the HCF, there was little or no commingling between the waste generation sources (i.e., the SCB/2A area and the glove boxes). The three PKEs that are presented in the AKSR as components of the single Waste Stream SNL-HCF-S5400-RH are summarized in Table 2.

Table 2. Summary of PKE Reports

Document Number	Waste Generation Source	Number of Parcels
PKE00044	SCBs and Zone 2A	19
PKE00047	Glove Boxes 1 and 2	9
PKE00027/54	Glove Box 3	4

[8] In this report, the use of *SNL* refers to the host site and its past and present waste generation, management and storage activities. The use of *SNL-CCP* means the party responsible for the TRU waste characterization activities that are within the scope of EPA's baseline inspection.

SNL-CCP is developing a separate set of scaling factors for each of the three groups described in Table 2 to account for the three distinct, area-specific radiological signatures. Therefore, this inspection and the final approval are limited to the 19 parcels in PKE00044. [See Section 8.1, Item (1) for further discussion of the waste stream definition.]

As a result of this approval, SNL-CCP may add containers to SNL RH waste group PKE00044, if the following conditions are met:

1. Additional containers must have a pedigree similar to the containers in PKE00044 described in this report; and
2. SNL-CCP must be able to demonstrate that the radionuclide scaling factors used for waste containers from PKE00044 (discussed in Section 8.2, below) are technically appropriate for use in the DTC determination of the radiological characterization of the additional containers.

If additional RH debris waste containers meeting the above criteria are to be emplaced in the WIPP facility, EPA notification and submission of the appropriate supporting documentation will be necessary immediately upon identification and characterization of the additional containers. Upon receiving the AK and radiological content documentation for the newly-generated RH waste containers to be added to PKE00044, EPA will verify (a) the adequacy and applicability of the scaling factors discussed in this report to the additional containers, (b) the common radiological aspects of the 19 original parcels of PKE00044 and the additional containers, and (c) the technical adequacy of the AK documentation. EPA will evaluate this documentation and, upon determining it to be adequate, SNL-CCP may dispose of the additional containers at the WIPP facility.

7.2 Inspection Process Overview

EPA conducted Baseline Inspection No. EPA-SNL-CCP-RH-06.11-8 of SNL-CCP's program to characterize RH TRU wastes at SNL on two occasions from March through May 2011 and at the Courtyard Inn in Golden, Colorado from June 7 through 8, 2011. This inspection had the scope described in Section 4.0 for the purpose of determining the site's compliance with 40 CFR 194.24. The inspection was conducted in the following steps:

(1) Obtaining and reviewing site procedures, reports, and other technical information related to RH waste characterization activities used to characterize SNL-CCP Waste Stream SNL-HCF-S5400-RH

(2) Observing SNL-CCP personnel perform VE, sample collection and DTC at SNL on two separate occasions in 2011 in advance of the baseline inspection in Golden, Colorado during June 2011

(3) Preparing technical questions prior to the inspection based on the activities cited in (1) above

(4) Interacting with CBFO and SNL-CCP personnel to arrange inspection logistics

(5) Evaluating SNL-CCP's implementation of waste characterization processes for adequacy and demonstrating compliance with 40 CFR 194.24 requirements

(6) Conducting the baseline inspection to verify the technical adequacy and/or qualifications of RH waste characterization personnel, procedures, processes, and equipment, as documented in SNL-CCP records

(7) Evaluating the radiometric and spectrometric data used to support the development of radionuclide-specific scaling factors

(8) Evaluating the correlations of containers for the purpose of identifying common attributes

(9) Recording one concern on an EPA Inspection Issue Tracking Form, which was completed and provided to CBFO and SNL-CCP personnel as it was generated (see Attachment C for a copy of this form)

(10) Communicating all pertinent information to CBFO and SNL-CCP personnel

(11) Conducting entrance, exit, and daily briefings for CBFO and SNL-CCP management personnel for all four segments of the inspection

(12) Obtaining and reviewing SNL-CCP documents that were revised and/or created in response to the EPA concern after the inspection, and closing the concern

(13) Issuing the inspection report and proposed approval

8.0 TECHNICAL EVALUATION

Sections 8.1 through 8.3 of this report detail the three technical areas assessed during this inspection:

- AK
- Radiological Characterization
- VE

8.1 Programmatic Requirements and Acceptable Knowledge

EPA examined the programmatic requirements as specified in the WCPIP, Revision 2, dated April 21, 2011, and AK process and associated information to determine if SNL-CCP demonstrated compliance with 40 CFR 194.8 requirements for RH Waste Stream SNL-HCF-S5400-RH.

Waste Characterization Element Description

As part of the inspection, EPA reviewed the following with respect to programmatic requirements and the use of AK for RH waste characterization by SNL-CCP:

- Inspection scope and waste stream identification
- Identification of the WCPIP waste characterization process
- Adequacy of the Certification Plan and other WCPIP documentation

- Adequacy of WCPIP waste qualification pathway
- Adequacy of data management reviews, validation activities, data reporting and records retention
- Adequacy of training
- Adequacy of waste stream profile form (WSPF) and related attachments
- Adequacy of Nonconformance and Discrepancy Resolution (DR) documentation
- Waste Stream definition including radiological and physical characteristics of the waste stream
- Verification that the subject waste is of defense origin and is not low-level waste (LLW), high-level waste (HLW), or spent nuclear fuel (SNF)
- Role of AK in the characterization methodology, including AK to support scaling factors derived by SNL-CCP
- Adequacy of AK procedure and procedure implementation, including Attachments [AK Accuracy, Characterization Reconciliation Reports (CRR), Correlation and Surrogate Summary Forms (CSSF)]
- Adequacy of the AKSR and associated source documents
- AK data traceability
- Attainment of Data Quality Objectives (DQOs)

Documents and Batch Data Reports Reviewed

Source documents, attachments, forms, and other data were provided to EPA and were reviewed as part of this T1 evaluation, as applicable. The listing of all documentation examined is in Attachment A. The BDRs examined are listed in Table 3.

Table 3. Batch Data Reports Examined

Drum No.	Sampling BDR	Analysis BDR	VE BDR	DTC BDR
SNLNM005339	SNRH1001	ALD11007	RHSNLVE100001	SNLRHDTC11001
SNLNM007007	SNRH1101	ALD11007	RHSNLVE110001	SNLRHDTC11001
SNLNM007008	SNRH1101	ALD11007	RHSNLVE110001	SNLRHDTC11001
SNLNM007009	SNRH1101	ALD11007	RHSNLVE110001	SNLRHDTC11001
SNLNM007010	–	ALD11007	RHSNLVE110002	SNLRHDTC11001
SNLNM007011	SNRH1101	ALD11007	RHSNLVE110001	SNLRHDTC11001

Technical Evaluation

EPA evaluated the adequacy of AK information specific to the PKE00044 parcels in Waste Stream SNL-HCF-S5400-RH as described in the ASKR, Revision 1 and CCP-AK-SNL-501, Revision 1. EPA also evaluated the records relative to the programmatic requirements in the WCPIP as part of Waste Stream SNL-HCF-S5400-RH characterization activities.

(1) The scope of the baseline inspection request and waste stream determination were examined for Waste Stream SNL-HCF-S5400-RH and found to be adequate (WCPIP, Revision 2, Section 3.0, p 13)[9].

The scope of EPA's baseline inspection was to evaluate the adequacy, implementation, and effectiveness of technical processes SNL-CCP used to characterize the repackaged, RH TRU debris (S5000) Waste Stream SNL-HCF-S5400-RH, as described in the AKSR. EPA reviewed the submission and agrees that the scope of the inspection is limited to the PKE00044 waste group described in the AKSR, Revision 1; the scope of the inspection was adequately defined.

EPA also examined data presented by SNL-CCP to determine whether the waste stream was adequately defined. The WCPIP, Revision 2, defines the waste stream as waste material that is (1) generated from a single process/activity, and (2) similar in material, physical form, and radiological properties. EPA concludes that the parcels associated with PKE00044 and described in the CCP-AK-SNL-501, Revision 1 exhibit common process origins and radiological compositions based on AK and sampling information.

Waste parcels associated with PKE00047 (Glove Boxes 1 and 2) and PKE00027/54 (Glove Box 3) were sampled separately and EPA expects that these will be included in future versions of CCP-AK-SNL-501 as T1 changes.[10] When the T1 changes for including these two waste groups in Waste Stream SNL-HCF-S5400-RH are submitted, the AKSR must clearly justify inclusion of these groups in the same waste group as PKE00044. Information showing more commonality of experiments and radiological materials between the SCB/Zone 2A area and glove boxes, as well as more justification as to why the distinct radiological populations do not warrant designation as separate waste streams as implied by the WCPIP, Revision 2 is necessary. Alternatively, if radiological data suggest designating these two groups as two new waste streams or a new single waste stream consisting of these two groups, SNL-CCP must accordingly revise the existing AKSR.

In the future, if CH information is used to characterize RH waste containers at SRS-CCP, EPA may determine that evaluation of the CH program is necessary. This evaluation may be warranted since the EPA has not had opportunity to review documentation that the Sandia National Laboratory, a small quantity generator, prepares as part of the inter-site transfer of CH TRU waste to the INL for characterization and disposal.

(2) The Certification Plan, including a description of the waste characterization process, was examined and found to be complete and technically adequate (WCPIP, Revision 2, Section 3, pp. 14-15).

The Certification Plan is presented in CCP-AK-SNL-502, Revision 0. The WCPIP, Revision 2, states that the Certification Plan must describe the process for certification of the waste stream,

[9] The WCPIP references are examples and are not meant to be an exhaustive list. Many of these requirements are discussed in several places within the WCPIP.

[10] If the additional containers to be added to Waste Stream SNL-HCF-S5400-RH do not require new or different scaling factors, a T1 change is not required. See Section 7.1 for details about these requirements.

including a description of the characterization methods selected (described in Section 4.1 of the WCPIP) and AK qualification method(s) (described in Section 5.0 of the WCPIP).

EPA's characterization requirements in 40 CFR 194.24 are presented schematically in Figure 1. The Certification Plan must satisfy requirements in 40 CFR Part 191 (Subparts B and C) and Part 194, the EPA final certification decision, and the WIPP Land Withdrawal Act (LWA) (Public Law 102-579).

EPA reviewed the Certification Plan entitled "Central Characterization Project RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test Plan." SNL-CCP's Certification Plan did not adequately represent the characterization and qualification processes as presented in Figure 1. SNL-CCP, therefore, revised the Certification Plan to indicate (a) which radiological characteristics of the waste (TRU, RH, and activity determinations) will be determined by sampling/analysis, by surface dose measurements, and by the DTC process; (b) how physical parameters and the absence of liquid will be determined through VE; (c) how the waste stream determination, defense determination, and absence of SNF and HLW will be determined by AK; and (d) that AK is not used directly to quantify any parameter, thus not requiring AK qualification. The revised Certification Plan addressed required elements and adequately addressed the waste characterization and qualification requirements. Notification to EPA when formal revisions of the Certification Plan are available is a T2 change. (See Table 1 where this is included as a T2 change; substantive modification of CCP-AK-SNL-502 that has the potential to affect the characterization process is a T1 change).

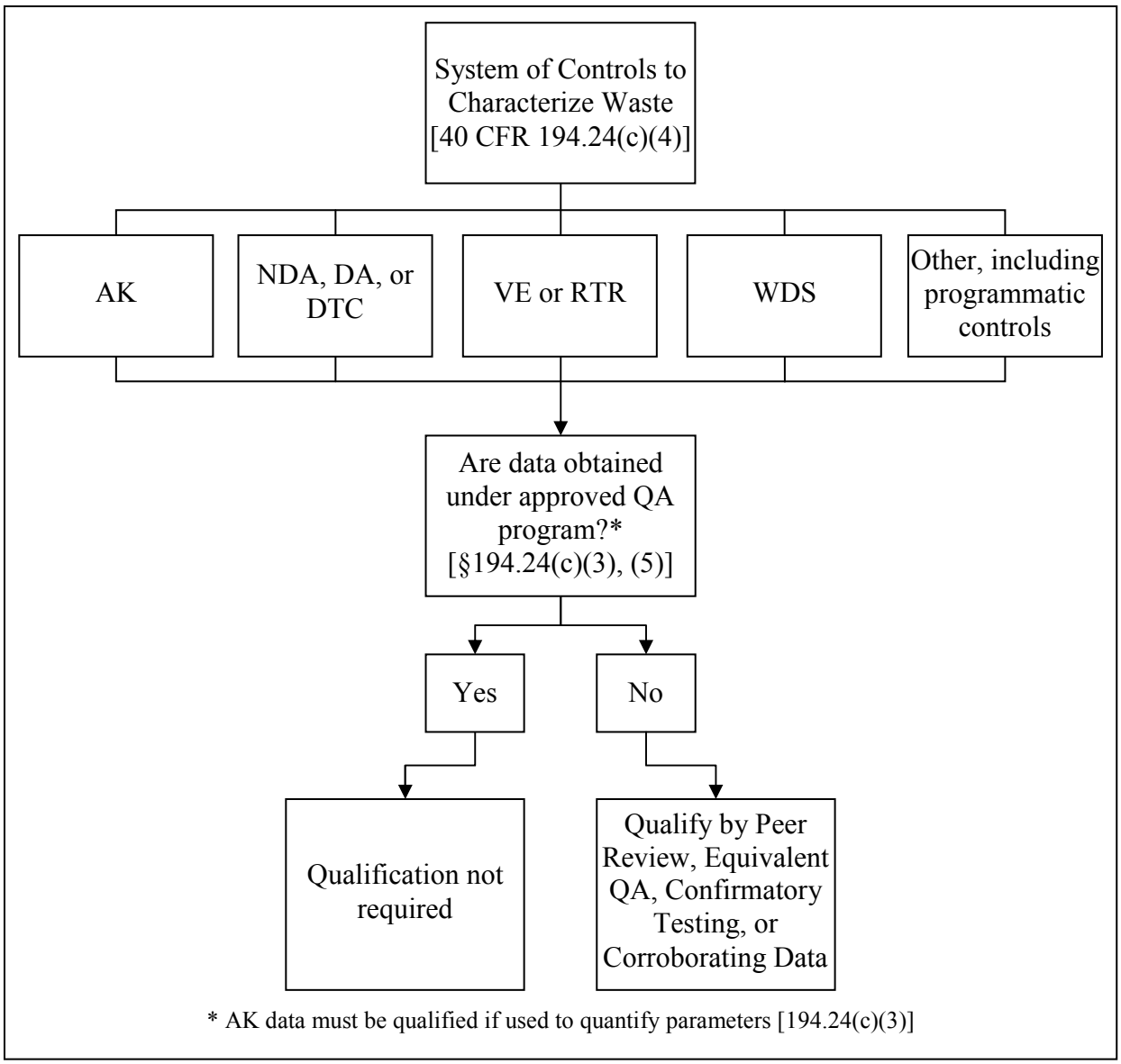

Figure 1. Characterization and Qualification Process

(3) The waste qualification pathway was identified and the selected approach and documentation were adequate (WCPIP, Revision 2, Figure 2, p.15 and Sections 5.0–5.4).

40 CFR 194.24(c)(3)-(5) state that a system of controls must be implemented to characterize waste components, and this system must comply with quality assurance (QA) requirements found at 40 CFR 194.22. If AK is used to quantify components, its use must comply with §194.22(b) which states that data collected prior to implementation of the WIPP-specific QA program must be qualified by peer review, corroborating data, confirmatory testing, or

demonstration that a QA program equivalent to ASME NQA-1[11] requirements was in place at the time of characterization.

Based on information presented in the revised Certification Plan, the physical and radiological compositions of the waste stream are determined through sampling, measurement, modeling, and VE, all of which are conducted under an approved QA program, and do not require qualification. AK is used to define the waste stream and to meet the DQOs associated with defense requirements and the absence of SNF and HLW, which do not require qualification per 40 CFR 194.24(c)(3). This approach was adequately presented in the revised Certification Plan [see Item (2), above]. EPA concluded that the qualification pathway was adequately identified and appropriate for the characterization approach used for this waste stream.

(4) Example Nonconformance Documentation and Discrepancy Resolution were examined and found to be adequate (WCPIP, Revision 2, Section 3.4.2.3, p. 24).

SNL-CCP provided two examples of non conformance reports (NCRs). Example 1 was NCR-RHSNL-2345-11 that dealt with an error on Attachment 1 of the VE form that identified a discrepancy associated with the container listed in Block 3 of the form. This resulted in the AKE being unable to complete an update to Attachment 8 for Waste Stream SNL-HCF-S5400-RH. Example 2 was NCR-RHSLN-2350-11 that addressed the identification of a solid (WMC S3000) drum in the S5000 Waste Stream SNL-HCF-S5400-RH. SNL-CCP stated that this drum will be characterized as a separate waste stream and has been removed from the S5000 debris waste stream.

SNL-CCP provided three examples of Discrepancy Resolution (DR) documents:

- DR1001 and DR1003 are AK-AK DRs that deal with discrepant information pertaining to the assignment of hazardous waste numbers

- DR1002 is an AK-Characterization DR that addresses the discrepant AK identification of a drum as being S5000 that was later discovered during VE to contain S3000.

Note that with implementation of CCP-TP-005, Revision 22, for RH and CH AK documentation (replacing portions of the WCPIP, Revision 0d Appendix A), CCP may also generate AK-Characterization discrepancy resolutions. The preparation of NCRs and discrepancy resolution reports is adequate. Notification to EPA of the availability of additional discrepancy resolution reports is a T2 change. (See Table 1 where this is included as a T2 change.)

(5) The Acceptable Knowledge Procedure was examined and found to be adequate and appropriately implemented (WCPIP, Revision 2, Section 4.1, pp. 32-33).

EPA compared the requirements in the original WCPIP (WCPIP, Revision 0d), the new WCPIP (WCPIP, Revision 2), and CCP-TP-005, Revision 22 to determine whether this transfer adequately addressed the initial WCPIP requirements. EPA discussed procedural questions,

[11] Quality Assurance Program Requirements for Nuclear Quality Assurance, ASME NQA-1-1989 Edition, The American Society of Mechanical Engineers

discrepancies, and deficiencies with SNL-CCP personnel during the inspection, including: correct referencing of WCPIP requirements; modification of the waste stream definition in CCP-TP-005, Revision 22, Attachment 12 to agree with the WCPIP; inclusion of WCPIP radiological data collection requirements by reference, records maintenance, container-specific data acquisition, waste correlations, collection of container-specific information; and, determination of AK accuracy calculations [see Item (11) for additional information about AK Accuracy].

Additionally, CCP-TP-005, Revision 22, includes 15 attachments and also requires development and maintenance of an AK tracking spreadsheet that presents a running compilation of drums within each waste stream at a site. SNL-CCP completed Attachments 1, 4, 6, 8, 10, and 13 for Waste Stream SNL-HCF-S5400-RH and they are adequate. Attachment 4 was not updated to include all AK source documents and references, but a revised version was later provided that was complete [see Item (6)]. SNL-CCP implemented a new approach to complete Attachment 8, which is the waste stream container list used to develop the WSPF. Attachment 8 will now contain all drums identified at the time of AKSR approval but will not be updated as in the past. Instead, Add Container Memoranda that document the addition and removal of containers from the waste stream will be generated and these memoranda will be placed in a single source document in the AK record.

Therefore, Attachment 8, associated Add Container Memoranda, and the AK Tracking Spreadsheet will together provide the full drum history and current waste stream inventory. SNL-CCP revised CCP-TP-005 (Revision 23) to address three EPA issues; the limited revisions to CCP-TP-005 are adequate provided the interpretations presented during the inspection are implemented as discussed. EPA will examine this implementation during the next applicable inspection or T1 review along with adequacy of the new drum tracking method using Attachment 8, the AK tracking spreadsheet, and Add Container Memoranda. Notifications to EPA when Add Container Memoranda are available and upon completion of revisions of procedure CCP-TP-005 are T2 changes. (See Table 1 where these are included as T2 changes.)

(6) The Acceptable Knowledge Summary Report was examined, along with the reference list and associated source documents, and found to be adequate for parcels associated with PKE00044 (WCPIP, Revision 2, Section 4.1, p. 31).

EPA reviewed the AKSR and found it to be deficient in several areas, including:

- Adequate support for the waste stream determination (all three waste groups as a single waste stream)
- Clear identification of the process areas within the HCF
- Adequate support for the defense determination
- Adequate explanation of the WMP calculations

SNL-CCP subsequently revised the AKSR to adequately identify process areas, better support the defense determination, and explain the WMP determinations. As indicated in Item (1), the AKSR adequately describes wastes associated with PKE00044 and the AKSR and additional

information reviewed by EPA during the inspection indicate that waste from PKE00047 and PKE00027/54 show common processes and the exchange or comingling of activities and experiments. However, if needed as a part of the T1 change, the AKSR must be revised to include additional information justifying that waste belonging to PKE00044, PKE00047, and PKE00027/54 constitute RH Waste Stream SNL-HCF-S5400-RH [see Item (1)]. The waste stream definition in the AKSR, Revision 2, is adequate for 19 parcels associated with PKE00044 that were evaluated during this baseline inspection.

CCP-TP-005, Revision 22 Attachment 4 presents all AK source documents reviewed in association with the waste stream, including references cited in CCP-AK-SNL-500, Revision 1 and documents that were not cited in the AKSR. Attachment 4 was revised after the EPA inspection to include all source documents identified as of the date provided, noting that Attachment 4 is continually updated. SNL-CCP representatives stated that the historical source documents that are generated by the site(s) independent of SNL-CCP are maintained by the sites. SNL-CCP AK personnel typically maintain copies of these as working files and submit them to CCP records where they are maintained as non-QA records. SNL-CCP does maintain the records that the AKEs generate as required by CCP-TP-P005, e.g., WSPF and other attachments, as QA-records. This approach is satisfactory as long as it is clearly understood that all records requested by EPA must to be obtainable and provided in a timely manner (e.g., prior to or during an inspection or T1 evaluation). Notifications to EPA when formal revisions of the AKSR and Attachment 4 are available are T2 changes. (See Table 1where these are included as T2 changes; substantive modification of CCP-AK-SNL-500 that has the potential to affect the characterization process is a T1 change.)

(7) The radiological and physical properties of the waste stream were examined and found to be adequately described for PKE00044 wastes based on Acceptable Knowledge (WCPIP, Revision 2, Section 3.0, p. 13).

The AKSR describes wastes from the SCB/Zone 2A area as organic and inorganic debris generated during the destructive and nondestructive examinations conducted in the HCF. The waste also includes personal protective equipment and plastic from decontamination and repackaging activities (References C1039, M1016, and M1019). SNL-CCP approximated the weight percentages using values and waste descriptions presented in DR documentation. For most parcels, the net weights were presented on the SNL RWNMDD Radiological Form, as well as other more detailed descriptions in the Discrepancy Report (DR) documentation and Reference M1019. EPA pointed out that the WMP weight percentage ranges presented in AKSR Table 3 did not adequately represent the possible distribution of material in the waste because the lower-end value of each parameter range is actually "0", rather than the numeric value presented on the table. SNL-CCP stated that the actual lowest weight percent identified in waste containers provides more information than the technically more accurate “0” and added a footnote explaining that the range includes the lowest non-zero estimated values for parcels prior to repackaging. The footnote adequately explains the ranges presented in AKSR Table 3.

Estimated WMP weight percent calculations and distributions by parcel were presented in a memorandum to Attachment 6 of CCP-TP-005, Revision 22. Weight percentage data indicate that PKE00044 is composed of about 65% or greater iron-based metals, with the remaining

consisting of other metals, inorganic, and organic materials. These calculations are estimates based on records and assumptions pertaining to overall percentages of materials in the drums. The methods used by SNL-CCP provided WMP weight and volume estimates, and the actual percentage of WMPs in each drum could vary. The physical composition of each parcel can be determined from AK documents and the overall waste composition of the PKE00044 waste parcel is adequately described.

AK data indicate that the predominant radionuclides include cobalt-60 (^{60}Co), ^{90}Sr, ^{235}U, ^{238}U, ^{137}Cs, and small amounts of TRU radionuclides, primarily ^{238}Pu, ^{239}Pu, and ^{241}Am (References M1016 and M1019). In the late 1990s, SNL RWNMDD waste handlers characterized each parcel by gamma spectrometry, using either the laboratory Q Squared (Q^2) [12] system or a portable system, in conjunction with activity ratios (scaling factors) for undetected radionuclides. If gamma spectrometry was not performed, SNL personnel used external exposure rate (dose rate) surveys in conjunction with MicroShield® modeling to estimate the ^{137}Cs activity (References M1016, M1019, M1020, and M1021). RH containers with high dose rate were initially characterized using only the portable gamma system because of dose rate limits associated with the Q^2 system. SNL confirmed the list of radionuclides in PKE00044 internally in 2004, based on limited swipe samples collected from the parcels that were analyzed by destructive and non-destructive radiometric analyses. The measurements indicated that PKE00044 was sufficiently accurate to allow differentiation of TRU and Non-TRU waste consistent with the 100 nCi/gram criterion. Comparison of the 2004 sampling results and the original PKE00044 radionuclide activities is presented in Table 1 (References M1016, M1020, and M1021). The radiological composition for each parcel is well known and adequately described in the PKE reports.

Table 4. PKE00044 Radionuclide Activity Ratio Comparison

Radionuclide	2004 Measured Activity Ratio to ^{137}Cs	PKE00044 Activity Ratio to ^{137}Cs	2004 Measured Activity Ratio to ^{241}Am	PKE00044 Activity Ratio to ^{241}Am
^{241}Am	1.95E-03	6.94E-04	1.00E+00	1.00E+00
^{238}Pu	1.31E-02	7.17E-03	6.73E+00	1.03E+01
$^{239/240}$Pu	1.29E-03	2.00E-03	6.64E-01	2.89E+00
^{90}Sr	2.95E-01	9.41E-01	NA	NA
^{147}Pm	2.50E-02	6.42E-02	NA	NA
^{241}Pu	2.79E-02	1.75E-02	1.43E+01	2.52E+01
TRU Alpha	1.63E-02	9.86E-03	8.39E+00	1.42E+01

NA: Not applicable since the radionuclide is not TRU.

SNL-CCP used radionuclide information from the DR documents to develop a summary of the radionuclides present in all 32 waste parcels. The gram value for each reported radionuclide was divided by the mass of all radioactive constituents in the waste stream and converted to a percentage to calculate the "Total Radioactive Weight %." A radionuclide weight percent range was also determined by dividing the mass of each individual radionuclide in a parcel by the total

[12] Q^2 is a Canberra Industries standard segmented gamma spectrometry assay system.

radiological mass for that parcel, and expressing it as a percentage. The minimum and maximum results are listed as "Radionuclide Weight % Range for Individual Parcels." Similar processes were used to determine the "Total Radionuclide Curie%" and "Radionuclide Ci% Range for Individual Parcels." The radiological compositions of each parcel, the groups of parcels in each PKE, and all 32 parcels together are adequately described.

(8) The waste stream information was examined and indicates that the waste stream does not contain spent nuclear fuel or high level waste (WCPIP, Revision 2, Section 2.2.7, p. 12).

The *Land Withdrawal Act* (LWA) prohibits the disposal of Spent Nuclear Fuel (SNF) and High Level Waste (HLW) as defined by the *Nuclear Waste Policy Act* (NWPA) at WIPP. The NWPA and DOE M435.1-1[13] state that SNF is "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing… [However,] test specimens of fissionable material irradiated for research and development only, and not production of power or plutonium, may be classified as waste, and managed in accordance with the requirements of this Order when it is technically infeasible, cost prohibitive, or would increase worker exposure to separate the remaining test specimens from other contaminated material." The NWPA states that HLW is "the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that the commission, consistent with existing law, determines by rule requires permanent isolation."
Waste Stream SNL-HCF-S5400-RH consists of debris contaminated during pre- and post-irradiation experiments and decontamination operations. The waste stream does not include: accountable[14] material; all test residues, materials, and fragments; or intact irradiated fuel pin test specimens that were removed from the HCF separately. Operations at the HCF did not include the separation or reprocessing of irradiated fuel elements withdrawn from a reactor. As a result, Waste Stream SNL-HCF-S5400-RH does not contain SNF or HLW as defined by the LWA and NWPA and is eligible for disposal at WIPP (References M1016 and P1041).

(9) The waste stream information was examined and indicates that the waste stream has a defense pedigree (WCPIP, Revision 2, Section 2.2.7, p. 12).

The scope of this inspection is limited to the 19 parcels associated with PKE00044. Waste from the SCBs and Zone 2A has been separately packaged in 13 parcels and will be evaluated at a later date. The NPR program was designed to develop a long-term source of tritium for use in nuclear weapons production, and is, therefore, entirely defense related (References P1030 and P1044). All of the materials examined in this area had been or were to be irradiated in the ACRR, which supported DOE and U.S. Department of Defense experiments, including irradiating components for defense programs and tritium production (References M1015 and P1102). Waste and material management practices in place in the late 1980s and 1990s were such that test materials were stored in common areas of the HCF and materials and machinery

[13] DOE M435.1-1 is the Department of Energy's Radioactive Waste Management Manual.

[14] *Accountable materials* are nuclear items and related materials that must be controlled as specified in DOE Order 410.2, Management of Nuclear Materials, and generally include fissile materials, source materials used to produce fissile materials and other materials of special interest.

were passed between the SCBs, resulting in commingling of the wastes; segregation of defense from non-defense wastes is not possible (References C1038 and P1104). The defense determination is justified based on commingling and cross contamination with defense activities.

(10) The Waste Stream Profile Form and attached Characterization Reconciliation Reports were examined and found to be adequate (WCPIP, Revision 2, Section 3.4.2.1, p. 22).

The draft Waste Stream Profile Form (WSPF) and Characterization Reconciliation Reports (CRR) were provided to EPA on June 1, 2011. Revision 2 of the WCPIP explicitly lists the required contents of both of these documents. The WSPF did not specify the Batch Data Report (BDR) numbers supporting waste stream characterization, and instead referenced the Characterization Information Summary (CIS). The CIS is not required or mentioned in either the WCPIP, Revision 2 or CCP-TP-005, Revision 22, and was not initially provided to EPA. SNL-CCP, however, has elected to combine the once separate EPA and New Mexico Environmental Department WSPFs; therefore, a CIS must be prepared and may be used in conjunction with the WSPF to meet EPA requirements as documented in WCPIP, Revision 2. SNL-CCP provided the CIS to EPA on June 23, 2011. The WSPF and CIS are draft documents, and therefore do not include the SPM signature and date. Together, the WSPF and CIS are complete and adequate.

The draft CRR did not accurately reflect the WCPIP, Revision 2 in the QAO and DQO sections. The DQO section needed to be revised to reflect edits to the Certification Plan discussed in Item (2), above. EPA interprets the WCPIP list of CRR elements to be required as applicable, and expects that some of the items (including the documentation of qualification) will not apply to all waste streams. Similarly, EPA interprets the intent of the CRR and the DQO section in particular is to briefly summarize how the DQOs are met–whether through AK or a different characterization method. If AK is used to meet one or more DQOs, this section should include information about how, if applicable, the AK is being qualified. A revised draft CRR was provided to EPA on June 27, 2011, that updated the radiological information for each characterized container and addressed the needed revisions as discussed above. The CRR is a draft document, and therefore does not include the SPM signature and date. The revised draft CRR is adequate. Notification to EPA of the availability of the final WSPF and CRR and any revisions to these documents and their attachments (e.g., CIS) are T2 changes. (See Table 1 where these are included as T2 changes.)

(11) The AK Accuracy Report was examined and found to be adequate; a Correlation and Surrogate Summary Form was not required (WCPIP, Revision 2, Sections 4.1, p. 30 and 3.2.2, pp. 17-19).

The AK accuracy report documents the comparison of AK information and measurement data used to characterize the waste and documents that the measurement-based DQOs have been met. As part of the AK accuracy process, the Site Program Manager (SPM) checks measurement values to verify that the waste contents match the AK-based waste stream definition. AK accuracy is affected by any containers that have to be reassigned to a different SCG or waste stream based on the reevaluation of AK or on testing, sampling, and/or analysis data. Issues with the individual data points are addressed during the characterization process and should be resolved before the data are sent to the SPM.

A draft AK accuracy report for Lot 1 consisting of six 55-gallon containers, i.e., seven of 19 parcels of PKE00044, was provided to EPA on June 1, 2011, wherein AK accuracy is reported at 100%. As a result of EPA's inquiries during the inspection, this AK accuracy report required revision to reflect the changes to CCP-AK-SNL-502 discussed in Item (2), above. SNL-CCP provided a revised draft AK accuracy report on June 21, 2011, that reflects those changes and is adequate. Notification to EPA when AK accuracy reports are completed, prepared annually at a minimum, is a T2 change. (See Table 1where this is included as a T2 change.)

Waste Stream SNL-HCF-S5400-RH has a companion CH waste stream; however, none of the CH information was used to characterize the RH waste stream. In the future, if CH information is used to characterize RH, a Correlation and Surrogate Summary Form (CSSF) will be required. Notification to EPA of the preparation of a CSSF is a T2 change. (See Table 1 where this is included as a T2 change.)

SNL-CCP expects to identify some RH wastes in the course of characterizing the companion CH waste stream. If this RH waste fits the AK description of waste in PKE00044 and if the same radiological characteristics are exhibited, then this newly-generated RH waste would be disposed of as PKE00044. When this happens, EPA notification is necessary along with the submission of supporting information, as discussed in Sections 1.0 and 7.1, above.

(12) Drum data are adequately traceable and are in the AK Record (WCPIP, Revision 2, Sections 3.4.4.1, p. 20; 3.4.2.2, p. 23; and 4.1, pp. 29-34).

The primary sources of drum traceability information are the DR forms in Reference M1016, which include: the location and date of parcel packaging; a list of the parcel contents (in some cases this includes information about the contributing experiment); the date the parcel was transferred to the Manzano Base; and the storage location of the parcel within the Manzano Bunkers. From packaging to disposal, each parcel will have been assigned five different identifying numbers, specifically:

- Original packaging parcel number
- New parcel number assigned at a future date
- Number of the container into which the parcel was placed for storage
- Number of the 30-gallon drum into which the parcel was/will be repackaged during VE
- Number of the 55-gallon drum into which the 30-gallon drum was packed.

To clarify the connections between each identification number, SNL-CCP modified Reference M1019 to include a crosswalk of all the identification numbers for each parcel. To verify drum traceability in the AK record, EPA randomly selected six parcels from PKE00044 that were described in two DR forms, as summarized in Table 5. Drum data are in the AK record and are traceable to packaging records from the decontamination operations in the HCF.

Table 5. Drum Traceability

Parcel No.	Original Parcel No.	Container No.	30-gallon No. (if known)	55-gallon No. (if known)	DR Form	Packaging Date and Location	Contributing Experiment (if known)	Transfer Date and Storage Bunker at Manzano
P9800937	HCF-RW-96-KC-07	C980373	P1110126	SNLNM007011	005965	3/14/96 SCBs	Unknown	4/30/98 78
P9800938	HCF-RW-96-KC-06	C980374	Not yet	Repackaged	005965	3/12/96 SCBs	Unknown	4/30/98 78
P9800939	HCF-RW-96-KC-04	C980375	Not yet	Repackaged	005965	2/13-14/96 SCBs	Unknown	4/30/98 78
P9800940	HCF-RW-96-KC-03	C980376	Not yet	Repackaged	005965	2/12/96 SCBs	Unknown	4/30/98 78
P9800941	HCF-RW-96-KC-02	C980377	Not yet	Repackaged	005965	2/7-8, 4/8/96 SCB	ST, NPR	4/30/98 78
P9900531	HCF-RW-95-KC-01	C990238	C080215	SNLNM005339	007205	10/25/95 SCB1	ST, MP	11/24/98 37063

(13) Acceptable Knowledge training was examined and found to be adequate after the EPA identified a concern that was resolved (WCPIP, Revision 2, Section 4.1, p. 32).

The WCPIP, Revision 2 requires that characterization personnel responsible for compiling AK, characterizing RH TRU waste streams using the AK process, and assessing the AK characterization shall be qualified and trained to:

- The WCPIP
- The characterization program nonconformance and corrective action process
- Site-specific training relative to the site's waste streams (e.g., current AKSRs)
- Determining radiological contents of individual containers

Through interviews and discussions with the AKEs, EPA was able to conclude that the SNL-CCP AKEs are current with respect to the training requirements listed above; however, SNL-CCP was unable to provide objective evidence of this training. The WCPIP, Revision 2 states in bold text on page 33: "The RH TRU characterization program is responsible for maintaining records of the training provided to personnel responsible for compiling AK." EPA discussed the issue with CBFO and SNL-CCP personnel and formalized it as a concern requiring a response on EPA Inspection Issue Tracking Form No. SNL-CCP-RH-AK-11-01CR. (See Attachment C for a copy of this form.) CBFO responses to EPA's concern are included in entirety as three different reports in the EPA Air Docket supporting the *Federal Register* notice announcing the proposed baseline approval of SNL-CCP's RH program. (For CBFO response, see regulatory docket EPA-HQ-OAR-2011-0786-0002 to 0004.)

EPA has observed during recent site inspections/evaluations that the current scope of SNL-CCP-implemented training program shows varied familiarity and understanding of SNL-CCP's waste characterization staff in the following areas:

- EPA requirements and DOE upper tier documents (e.g., WCPIP, WAC or QAPD)

- Information EPA needs to support adequacy of each of EPA's inspection report elements and eventual approval[15]
- Type of source documents and information needed/used to develop waste stream characteristics (defense waste, TRU basis, non-SNF and non-HLW, waste contents)
- Host site's facility and equipment training requirements
- Need for adequate number of waste samples for radiological characterization for scaling factors, and available/applicable analytical options for radiological contents of a drum
- Physical contents of waste drums subjected to nondestructive evaluation
- Working knowledge of TRU waste from previously-approved sites

This has affected the quality of documents prepared by SNL-CCP, particularly the 500- and 501-series, that EPA receives for evaluation. EPA and CBFO are working on resolving this program-wide issue.

(14) Data Quality Objectives were evaluated and found to be adequately met (WCPIP, Revision 2, Section 3.4.2, p. 22).

The WCPIP, Revision 2, identifies the following DQOs that must be addressed:

Defense Waste, HLW, and SNF Determination (Regulatory Basis: LWA): This is required to ensure that the waste stream was generated by atomic energy defense activities, is not HLW, and is not SNF. These are addressed in CCP-AK-SNL-500, Revision 2, and CCP-AK-SNL-502, Revision 1, as discussed in (9) and (8), above, respectively.

Radioactive Properties (Regulatory Basis: LWA, EPA Certification of the WIPP):

- *TRU Waste Determination:* Waste must contain more than 100 nanocuries (nCi) of TRU isotopes per gram of waste
- *RH Waste Determination:* Surface dose rate must be equal to or greater than 200 millirem per hour (mrem/hr) and less than 1,000 rem/hr
- *Activity Determination:* The total waste inventory can be no more than 5.1 million curies of RH TRU; activity limit per canister is 23 Ci per liter; and all radionuclides important to release calculations must be tracked

These three DQOs are addressed in CCP-AK-SNL-501, Revision 1, as discussed in Section 6.2, below.

Physical Properties (Regulatory Basis: EPA Certification of the WIPP):

- *Liquids:* The absence of liquids in excess of one percent must be confirmed

[15] EPA provided an annotated outline of an EPA Inspection Report detailing EPA's information and document needs to CBFO most recently in January 2010.

- *Physical Form:* The physical form of the waste to delineate the waste stream as required by the final certification rule must be determined

These two DQOs are addressed in VE BDR Nos. RHSNLVE100001, RHSNLVE110001, and RHSNLVE110002, as discussed in Items (7) and (12), above.

EPA determined that the documents cited above supported that all DQOs were achieved.

Summary of Acceptable Knowledge Findings and Concerns

The EPA evaluation team identified one AK-related concern, which is discussed in Item (13), above. A copy of the EPA Inspection Issue Tracking Form is included in Attachment C. CBFO responses to EPA's concern are included as three separate reports in the EPA Air Docket supporting the *Federal Register* notice announcing the proposed baseline approval of SNL-CCP's RH program. ((For CBFO response, see regulatory docket EPA-HQ-OAR-2011-0786-0002 to 0004.) EPA's evaluation of CBFO response is discussed in AK Item 13 of Section 8.1. EPA considers all aspects of this concern to have been adequately addressed, and there are no open findings or concerns related to AK resulting from this inspection.

8.2 Radiological Characterization

Waste Characterization Element Description

The radiological characterization of SNL-CCP Waste Stream SNL-HCF-S5400-RH relies on DTC in conjunction with radionuclide-specific scaling factors that were developed for this waste stream based primarily on the following two sources of information:

- AK for Waste Stream SNL-HCF-S5400-RH, as summarized in CCP-AK-SNL-500 and associated source documents
- Radionuclide-specific laboratory results from the analysis of smear samples collected for six randomly selected parcels from a population of 19 parcels associated with the PKE00044 source, as summarized in CCP-AK-SNL-501 and its supporting calculation packages

The radiological characterization methods used for SNL-CCP Waste Stream SNL-HCF-S5400-RH were evaluated in terms of the 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 inspection, the EPA inspection team evaluated the following elements of the SNL-CCP radiological characterization program:

- Sample collection observed at SNL in March 2011
- External gamma measurements (DTC) made at SNL in May 2011
- Development of DTC correlation for 30-gallon drums overpacked in 55-gallon drums using waste densities ranging from 0.2 g/cm^3 to 1.8 g/cm^3 based on MicroShield®

modeling of the drum's gamma dose rate using a one-curie source of ^{137}Cs, assumed to be the main contributor to the dose

- Derivation of radionuclide scaling factors using radiometric and spectrometric analyses of smear (swipe) samples obtained from randomly selected parcels
- Representativeness and technical adequacy of the analytical data used to support the scaling factors

Documents Reviewed

All SNL-CCP RH radiological characterization documents that were reviewed to support this inspection are listed in Attachment A.

Technical Evaluation

The EPA inspection team evaluated the following aspects:

(1) The overall radiological characterization process and its documentation were evaluated and found to be adequate.

The radiological characterization process for Waste Stream SNL-HCF-S5400-RH was comparable to the processes observed at previous RH TRU sites. The main technical components consisted of the following: collecting representative smear samples; radiometric and spectrometric analyses of the samples; determining isotopic distributions to develop radionuclide-specific scaling factors; measuring each container's external exposure (dose) rate; and computer modeling to correlate the waste container's dose rate and radionuclide concentration. Each of these components is discussed in the subsequent parts of this section. Members of the EPA inspection team prepared a flow diagram of the process, shown in Figure 2, below. The radiological characterization process for Waste Stream SNL-HCF-S5400-RH was found to be technically adequate and appropriately documented.

Any new RH waste stream not approved to date or the addition of containers to Waste Stream SNL-HCF-S5400-RH that requires changing the established radionuclide scaling factors or the use of a different radiological characterization process from what is documented in CCP-AK-SNL-501, Revision 1, is a T1 change. (See Table 1 where this is included as a T1 change.) Any change to CCP-AK-SNL-501 that requires CBFO approval is a T2 change. (See Table 1 where this is included as a T2 change.)

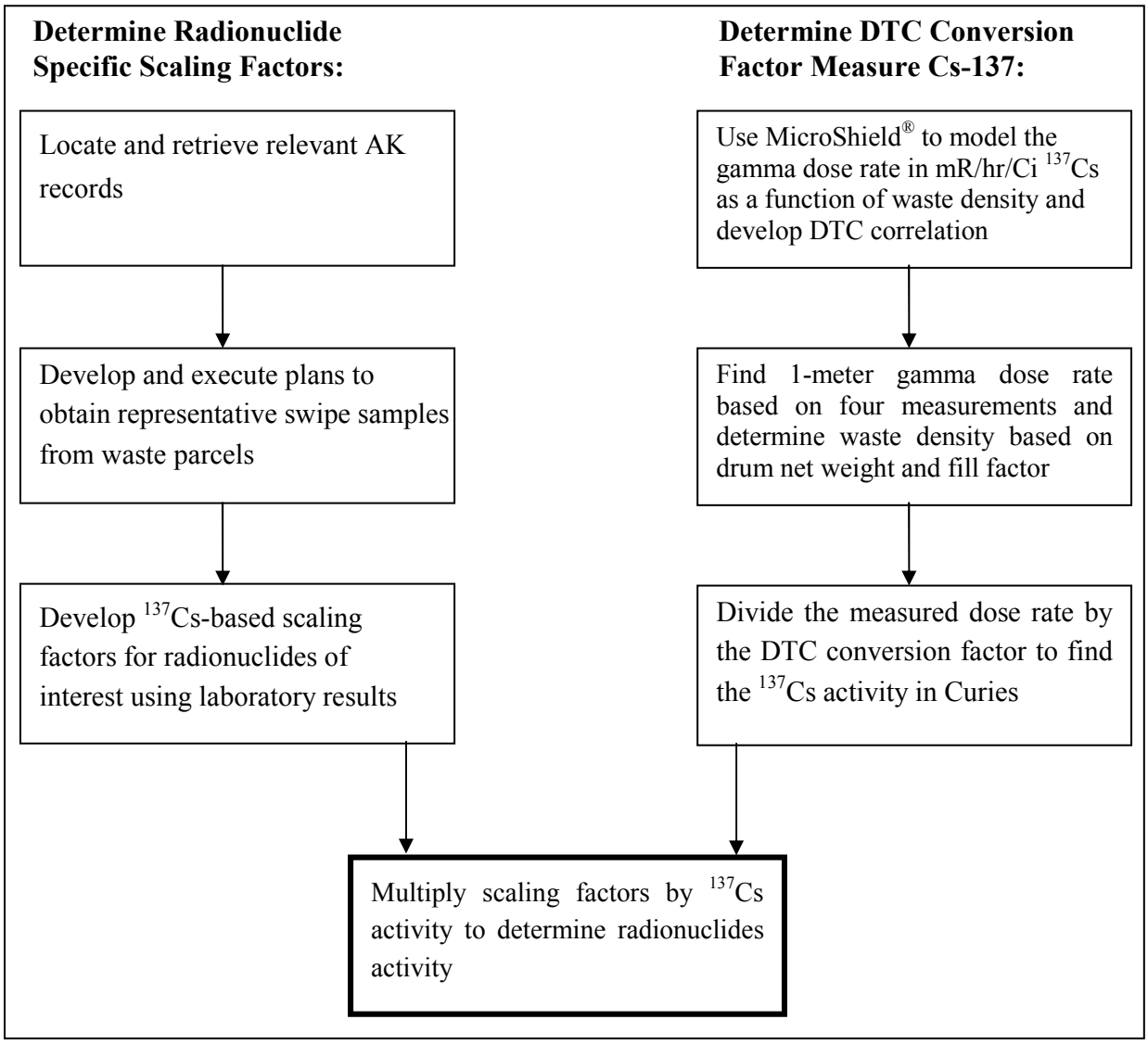

Figure 2. Flow Diagram of the Characterization Process for SNL-HCF-S5400-RH

(3) The collection of representative samples from the waste stream was evaluated and found to be adequate and appropriately documented.

The sampling and analysis plan CCP-AK-SNL-505 (SAP), Revision 0, describes the sampling basis, methods, and applicable Quality Assurance/Quality Control (QA/QC) requirements. Procedure CCP-TP-512, Revision 4, presents the sampling procedures implemented by SNL-CCP for sampling Waste Stream SNL-HCF-S5400-RH. EPA reviewed both of these documents along with CCP-AK-SNL-501, Revisions 1 and 2, and the Holderness Post-sampling Memorandum dated April 26, 2011. The SAP also documented the methodology for calculating the minimum number of samples required, the applicable QAOs (accuracy, precision, representativeness, completeness, and comparability) and how they were achieved, and the QC requirements based on the analytical laboratory's criteria.

EPA inspectors observed the sampling process for Waste Stream SNL-HCF-S5400-RH in a hot-cell in Building 6597 on March 8, 2011, at SNL. The hot-cell manipulator operators were SNL personnel, but sampling was directed, supervised and recorded by qualified SNL-CCP personnel, all of whom were listed as current on the LOQI. The parcel EPA observed being sampled was No. P2000998; the original container was No. C200357, which had been repackaged into 30-gallon container No. P1110158; the final 55-gallon shipping container into which the 30-gallon drum had been repackaged was No. SNLNM007020. This parcel is not included in PKE00044 and therefore was not technically a part of this baseline inspection. However, EPA considers it to be a surrogate, i.e., observing its sampling was sufficient to demonstrate the adequacy of the SNL-CCP sampling process.

Smears were taken at pre-designated locations using pre-numbered Q-tips that were stored in the hot-cell post-sampling after packaging in individual sample bottles. Sampling personnel minimized cross contamination during all aspects of the process that EPA observed. A total of 18 smear samples were taken from the surfaces of six randomly selected parcels (out of a population of 19 parcels), and all samples were obtained in accordance with the sampling procedure and SAP. Three Q-Tip swabs were taken from each parcel and these were combined into six laboratory composite samples, one for each of six parcels associated with PKE00044. The samples were sent to the Idaho Cleanup Project (ICP) Analytical Laboratory[16] for radiometric and spectrometric analyses. SNL-CCP personnel correctly recorded and reviewed the sampling data, which are contained in the laboratory BDRs. EPA did not directly observe the final packaging of the smear samples, Chain-of-Custody procedures and sample preparation for transportation, but EPA did review the records that documented these activities and they demonstrated compliance with SNL-CCP procedures. The applicable QAOs of accuracy, precision, representativeness, completeness, and comparability were achieved.

(4) The radiochemical data were found to be representative and technically adequate to support the development of radionuclide-specific scaling factors.

Based on a review of the SAP and J. Holderness Memorandum, EPA agreed that the sample size of six was adequate to meet the predetermined accuracy criterion for the sample mean, i.e., that the uncertainty in the mean scaling factor must not exceed a factor of two. EPA agreed that the samples collected were representative of the population of 19 parcels associated with PKE00044. Table 6 correlates the sample collection and laboratory identifiers with the specific parcel of PKE00044, and indicates if a sample was Primary or a Duplicate, and Table 7 lists the measurement technique(s) used to quantify each radionuclide (Reference U1029). EPA inspectors reviewed randomly selected analytical data to ensure complete and accurate reporting of results and verify the use of appropriate quality control. This review demonstrated the following:

- Batch narratives provided a complete and correct description of the analytical process(es)
- Appropriate preparation, analytical procedures and radiometric techniques were used
- Appropriate standards and verification samples were employed and evaluated

[16] This facility was formerly known as the INTEC (Idaho Nuclear Technology Center) laboratory.

- Control and verification samples were within pre-established acceptance criteria
- Data had been subject to review before release
- Analytical results were reported with correct units of measure including uncertainty and data were flagged as required

EPA determined that the case narratives correctly described the analytical processes and data for each batch reviewed. EPA noted that Table 4-1 of the SAP requires laboratory duplicates for alpha, beta and gamma analyses, but the J. Holderness Memorandum states: "A laboratory duplicate sample was created for Sample IDF52, but only for the gamma spectrometry." The WCPIP, Section 4.3.4.3, states that the laboratory may use its own QC requirements for analyses if it has an established QA program. This modifier to the QC requirements was not flowed down from the WCPIP to the SAP. Table 8, below, shows the radionuclides that were reported for the primary samples and the number of reported values.

Table 6. PKE00044 Samples

Sample ID	Parcel	Laboratory ID	Sample Description
SN11301001	P9900531	IDF52	Primary Sample
SN12011001		IDF52D	Duplicate Sample
SN12011002			
SN01201101	P9800937	IDF53	Primary Sample
SN01201102			
SN01201103			
SN1261101	P9800943	IDF54	Primary Sample
SN1261102			
SN1261103			
SN02031101	P9800964	IDF55	Primary Sample
SN02031102			
SN02031103			
SN02151101	P9800944	IDF56	Primary Sample
SN02151102			
SN02151103			
SN02211101	P9800660	IDF20	Primary Sample
SN02221102			
SN02231103			

Table 7. Measurement Technique Used for Each Radionuclide

Liquid Scintillation	Gas Flow Proportional	Alpha Spectrometry	Gamma Spectrometry	ICP-Mass Spectrometry
Pu-241	Sr-90	Am-241	Eu-154	U-233
		Cm-244	Cs-137	U-234
		Cm-245		U-235
		Pu-238		U-236
		Pu-239/Pu-240		U-238
		U-233/U-234		Pu-239
		U-235/U-236		Pu-240
		U-238		Pu-242

Table 8. Reported Radionuclides in the Six Primary Samples

Radionuclide	Number of Reported Values
U-233/U-234[1]	6
U-233[2]	0
U-234[2]	6
U-235/U-236[1]	6
U-235[2]	6
U-236[2]	6
U-238	6
Pu-238	6
Pu-239/Pu-240[1,3]	6
Pu-239[2]	5
Pu-240[2]	5
Pu-241	6
Pu-242	0
Am-241	6
Cm-242	6
Cm-244	6
Cm-245	6
Sr-90	6
Cs-134	2
Cs-137	6
Co-60	1
Eu-154	6
Pb-210	1

[1]Value derived by Alpha Spectrometry
[2]Value derived by ICP-MS
[3]Because ^{239}Pu and ^{240}Pu cannot be resolved by alpha spectrometry the values reported include contributions of both radionuclides

(5) The development of scaling factors based on cesium-137 was found to be technically adequate and correctly documented.

In the context of the SNL-CCP RH characterization program, a scaling factor is the ratio of the activity of a typically difficult-to-measure radionuclide, e.g., ^{239}Pu or ^{241}Am, to an easily measured radionuclide, in this case ^{137}Cs. Assuming that the container's measured dose rate is attributable essentially to ^{137}Cs, the container's dose rate and ^{137}Cs concentration can be correlated. Using radionuclide-specific scaling factors, i.e., for ^{238}Pu, ^{240}Pu, ^{233}U, ^{234}U and others, radionuclides are quantified by *scaling* them to the ^{137}Cs content, i.e., the container's measured dose rate. This allows the determination of multiple radionuclides by virtue of a single measurement of the container's dose rate. The correlation of dose rate and ^{137}Cs concentration is discussed in Item (5), below, and the scaling factors are summarized in Table 9.

Table 9. Scaling Factors for Waste Stream SNL-HCF-S5400-RH

Radionuclide	^{137}Cs Scaling Factor, Ci Radionuclide/Ci ^{137}Cs
Am-241	7.48E-3
Cm-242	3.78E-5
Cm-244	3.25E-4
Cm-245	2.51E-4
Pu-238	1.49E-2
Pu-239	8.81E-4
Pu-240	1.07E-3
Pu-241	5.58E-2
Pu-242	5.84E-5
U-233	1.85E-6
U-234	1.02E-3
U-235	3.35E-5
U-236	1.22E-5
U-238	4.44E-6
Cs-137	1.00E0
Eu-154	5.83E-3
Sr-90	5.67E-1

SNL-CCP developed radionuclide-specific scaling factors based on the analytical results from the six composite smear samples collected from parcels in PKE00044 discussed in Items (2) and (3), above. The radiometric and ICP-MS data from the laboratory analyses used to derive scaling factors were adequate for this purpose. EPA personnel reviewed the contents of the spreadsheet for completeness, accuracy and adequacy. Based on the J. Holderness Memorandum, the geometric mean of the sample scaling factors for each reported radionuclide was presented as the scaling factor for that radionuclide, as the distribution of sample data for each radionuclide appeared to be log normal distribution. For the ^{233}U/^{234}U radionuclide pair, SNL-CCP assigned the reported value from the alpha spectrometry measurements to ^{234}U, because ^{233}U was below the instrument detection limit (IDL). Other radionuclide pairs were ^{239}Pu/^{240}Pu and ^{235}U/^{236}U. For the ^{239}Pu/^{240}Pu pair, SNL-CCP used the alpha spectrometry result for each sample in conjunction with the ^{239}Pu-^{240}Pu split fractions from ICP-MS to determine the activity of each radionuclide.

The average split fractions were 0.453 and 0.547 for ^{239}Pu and ^{240}Pu, respectively. There were no reported activity values for ^{242}Pu, so the ^{242}Pu IDL was used as the ^{242}Pu activity.

The use of any alternate radiological characterization procedure other than DTC with established scaling factors as documented in CCP-TP-504 and CCP-AK-SNL-501, Revision 1, respectively, or substantive modification, is a T1 change. (See Table 1 where this is included as a T1 change.) Any revision to CCP-AK-SNL-501 that requires CBFO approval is a T2 change. (See Table 1 where this is included as a T2 change.)

(6) Computer modeling to develop the dose-to-curie correlation was evaluated and was found to be adequate.

SNL-CCP used the MicroShield® computer code to develop DTC correlation for a 30-gallon drum containing the debris waste overpacked in a 55-gallon drum. This was based on the assumption that a one-curie source of ^{137}Cs was uniformly distributed within the drum and that the only significant gamma emitter in the drum was ^{137}Cs. Specifically, the contributions of Europium-154 (^{154}Eu), cobalt-60 (^{60}Co) or other gamma emitters in the drum were negligible. This provided the specific correlation of a container's measured dose rate and ^{137}Cs content for waste densities ranging from 0.2 g/cm^3 to 1.8 g/cm^3. Based on the measured one-meter dose rates a least-squares curve-fitting routine was used to derive a function relating waste density and MicroShield®-calculated dose rates. CCP-AK-SNL-501 shows a schematic of the 30-gallon drum overpacked in a 55-gallon drum and the ^{137}Cs correlation curve in Figures 5-1 and 5-2, respectively. Reference U1032 details the development of the DTC calculation. Revision 1 of CCP-AK-SNL-501 and Revision 1 of SNL-RH-04 were developed to incorporate correct dimensions for the 30-gallon drum in the computer model. The use of any alternate scaling factors other than those documented in CCP-AK-SNL-501, Revision 1, is a T1 change. (See Table 1 where this is included as a T1 change.)

(7) Correlation of radionuclide values to the ^{137}Cs concentration for each drum was evaluated and was found to be technically adequate and appropriately documented.

SNL-CCP applied the DTC correlation factor to determine the ^{137}Cs concentration in the drum using the arithmetic mean of four dose measurements, made at a distance of one meter from the drum surface at the vertical mid-point at four 90 degree intervals. This value was divided by the DTC correlation factor corresponding to the waste density. SNL-CCP combined the dose measurements used to quantify the radionuclides of interest in the drum with the radionuclide-specific scaling factors to produce the list of radionuclides as follows: ^{233}U, ^{234}U, ^{235}U, ^{238}U, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu, ^{241}Am, ^{137}Cs, barium-137 (^{137m}Ba) (^{137}Cs progeny), ^{90}Sr, and yttrium-90 (^{90}Y) (^{90}Sr progeny). This list goes beyond the 10 WIPP-tracked radionuclides because all radionuclides that contribute to at least 95% of the radionuclide hazard, at least 95% of the thermal loading and any radionuclide that contributes greater than one percent of the total must be reported, which includes ^{137m}Ba and ^{90}Y[17]. Additionally, the ^{235}U value must be considered for criticality purposes. The determination of radionuclide activities by SNL-CCP is technically adequate and correctly documented.

[17] Transportation is not within EPA's regulatory purview; however, this information may be useful in understanding a container's radionuclide composition.

(8) The technical basis and documentation of total measurement uncertainty were evaluated and found to be adequate.

The development of Total Measurement Uncertainty (TMU) for Waste Stream SNL-HCF-S5400-RH is based on the propagation of uncertainties present in 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[18]. The TMU determination included contributions of the following:

- ^{137}Cs DTC correlation – MicroShield® code, MicroShield® modeling, and waste density uncertainties
- ^{137}Cs activity measurement – dose rate measurement uncertainty and uncertainty due to the contribution of other gamma-emitting radionuclides
- Scaling factor uncertainty – sample data uncertainty (except ^{233}U and ^{242}Pu), isotopic fractions uncertainty (^{239}Pu and ^{240}Pu), and ICP-MS IDL values uncertainties (^{233}U and ^{242}Pu)

A general treatment of TMU for PKE00044 is presented in CCP-AK-SNL-501, Revision 1, Section 6, and the detailed treatment of TMU is provided in *Uncertainty Analysis for the Drums – PKE00044*, Calculation Package SNL-RH-05, Revision 1 (Reference U1033). The overall uncertainties are consistent with what EPA has observed for RH determinations at other RH TRU generator sites. The overall uncertainties for PKE00044 drums are provided in Table 10, below.

Table 10. Overall Uncertainty of Example Drum

Radionuclide	^{137}Cs Uncertainty	Total Scaling Factor Uncertainty	Total Uncertainty
U-233	28.0%	100%	103.8%
U-234	28.0%	37.5%	46.8%
U-235	28.0%	37.9%	47.1%
U-238	28.0%	39.3%	48.3%
Pu-238	28.0%	32.9%	43.2%
Pu-239	28.0%	42.7%	51.1%
Pu-240	28.0%	42.6%	51.0%
Pu-241	28.0%	39.0%	48.0%
Pu-242	28.0%	100%	103.8%
Am-241	28.0%	40.5%	49.2%
Sr-90	28.0%	20.4%	34.6%
Cs-137	28.0%	0.0%	28.0%
Y-90	28.0%	20.4%	34.6%
Ba-137m	28.0%	0.0%	28.0%

[18] Adding in quadrature is a standard statistical technique that allows one to combine the square root of the sum of each contributor to uncertainty squared, resulting in a lower value than what would be obtained if the values were simply added. For example, the total uncertainty for ^{239}Pu is derived by taking the square root of $(28.0\%)^2$ plus $(42.7\%)^2$, which equals 51.1%, which is less than the value obtained by simply adding the values, i.e., less than 70.7%, as shown in Table 10.

(9) Execution and documentation of the dose-to-curie technique was assessed and found to be adequate.

EPA observed the DTC technique on May 10, 2011, in the TA-V Building 6597 for drum Nos. SNLNM007008, SNLNM007009 and SNLNM007020[19]. The SNL-CCP DTC operators were James Rowsell and Jimmy Palmer, both of whom were listed on the current LOQI. They supervised the SNL personnel who actually handled the drums and ensured that all appropriate CCP aspects of the process were addressed. The DTC personnel began by performing the operational check on Dyna-Link Scale No. XC0702, which was last calibrated on June 3, 2010, and is due for recalibration on June 3, 2015. SNL personnel weighed the drum and CCP operators recorded the weight. The weights were recorded on the Measurement Control Report (CCP-TP-504, Attachment 1) and summarized in the operational log book.

DTC personnel performed the source checks for Thermo Scientific Model FH 40 G Dose Rate Measuring Unit with FHZ 612 Probe (Instrument No. 023553) attached to Probe No. XC0676. The ambient background was measured and source checks were performed for the high and low ranges and all measurements were recorded on the Measurement Control Report and summarized in the operational log book. DTC personnel consulted *CCP Operator Aid: RH-SNLNM-001, Revision 0, 5-09-11*, which listed tolerances for the Test Drum Weights, Scale Error, Operational Ranges for the Geiger Mueller Probes and acceptance criteria for the source checks. This operator aid was revised to correct minor inconsistencies and was reissued as Revision 1 on May 12, 2011. DTC operators took a background dose reading while all containers were in a shielded position. SNL personnel then lifted drum No. SNLNM007008 onto the DTC assembly and J. Palmer and J. Rowsell observed SNL personnel perform the DTC process in accordance with CCP-TP-504, Revision 11. A copy of the Measurement Control Report was provided to EPA and it included all pertinent information. Measurements were made in four locations on the drum's circumference (0°, 90°, 180° and 270°) and all measurements were recorded on the Container Data Sheet (CCP-TP-504, Revision 11, Attachment 2), a copy of which was provided to EPA. EPA observed the same process for two additional drums (Nos. SNLNM007009 and SNLNM007020), as stated previously. Contact dose rates for each of the three drums exceeded the 200 mrem/hr dose rate, which was inferred by multiplying the one-meter readings by 18. All contact dose rate readings exceeded three times the measured background of 0.2 mr/hr. The measurements and all accompanying parameters were acceptable, and a copy of the Measurement Control Report and the Container Data Sheet for all drums are contained in DTC BDR SNLRHDTC11001, as discussed in Item (9), below.

The use of any alternate radiological characterization procedure other than DTC with established scaling factors documented in CCP-TP-504 and CCP-AK-SNL-501, Revision 1, respectively, or substantive modification thereof, is a T1 change. (See Table 1 where this is included as a T1 change.) Any change to CCP-TP-504 that requires CBFO approval is a T2 change. (See Table 1 where this is included as a T2 change.)

[19] Container No. SNLNM007020 is not part of PKE00044 and technically is not within the scope of this inspection however EPA observed the DTC process as executed by SNL-CCP for all three drums.

(10) Radionuclide documentation in dose-to-curie batch data reports was assessed and found to be adequate.

The DTC results for all containers were documented in a single BDR, SNLRHDTC11001. The EPA inspection team verified that this BDR included the following:

- SPM Checklist, Attachment 8
- BDR Cover Sheet, Attachment 4
- DR Table of Contents, Attachment 5
- BDR Narrative Summary, Attachment 6
- ITR Review Checklist, Attachment 7
- Measurement Control Report with all parameters acceptable, Attachment 1
- Container Data Sheets, Attachment 2
- Waste Container DTC Conversion Records with all required parameters, Attachment 3
- Evidence of signatures by the ITR on Attachment 7 and an SPM on Attachment 8
- Type of waste in each container on Attachment 3, organic and inorganic
- TRU determination for all containers on Attachment 3
- Correct revision of CCP-TP-504, Revision 11

The BDR was technically adequate.

(11) Remote-handled determinations were evaluated and found to be adequate.

The determination that each container in the stream was RH, i.e., had a contact dose rate in excess of 200 mrem/hr, must be based on unshielded dose rates. This required the use of a surface dose multiplier, defined as the ratio of the surface dose rate where no credit is taken for shielding to the shielded dose rate. SNL-CCP used MicroShield to model the unshielded dose on the drum surface, and developed dose rate multipliers for both configurations, as documented in calculation package SNL-RH-07, *Calculation of Drum Surface Dose Rate* (Reference U356) [see Item (5), above]. SNL-CCP corrected the measured (shielded) dose rate using the surface dose multiplier to make the RH determination. Memorandum B-NEO(NE)DNE-64E, dated April 12, 2011, titled *Erratum: Surface Dose Rates for 55-Gallon Drums Loaded with Sandia National Laboratory Remote Handled Transuranic Debris Waste Stream SNL-HCF-S5400-RH* adequately documents this procedure.

(12) TRU determinations were evaluated and were found to be adequate.

DTC BDR SNLRHDTC11001 contained values and the associated uncertainties for the 10 WIPP-tracked radionuclides plus other radionuclides, as appropriate. In all cases the TRU alpha concentration exceeded 100 nCi/g.

Summary of Radiological Characterization Findings and Concerns

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

8.3 Visual Examination

Waste Characterization Element Description

As part of the inspection of the VE activities, the EPA inspection team focused on overall procedural technical adequacy and implementation, as well as the identification of WMPs and prohibited items, in reviewing the following VE elements:

- Documentation of activities through use of an approved procedure
- Proper execution of VE activities
- Management oversight and independent review
- Personnel training

A complete listing of all objective evidence the EPA team evaluated during the inspection is provided in Attachment A. VE was used to determine the following aspects of TRU waste characterization:

- Types and amounts of WMPs
- Confirmation of Waste Matrix Codes (WMC)
- Presence or absence of prohibited items

Technical Evaluation

During the inspection, the EPA inspection team evaluated the technical elements of the VE process. These areas are summarized as follows:

(1) Overall procedural technical adequacy and implementation were adequate.

The VE procedure, documented in CCP-TP-500, contained specific information on performing visual examination, including identification of prohibited items, assignment of Waste Material Parameters (WMP), data recording and technical review of the VE results. The EPA assessed this procedure for technical adequacy and completeness and found it to be adequate. Any change to the VE procedure(s) that requires CBFO approval is a T2 change. (See Table 1 where this is included as a T2 change.)

(2) Characterization of WMPs and prohibited items was assessed and was found to be adequate.

VE operations and sampling activities took place simultaneously. EPA observed the VE operations for parcel P2000998, original container No. C200357, which was repackaged into 30-gallon container P1110158, and the final 55-gallon container SNLNM007020. The operators verified that the receiving (daughter) drum was empty. The parcel was a 5-gallon paint can, labeled “HCFSCB-3 sweeping.” A smaller can (approximate volume 1 pint) was removed from the 5-gallon paint can. VE was performed on the contents of the inner can and the waste items were placed into the receiving 30-gallon container, No. P1110158. Waste items removed from the 1-pint can were identified and recorded by the CCP VE personnel. Two operators performed

VE in accordance with procedure CCP-TP-500 using Attachment 1, the VE data form from the procedure. The EPA reviewed BDR Nos. RHSNLVE100001, RHSNLVE110001, RHSNLVE110002, and RHSNLVE110003 and determined that VE data contained within the BDRs had been generated and recorded in accordance with procedure requirements. Data sheets were completed and signed. EPA inspectors determined that ITR- and SPM-level reviews were adequately performed and appropriately recorded.

The use of VE for waste SCGs not covered by this approval or by any new process for S5000 debris wastes is a T1 change. (See Table 1 where these are included as T1 changes.) The addition of new SNL-CCP S5000 debris waste streams is a T2 change. (See Table 1 where this is included as a T2 change.)

(3) Documentation of VE activities was examined and was found to be adequate.

EPA reviewed BDR Nos. RHSNLE100001, RHSNLVE110001 and RHSNLVE110001, which contain VE data for PKE00044 examined during this inspection. EPA also reviewed BDR No. RHSNLVE110003 which contained VE data from the parcel observed on-site during the March visit. WMPs were identified and recorded on the VE Data Form, and the absence of prohibited items was confirmed and recorded. WMP weights are not assigned during VE of RH waste because all waste item weights are reported into WWIS/WDS as "plastic". Waste item categories were identified, for example, cellulosics (C) and "other metal" (OM), and recorded on the VE data sheets. Table 2 of CCP-TP-500 provides a complete listing of WMPs. A listing of prohibited items is provided in Table 1 of the procedure and the absence or presence of these items was recorded on VE data sheets. No prohibited items were identified in the containers subject to VE and reported in the above BDRs.

(4) Training of VE personnel was evaluated and was found to be adequate.

SNL-CCP maintains a list of qualified individuals (LOQI), which it uses to ensure that all training is current. SNL-CCP documents the personnel who are trained for performing VE and data generation-level data review, and the VEE. The EPA team reviewed the Qualification Cards for the VEO and VEE and found that these VE operators were comprehensively and adequately trained to perform VE operations. The training records were complete and available for review.

Summary of VE Findings and Concerns

The EPA team did not identify any findings or concerns related to VE during this baseline inspection.

9.0 RESPONSE TO COMMENTS

On October 6, 2011, when announcing the proposed approval of SNL-CCP's RH TRU waste characterization program for debris waste (S5000), EPA sought public comment on the proposed decision (See 76 FR 62062-62066). EPA public comment period spanned over 45 days and ended on November 21, 2011. EPA did not receive any public comment on the proposed decision and the docketed inspection report (A-98-49; II-A4-152).

10.0 SUMMARY OF RESULTS

10.1 Environmental Protection Agency Findings and Concerns

EPA identified one concern during this inspection related to the processes SNL-CCP implemented to characterize RH TRU debris Waste Stream SNL-HCF-S5400-RH. A copy of the EPA Inspection Issue Tracking Form that captures the finding is included in Attachment C of this report. Several rounds of communication between EPA and CBFO personnel followed issuance of this concern and CBFO responses to EPA's concern are included in entirety as three different reports in the EPA Air Docket supporting the *Federal Register* notice announcing the proposed baseline approval of SNL-CCP's RH program. (For CBFO response, see regulatory docket EPA-HQ-OAR-2011-0786-0002 to 0004.)

EPA determined that objective evidence provided supporting the response is adequate. As a result, EPA considers this issue to be closed. No issues resulting from this baseline inspection remain open at this time.

10.2 Conclusions

This final approval is based on EPA's baseline inspection conducted in three steps: observation of the VE and sampling processes at SNL on March 8, 2011; observation of DTC measurements on May 10, 2011 at SNL; and the formal baseline inspection on June 7-8, 2011, held in Golden, Colorado. EPA evaluated the SNL-CCP's RH waste characterization program for the 19 parcels of waste group PKE00044 from the debris waste stream SNL-HCF-S5400-RH and determined it to be technically adequate. The final approval includes the following:

(1) The AK process for 19 parcels of retrievably-stored TRU debris waste from the waste group PKE00044 from SNL RH Waste Stream SNL-HCF-S5400-RH

(2) The radiological characterization process documented in CCP-AK-SNL-501, Revision 1, and supported by the calculation packages referenced in this report

(3) The VE process to identify waste material parameters (WMPs) and the physical form of debris waste

SNL-CCP must continue to use the approved RH TRU waste characterization program components in accordance with the conditions and restrictions discussed in this report.

SNL-CCP may add waste parcels to the waste group PKE00044, if:

1. Additional waste's pedigree is similar to the parcels in PKE00044 as described in this report; and
2. the radionuclide scaling factors used for 19 waste parcels from PKE00044 are technically appropriate and applicable for the additional waste.

When adding waste to PKE00044, SNL-CCP must notify EPA and submit the appropriate supporting documentation that fulfills the above conditions. With EPA approval, SNL-CCP may dispose of the additional waste from PKE00044 at the WIPP facility. However, if a population of additional newly-generated waste requires new or different radionuclide scaling factors, those containers will require a Tier 1 (T1) approval prior to disposal at the WIPP. Also, in the future, if SNL-CCP uses contact-handled (CH) information to characterize any SNL-CCP RH waste, EPA's evaluation of the applicable CH program is necessary. Waste Stream SNL-HCF-S5400-RH is comprised of two other waste groups (PKE00047 with nine parcels and PKE00027/54 with four parcels) and will require separate T1 approvals as shown in Table 1.

11.0 REFERENCES

U.S. Environmental Protection Agency, "Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the Disposal Regulations: Certification Decision; Final Rule," *Federal Register*, Vol. 63, No. 95, May 18, 1998, pp. 27354, 27405.

U.S. Code of Federal Regulations, *Title 40*, *Protection of Environment*, Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes."

U.S. Code of Federal Regulations, *Title 40*, *Protection of Environment*, Part 194, "Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations."

U.S. Department of Energy, Office of Environmental Management, "Radioactive Waste Management Manual," DOE M435.1-1, July 9, 1991, Change 1: June 19, 2001.

U.S. Department of Energy, Carlsbad Field Office, "Remote Handled TRU Waste Characterization Program Implementation Plan," DOE/WIPP-02-3214, Revision 0D, Carlsbad, New Mexico, October 30, 2003.

U.S. Department of Energy, Carlsbad Field Office, "Remote Handled TRU Waste Characterization Program Implementation Plan," DOE/WIPP-02-3214, Revision 2, Carlsbad, New Mexico, April 21, 2011.

U.S. Department of Energy, Title 40 CFR Part 191, Compliance Certification Application for the Waste Isolation Pilot Plant, DOE/CAO 1996-2184, Carlsbad, New Mexico, 1996.

U.S. Department of Energy, Title 40 CFR Part 191, SUBPART D AND C, Compliance Recertification Application 2004, DOE/WIPP/2004-3231.

U.S. Department of Energy, "Remote-Handled Transuranic Waste Authorized Methods for Payload Control (RH-TRAMPAC)," Carlsbad, New Mexico.

ATTACHMENT A: DOCUMENTS REVIEWED

CCP-AK-SNL-500, Central Characterization Project Acceptable Knowledge Summary Report for Sandia National Laboratories/New Mexico Remote-Handled Hot-Cell Facility Transuranic Waste (Debris), Waste Stream: SNL-HCF-S5400-RH, Revision 1, March 4, 2011 and Revision 2, July 6, 2011

CCP-AK-SNL-501, Central Characterization Project Remote-Handled Transuranic Radiological Characterization Technical Report for Sandia National Laboratories/New Mexico Hot-Cell Facility Remote-Handled Transuranic Debris Waste, Waste Stream: SNL-HCF-S5400-RH, Revision 0, May 10, 2011 and Revision 1, August 3, 2011

CCP-AK-SNL-502, Central Characterization Project RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test Plan for Sandia National Laboratories/New Mexico Laboratory Remote-Handled Transuranic Debris Waste, Waste Stream: SNL-HCF-S5400-RH, Revision 0, May 10, 2011 and Revision 1, August 10, 2011

CCP-AK-SNL-505, Central Characterization Project Sampling and Analysis Plan for Sandia National Laboratory Remote-Handled Transuranic Debris Waste, Waste Stream: SNL-HCF-S5400-RH, Revision 0, November 29, 2010

CCP-TP-002, Attachment 2 – CCP Waste Stream Profile Form, Waste Stream SNL-HCF-S5400-RH, Draft for Audit Purposes, Provided June 1, 2011

CCP-TP-005, Attachment 1, Acceptable Knowledge Documentation Checklist, April 25, 2011

CCP-TP-005, Attachment 4, Acceptable Knowledge Source Document Reference List, April 25, 2011 and June 16, 2011

CCP-TP-005, Attachment 6, Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, April 21, 2011

CCP-TP-005, Attachment 8, Waste Containers, April 21, 2011

CCP-TP-005, Attachment 10, Acceptable Knowledge Re-evaluation Checklist, NCR-RHSNL-2350-11, June 16, 2011

CCP-TP-005, Attachment 13, CCP Waste Stream Characterization Checklist, Draft, Provided June 21, 2011

CCP-TP-500, Revision 10, CCP Remote-Handled Waste Visual Examination, December 29, 2010

CCP-TP-512, CCP Remote-Handled Waste Sampling, Revision 4, December 29, 2010

Characterization Reconciliation Report for Waste Stream SNL-HCF-S5400-RH, Draft for Audit Purposes, Provided June 1, 2011 and June 27, 2011

Characterization Information Summary, Waste Stream SNL-HCF-S5400-RH, Draft, Provided June 24, 2011

DTC BDR No. SNLRHDTC11001

Inter-Office Correspondence, from Irene Quintana to CCP Records Custodian, Acceptable Knowledge Accuracy Report, Sandia National Laboratory/New Mexico Waste Stream Number SNL-HCF-S5400-RH, Lot 1, For Audit Purposes Only, May 31, 2011

List of qualified individuals (LOQI) for waste sampling and VE; January 1, 2011 and May 4, 2011

NCRs: NCR-RHSNL-2345-11 and NCR-RHSLN-2350-11

Post Sampling Analysis Memorandum: Analysis of Sample Data for Sandia National Laboratory/New Mexico (SNL/NM), Waste Stream SNL-HCF-S5400-RH, J. Holderness, April 26, 2011

Qualification Card for J. Kleckner, provided May 3, 2011

Qualification cards and training records for VE operators/ITRs, and VEEs

Sampling BDR Nos. SNRH1001 and SNRH1101

VE BDR Nos. RHSNLVE100001, RHSNLVE110001, RHSNLVE110002, and RHSNLVE110003

Laboratory Analytical Data Packages: ALD 11007A, Actinides by Alpha Spectrometry, Radiochemical Analysis Data Report; ALD11007L, Liquid Scintillation Counting Radiochemical Analysis Data Report; ALD11007I, ICP-MS Isotopic Data Report and Narrative

C1004, Reactor Accident Experiments and Funding, Sandia National Laboratories, Summer 1978

C1038, Ken Reil lnterview by John Kleckner, February 3, 2010

C1039, Waste Material Parameter Memorandum for Waste Stream SNL-HCF-S5400, John Kleckner, February 1, 2010

DR1001, Discrepancy Resolution for the Assignment of EPA Hazardous Waste Numbers, Kevin J. Peters and Steve Schafer, February 15, 2011

DR1002, Discrepancy Resolution for Container #P1110154 (Parent Container C980313), John Kleckner, April 21, 2011

DR1003, Discrepancy Resolution: Assignment of EPA Hazardous Waste Numbers, Steve Schafer, June 15, 2011

I1030, Hot Cell Facility (HCF) Decontamination Plan, December 13, 1994

M1015, Miscellaneous Articles and Public Extracts, 1976 to 2008, not inclusive

M1016, Disposal Requests from the 2007/2008 Repackaged Containers, 2007 through 2008

M1019, Collection of Spreadsheets Pertaining to TRU Waste Generated at the AHCF and Other Locations in TA-V, September 18, 2007

M1020, Process Knowledge Evaluations (PKE) for Radiological Ratios (e.g., PKE00044 and PKE00047), March 1980 through March 2004

M1021, Memo to Record, re: Evaluation of Radionuclide Activity Ratios for Hot Cell Facility Wastes (PKE00044 and PKE00047) and Memo to Record, re: PKE000047 Radionuclide Activity Ratios, Michael Enghauser, June 24, 2004 and June 24, 2004

P1015, Sampling and Analysis Plan for Characterization of Waste Arising From Hot Cell Facility Glovebox Decontamination, PLA 95-28, Revision 1, October 12, 1995

P1030, Plutonium, The First 50 Years, undated

P1041, Sandia National Laboratories/New Mexico Environmental Information Document, Volume II, J.V. Guerrero, K.A. Kuzio, W.H. Johns, L.S. Bayliss, and B.B. White, SAND99-2022/2, September 1999

P1044, The Department of Energy's Tritium Production Program, R.E. Rowberg, RL30425, November 02, 2001

P1102, Building 6580 Hot Cell Facility, Steel Containment Boxes and Zone 2A Process Knowledge Documentation: Isotope Production Program, Hot Cell Facility Decontamination Project, L. Fugelso, S. Longley, and S. Bourcier, June 26, 1996

P1104, Hot Cell Facility (HCF) Safety Analysis Report, Main Report and Appendices, Louis F. Restrepo, SAND94-2650, October 21, 1994

U1029, Radiochemistry and Mass Spectrometry Data Input Check, J. Vance, SNL-RH-01, Revision 0, May 6, 2011

U1030, Scaling Factor Development Debris – PKE00044, J. Vance, SNL-RH-02, Revision 0, May 6, 2011

U1031, Determination of Reportable Radionuclides – PKE00044, J. Vance, SNL-RH-03, Revision 0, May 6, 2011

U1032, Drum Dose-to-Curie Derivation for Cs-137, J. Vance, SNL-RH-04, Revision 0, May 6, 2011

U1032, Drum Dose-to-Curie Derivation for Cs-137, J. Vance, SNL-RH-04, Revision 1, May 31, 2011

U1033, Uncertainty Analysis for Drums-PKE00044, J. Holderness, SNL-RH-05, Revision 0, May 6, 2011

U1033, Uncertainty Analysis for Drums-PKE00044, J. Holderness, SNL-RH-05, Revision 1, May 31, 2011

U1034, DTC and Related Calculations for Drums PKE00044, J. Holderness, SNL-RH-06, Revision 0, May 6, 2011

U1034, DTC and Related Calculations for Drums PKE00044, J. Holderness, SNL-RH-06, Revision 1, May 31, 2011

ATTACHMENT B: PERSONNEL CONTACTED DURING INSPECTION

Personnel Name	Affiliation	Area of Expertise, Function	Sampling - VE	DTC	AK
Rajani Joglekar	U.S. EPA ORIA	Inspection Team Leader		✓	✓
Ed Feltcorn	U.S. EPA ORIA	Inspection Team	✓		✓
Connie Walker	SC&A	Inspection Team, AK			✓
Kira Darlow	SC&A	Inspection Team, AK			✓
Dorothy Gill	SC&A	Inspection Team, VE	✓		✓
Rose Gogliotti	SC&A	Inspection Team, Radiological Characterization		✓	✓
Patrick Kelly	SC&A	Inspection Team, Radiological Characterization		✓	✓
Amir Mobasheran*	SC&A	Inspection Team, Radiological Characterization	–	–	–
Andrew Stallings	CCP	SQS Project Manager		✓	
James Rowsell	CCP	DTC Operator		✓	
Jimmy Palmer	CCP	DTC Operator		✓	
Mitchell Callahan	SNL	Radiation Protection		✓	
John Miller	SNL	Radiation Protection	✓		
Tommy Mojica	WTS-CCP	Visual Examination Expert	✓		
Spencer Pattee	WTS-CCP	Visual Examination Operator	✓		
Ronnie Lee	WTS-CCP	CCP Project Manager	✓		
Michael Sensebaugh	WTS-CCP	CCP Projects Manager	✓		
Laura Nelson	CCP	RH Site Project Manager	✓		
Mark Doherty	CCP-TechSpecs	AK Expert			✓
Betty Humphrey	SNL	TRU Waste Specialist		✓	
Jim Holderness	WTS-CCP	Radiological Characterization			✓
Kevin Peters	CCP-TechSpecs	SNL-CCP AK Expert			✓
John Kleckner	CCP-TechSpecs	SNL-CCP AK Expert			✓
Steve Schafer	CCP-TechSpecs	SNL-CCP AK Expert			✓
Court Fesmire	CBFO	CBFO Representative	✓		✓
Irene Quintana	WTS-CCP	RH Site Project Manager	✓	✓	✓
Jene Vance	WTS-CCP	Radiological Characterization			✓

*Amir Mobasheran performed his evaluations via a desk-top review.

ATTACHMENT C: EPA INSPECTION ISSUE TRACKING FORM
NO. SNL-CCP-RH-AK-11-01CR

Inspection No. EPA-SNL-CCP-RH-06.11-8	**Issue Number:** SNL-CCP-RH-AK-11-01CR **Date:** June 8, 2011
Inspector: C. Walker and K. Darlow **Attachments?** ☐ YES ☒ NO	**Sample Size:** Unknown **Population size (if known):** Unknown

A. Description of Issue: The WCPIP, Revision 2, requires that characterization personnel responsible for compiling AK, characterizing RH TRU waste streams using the AK process, and assessing the AK characterization shall be qualified and trained to (1) the WCPIP, (2) the characterization program nonconformance and corrective action process, (3) site-specific waste streams (e.g., current AKSR), and (4) determination of radiological contents of individual containers. The WCPIP requires (on page 33): "**The RH TRU characterization program is responsible for maintaining records of the training provided to personnel responsible for compiling AK**."

SNL-CCP was unable to provide objective evidence showing that the AKEs compiling AK documents for the Sandia waste are trained to the above requirements. Through interviews and discussions with AKEs EPA was able to conclude that they are up to date on the training requirements listed above. However, the RH TRU characterization program does not maintain the required records and that deficiency in the RH Program at SNL-CCP must be addressed to be in compliance with WCPIP, Revision 2 that was effective April 21, 2011.

B. Regulatory Reference: 40 CFR 194.24(c)

C. Site requirement(s): WCPIP, Revision 2, Section 4.1 describes the requirements for AK training documentation and the AK QA comparability that includes training.

D. Discussed with: M. Doherty, C. Fesmire, I. Quintana, Kevin Peters and Steve Schafer

E. Additional Comments: None

F. Site Response Information:
Site Response Required? ☒ YES ☐ NO
Site Initial Response Due Date: June 23, 2011