



United States Government

Department of Energy

memorandum

Carlsbad Field Office
Carlsbad, New Mexico 88221

DATE: July 23, 2014

REPLY TO
ATTN OF: CBFO:OQA:DSM:MAG:14-1199:UFC 2300.00

SUBJECT: Transmittal of Surveillance Report S-14-20, SRS/CCP Radiological Characterization of Sealed Sources

TO: Herbert M. Crapse, DOE-SR

The Carlsbad Field Office (CBFO) conducted Surveillance S-14-20 to evaluate the Savannah River Site Central Characterization Program (SRS/CCP) radiological characterization of waste stream SR-RH-SDD.01 consisting of heterogeneous debris waste in the form of three sealed plutonium-beryllium neutron sources from the SRS Physics Laboratory. The surveillance was conducted May 13-19, 2014.

Five Concerns were identified during the surveillance, as follows:

- Two conditions adverse to quality resulted in Corrective Action Reports (CARs) 14041 and 14-042 (issued under separate cover);
- Two conditions adverse to quality, minor in nature, were corrected during the surveillance; and
- One Observation.

One recommendation was offered for management consideration. The surveillance team concluded that the process for radiological characterization of the three SRS remote-handled transuranic sealed sources is adequate with respect to procedural compliance, satisfactorily implemented and effective.

If you have any questions concerning Surveillance S-14-20, please contact me at (575) 234-7491.

Dennis S. Miehl
Senior Quality Assurance Specialist

Attachment

cc: w/attachment

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140747



CBFO SURVEILLANCE REPORT

Surveillance Number: S-14-20 **Date of Surveillance:** May 13 – 19, 2014

Surveillance Title: SRS/CCP Radiological Characterization of Sealed Plutonium-Beryllium Neutron Sources Surveillance

Organization Surveilled: Savannah River Site/Central Characterization Program (SRS/CCP)

Surveillance Team:

Dennis S. Miehls	Carlsbad Field Office (CBFO) Management Representative
Priscilla Y. Martinez	Surveillance Team Leader, Carlsbad Field Office Technical Assistance Contractor (CTAC)
Randall Allen	Team Member, CTAC
Richard Blauvelt	Technical Specialist, CTAC
Joe Harvill	Technical Specialist, CTAC
Jim Oliver	Technical Specialist, CTAC
Jim Schuetz	Technical Specialist, CTAC

Surveillance Scope:

The scope of the surveillance was to evaluate documentation for supporting the characterization of Remote-Handled (RH) S5000 debris waste, specific to the radiological characterization of waste stream SR-RH-SDD.01 consisting of three sealed plutonium-beryllium neutron sources from the SRS Physics Laboratory. The surveillance team evaluated the SRS/CCP radiological characterization process May 13–19, 2014.

Governing Documents/Requirements:

The surveillance was based on the applicable requirements in current revisions of the following documents:

- DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (WAC)*
- DOE/WIPP-02-3214, *Remote-Handled TRU Waste Characterization Program Implementation Plan*
- DOE/CBFO-94-1012, *CBFO Quality Assurance Program Document*
- 40 Code of Federal Regulations (CFR) 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*
- CCP-PO-002, *CCP Transuranic Waste Certification Plan*
- CCP-PO-505, *CCP Remote-Handled Transuranic Waste Authorized Methods for*

Payload Control (RH-TRAMPAC)

- CCP-QP-022, *CCP Software Quality Assurance Plan*
- CCP-TP-514, *CCP Procedure for Radiological Calculation Package Submittal*

Surveillance Results:

The surveillance team identified two conditions adverse to quality (CAQs), as documented in CBFO CARs 14-041 and 14-042, two CAQs minor in nature, requiring only remedial action as documented in CDS-1 and CDS-2, one observation and one recommendation.

Activities Evaluated:

This surveillance was conducted to review the radiological characterization of three remote-handled (RH) transuranic (TRU) sealed sources from the SRS in a waste stream designated as SR-RH-SDD.01. The following relevant reports and supporting documents (References and Acceptable Knowledge [AK] Source Documents) were reviewed during the surveillance:

- CCP-AK-SRS-630, Rev. 1, *CCP AK Summary Report for SRS Physics Laboratory Sealed Sources Waste Stream SR-RH-SDD.01*
- CCP-RC-SRS-631, Rev. 1, *CCP RH TRU Radiological Characterization Technical Report for SRS Physics Laboratory Sealed Sources Waste Stream SR-RH-SDD.01*
- CCP-CP-SRS-632, Rev. 0, *CCP RH TRU Waste Certification Plan for 40 CFR 194 Compliance for Waste Stream SR-RH-SSD.01*

From CCP-AK-SRS-630:

Reference 13 - CCP-LANL-AK-008, *CCP AK Summary for LANL Off-Site Source Recovery Project Sealed Sources, Waste Streams: LA-OS-00-01.001, LA-OS-00-03 and LA-OS-00-04*

Reference 22 - 49 CFR 173, *Shippers-General Requirements for Shipments and Packagings*, U.S. EPA

AK Source Document C001 - Characterization of Sources from Savannah River Plant

AK Source Document C002 - Memo to J. McAlpin from T.J. Feske: re: Pu-BE Sources-777-10A

AK Source Document U001 - Container Paperwork for Waste Stream SR-RH-SDD.01

AK Source Document U002 - Miscellaneous Pu-Be Neutron Source Documentation and Specifications

AK Source Document U003 - Reported Radionuclide Evaluation Tables for Waste Stream SR-RH-SDD

From CCP-RC-SRS-631:

Reference 6 - Radiological Characterization of Actinide Sealed Source Waste for Disposal at WIPP (D007)

Reference 8 - Calculation SRS-RH-88, Sealed Source Characterization for SRS-630 Drums

Reference 10 - Plutonium Beryllium Neutron Sources for E.I. DuPont, Monsanto Research Corporation, Dayton OH

From CCP-CP-SRS-632:

Reference 10 - Sealed Source Peer Review Report December 5, 2003

Acceptable Knowledge

The surveillance team evaluated Certification Plan, CCP-CP-SRS-632, Rev. 0, *CCP RH TRU Waste Certification Plan for 40 CFR 194 Compliance for Waste Stream SR-RH-SSD.01* and CCP-RC-SRS-631, Rev. 1, *CCP RH TRU Radiological Characterization Technical Report for SRS Physics Laboratory Sealed Sources Waste Stream SR-RH-SDD.01*. The review indicated that the proposed characterization method described in CCP-CP-SRS-632 and approved by CBFO was the EPA approved ACCESS database developed for the Off-Site Source Recovery Program (OSRP). During development of the Radiological Characterization Technical Report (CCP-RC-SRS-631) the ACCESS database was found to not be capable of providing acceptable characterization data. The final characterization method developed in CCP-RC-SRS-631 was therefore significantly different involving an independent calculation and the development of an EXCEL worksheet.

Also, data in two reference documents (Drawing MRC-N-SS-W-Pu8Be29, Plutonium Beryllium Neutron Sources for E.I. DuPont, Monsanto Research Corporation, Dayton, Ohio, and Nuclear Materials Management and Safeguard System Report dated 12-31-85) were cited as the objective evidence used to provide the starting quantities of the plutonium and the isotopic mixes. The data in the two reports differ from each other and do not match the original OSRP traveler forms. In addition, the surveillance team questioned the quality, traceability, and validity of the Monsanto drawing due to difficulty in reading the document and lack of clear traceability of the handwritten notes to an original author. These differences in the sources of AK data caused the original AK data provided in the Certification Plan (CCP-CP-SRS-632) to be significantly changed in the subsequent Radiological Characterization Technical Report (CCP-RC-SRS-631). CCP personnel indicated that this drawing was the best available information and that the originally presented AK data had been considered as the appropriate starting point by the OSRP and SRS before the CCP was tasked with characterization and disposition of the sealed sources.

Per the WCPIP Section 3.2.2 requirement, "the Certification Plan shall be prepared to describe the process for certification of the waste stream, including a description of the characterization methods selected for the waste stream." Furthermore, Figure 1 of the WCPIP presents a flowchart that appears to require revision of the Certification Plan if discrepancies in the original AK information are discovered during the characterization process. This was clarified by CCP personnel who explained that their interpretation of the text and figure in the WCPIP do not require revision of the Certification Plan, but the text and figure together may present some confusing guidance that is open to interpretation. Due to this appearance of inconsistency, the surveillance team believes the text and flowcharts in the WCPIP should be reviewed and clarified to eliminate potential areas of confusion and interpretation. This is classified as Observation 1.

The surveillance team discussed the availability and control of reference documents listed in the primary documents cited above. While it was noted that referenced documents are not controlled in the manner of an AK source document, it was recommended that documents should be available on request. In addition, it was also recommended that references

containing "vital" information such as the starting quantities of the radionuclides should be controlled and cited as AK source documents. (See Recommendation 1)

In reviewing the supporting documentation, it was noted by the surveillance team that several dates of manufacture are listed with a range of a few years. Since this date is used as the starting point for decay of the radionuclides, the justification for using the date of 12-31-66 was requested rather than, for example, the dates on the Monsanto drawing. The CCP response was that the selected date was chosen by the OSRP and the SRS as the most supportable. In addition, the CCP developed a sensitivity calculation that indicated that variation of the dates resulted in differences that fell within the uncertainty value for americium (Am)-241, the most sensitive of the primary radionuclides. The CCP response was acceptable to the surveillance team and requires no further action.

During the review of Reference 8, Calculation SRS-RH-88, *Sealed Source Characterization for SRS-630 Drums*, the surveillance team could not verify the calculation steps of how CCP evaluated the Pu radionuclide quantities noted on the Monsanto drawing and arrived at the numbers used in CCP-RC-SRS-631 as the starting point for decay and listed in Table 1-1 of the document. CCP added the calculation steps to Calculation SRS-RH-88. The surveillance team determined this issue was isolated in nature, and the surveillance team was able to verify the calculation steps were added to Calculation SRS-RH-88 prior to the completion of the surveillance (See CDS 1).

Software Quality Assurance

The surveillance team reviewed the calculation package Calculation SRS-RH-88, *Sealed Source Characterization for SRS-630 Drums*, that was used to generate values presented in CCP-RC-SRS-631, *CCP RH TRU Radiological Characterization Technical Report for Savannah River Site Physics Laboratory Sealed Sources Waste Stream: SR-RH-SDD.01* document. The package was evaluated with respect to application of Software Quality Assurance (SQA) control to the *SRS-630 Sealed Source Characterization* spreadsheet referenced in the calculation. The formulae and data in the tabs within the spreadsheet are applicable to the calculations being performed within the scope of the calculation. The surveillance team determined that the calculation was performed and adequately evaluated to an extent to provide correct and valid values for the technical report. However, the surveillance team identified some editorial errors in the text of the calculation and some inconsistencies in the presentation of values in tables within the spreadsheet. These were discussed with CCP personnel and were corrected during the surveillance. The surveillance team determined these issues to be isolated in nature, and the surveillance team verified that corrections to the documents were completed prior to the end of the surveillance (See CDS 2).

The surveillance team discussed functionality of the spreadsheet and the application of SQA. The surveillance team determined that the spreadsheet was not being controlled in accordance with the CCP SQA procedure CCP-QP-022, *CCP Software Quality Assurance Plan*. Application of SQA and control of the spreadsheet as an application that was written within commercial-off-the-shelf software is addressed in CBFO Corrective Action Report (CAR) 14-041. The surveillance team determined that the procedure, CCP-TP-514, Rev. 1, *CCP Procedure for Radiological Calculation Package Submittal*, which governs generation of

calculations, is inadequate with respect to specification of the application of SQA to software applications written within calculations. Revision of the procedure to address application of SQA to software within calculations is addressed in CBFO CAR 14-042.

Corrective Actions:

CAR 14-041

Procedure CCP-QP-022, *CCP Software Quality Assurance Plan*, Rev. 13, Section 1.1, Scope, states in part that "This SQAP applies to all computer software including applications developed within Commercial-Off-The-Shelf (COTS)...".

Documentation of the verification of values in the calculations taken from the "SRS-630 Sealed Source Characterization" spreadsheet and presented in Calculation No. SRS-RH-88, *Sealed Source Characterization for SRS-630 Drums*, is inadequate in scope. SQA per CCP-QP-022 has not been performed for the spreadsheet referenced in the calculation (Microsoft Office 2010 Excel spreadsheet "SRS-630 Sealed Source Characterization"). A full check/verification of the spreadsheet values and formulae has not been performed. The stated requirement is interpreted to indicate that the spreadsheet within calculation SRS-RH-88 should be controlled.

CAR 14-042

DOE/CBFO-94-1012, Rev. 11, *Quality Assurance Program Document*, Section 2.1.2 B., Implementing Procedures, states in part that "Implementing procedures shall include the following information, as appropriate to the work to be performed:...". Definition and specification of SQA requirements in an overall plan as well as within individual procedures of specific focus are "technical requirements" per subparagraph 2, and are "prerequisites" per subparagraph 5, indicating that the application of SQA should be addressed in implementing procedures.

Procedure CCP-TP-514, Rev. 1, *CCP Procedure for Radiological Calculation Package Submittal*, does not address performance of verification of software applications that are part of calculations or application of SQA to software used within calculations.

Corrected During the Surveillance:

Two CDSs were identified during the surveillance:

CDS-1

The radiological determination for the sealed sources as documented in reference 8 of CCP-RC-631, Rev.1, *Calculation SRS-RH-88, Sealed Source Characterization from SRS-630 Drums*, omits the initial step of taking Pu values from the manufacturer's drawing (Reference 10 from SSP-RC-631, Rev. 1) and determining the starting isotopic quantities for decay. NWP revised the calculation package to

address the bullet identifying the incompleteness in the documentation of the calculation.

CDS-2

Inconsistencies in presentation of spreadsheet cell references and editorial errors were identified in Calculation SRS-RH-88 *Sealed Source Characterization for SRS-630 Drums*.

- The "Assumptions" section on page 2 is blank.
- The "Container Gross Weight" line item at the top of page 3 shows 20.8 kg, which is different than that shown in the "Total Drum Mass" cell in the table from the "constants" tab on the same page that gives the value of 1.95E+01.
- The formulae in the "Totals" cells at the bottom of the second table on page 5 shows "=SUM(B18:B31)" which appears to reference cells different than the line numbers at the left of the table.
- Values in the cells of various tables are presented with differing significant figures: 2.100E-06 and 1.21 E-06.
- A notation should be included in the calculation that the spreadsheet covers values and formulae for three sources and that the information shown for MRP8BE45 will be similar for that for the other two sources (MRP8BE29 and MRP8BE44).

The Nuclear Waste Partnership LLC (NWP) revised Calculation SRS-RH-88 to address all five of the bullets identifying the inconsistencies in the calculation. The surveillance team determined these issues to be isolated in nature, and the surveillance team was able to verify the calculation was revised prior to the completion of the surveillance. These issues are considered to be resolved.

Observations:

One Observation was made as a result of this surveillance:

The results of the review indicated that the proposed characterization method described in CCP-CP-SRS-632 and approved by CBFO was the EPA approved ACCESS database developed for the OSRP. The ACCESS database was found to be incapable of providing acceptable characterization data so the final characterization method developed in CCP-RC-SRS-631 was significantly different. Also, differences in the sources of AK data caused the original AK data provided in the Certification Plan (CCP-CP-SRS-632) to be significantly changed in the subsequent Radiological Characterization Technical Report (CCP-RC-SRS-631). CCP personnel indicated that this drawing was the best available information and that the originally presented AK data had been considered as the appropriate starting point by the OSRP and SRS before the CCP was tasked with characterization and disposition of the sealed sources.

Per the WCPIP Section 3.2.2 requirement, "the Certification Plan shall be prepared to describe the process for certification of the waste stream, including a description of the characterization methods selected for the waste stream." Furthermore, Figure 1 of the

WCPIP presents a flowchart that appears to require revision of the Certification Plan if discrepancies in the original AK information are discovered during the characterization process. This was clarified by CCP personnel who explained that their interpretation of the text and figure in the WCPIP do not require revision of the Certification Plan, but the text and figure together may present some confusing guidance that is open to interpretation. Due to this appearance of inconsistency, the surveillance team believes the text and flowcharts in the WCPIP should be reviewed and clarified to eliminate potential areas of confusion and interpretation.

Recommendations:

One Recommendation was offered to CCP management as a result of this surveillance.

Recommendation 1

The surveillance team discussed the availability and control of reference documents listed in the primary documents cited above. While it was noted that referenced documents are not controlled in the manner of an AK source document, it was recommended that documents should be available on request. In addition, it was also recommended that references containing "vital" information such as the starting quantities of the radionuclides should be controlled and cited as AK source documents.

Conclusions:

Based on the resolution of corrective actions identified in CBFO CARs 14-041 and 14-042, and completion of actions identified above in CDS 1 and 2, the surveillance team finds the process for radiological characterization of the three SRS RH sealed sources to be adequate with respect to procedural compliance, satisfactory and effective.

Surveillance Team Leader: Priscilla Y. Martinez Date: 7-22-14
Priscilla Y. Martinez

Assistant Manager/Office Director: N/A Date: N/A

CBFO QA Director Approval: D. J. Mills Date: 7-22-14