

**Safety Evaluation Report for the  
Safety Analysis Report for Packaging, Hanford  
Unirradiated Fuel Package  
(CHPRC-00164, Revision 1, November 2009)**

**Docket Number 09-46-9905**

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## OVERVIEW

This Safety Evaluation Report (SER) documents the review of the *Safety Analysis Report for Packaging for the Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009)*.<sup>[i]</sup> The Savannah River National Laboratory (SRNL) Staff performed the review at the request of the U.S. Department of Energy (DOE) Packaging Certification Program (PCP). The safety performance of the Hanford Unirradiated Fuel Package with the intended payloads meets the requirements of 10 CFR 71<sup>[ii]</sup>.

### Background

The Hanford Unirradiated Fuel Package (HUFPP) is designed in accordance with the requirements of 10 CFR 71 and 49 CFR 173<sup>[iii]</sup> to provide a safe means of transporting one core component container (CCC) housing Mixed-oxide (MOX) driver fuel assemblies (DFAs) or multiple IDENT-69G containers housing loose fuel pins. The packaging design can carry up to seven DFAs (within a CCC) or six IDENT-69G containers, all loaded in excess of 20 Ci of plutonium. The HUFPP transports in excess of 30,000 Ci of radioactive material, resulting in a Category I designation.

A Safety Analysis Report for Packaging (SARP) for the HUFPP<sup>[iv]</sup> was approved in 2008, and a certificate of compliance (CoC), Revision 0, USA/9905/B(U)F-96(DOE) was issued. In 2009, the HUFPP fabrication work was completed, and all units were delivered to the Plutonium Finishing Plant at Hanford. During fabrication, modifications to the HUFPP design were identified. The modifications were evaluated by the CH2MHILL Plateau Remediation Company (CHPRC) per the HUFPP SARP (HNF-28554: Section 9.3.1: Design Control) and were determined not to affect the safety performance or the certification conditions for the HUFPP. The modifications were incorporated into the SARP, and a new SARP was generated with a title reflecting the new Central Plateau Remediation Contract. The difference between the new and previous SARP is in the revisions that were prompted by the modifications. The revisions were concentrated in Chapter 1 (only drawings revisions) and Chapter 9 and were “redlined” to help in the review process. The scope of this SER is to review these revisions and evaluate their impacts on the HUFPP safety performance.

The DOE PCP has concluded that the revisions to the SARP have no impact on the safety performance of the modified HUFPP and that the performance with the intended payloads meets the requirements of 10 CFR 71. Reviews of each SARP Chapter are documented herein.

### Regulatory Changes

The set of regulations driving the HUFPP modified design is the same as that which drove the “-96” certified HUFPP design. No further discussion is necessary.

The review presented herein was performed using the methods outlined in the *Packaging Review Guide for Reviewing Safety Analysis Reports for Packagings*<sup>[v]</sup> (PRG), as applicable.

## 1. GENERAL INFORMATION REVIEW

A review and evaluation of Chapter 1 of the *Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009)* was performed by DOE PCP Staff with respect to the requirements given in 10 CFR 71. The review and evaluation was focused on the revisions to the engineering drawings given in Chapter 1.

### 1.1 Areas of Review

Because the drawings of Appendix 1.3.2 have been revised, the areas of review were limited to these drawings and related texts.

### 1.2 Regulatory Requirements

The requirements of 10 CFR 71 applicable to the General Information review of the HUFPP are those cited in the Packaging Review Guide, as applicable.

### 1.3 Review Procedures

The Introduction section of the reviewed SARP is identical to the Introduction section of the previously approved SARP.

The purpose of the Applicant's submittal is clearly stated in an accompanying transmittal letter. The application is for the approval of minor modifications of an approved design. The SARP revisions prompted by these modifications were "redlined" and clearly identified on drawings included in Chapter 1. The application states that the modifications were evaluated per the HUFPP SARP (HNF-28554: Section 9.3.1: Design Control) and determined not to affect the safety performance or the certification conditions for the HUFPP [DOE CoC number USA/9905/B(U)F-96(DOE)].

Chapter 1 of the SARP includes two appendices. Appendix 1.3.1, entitled *Nomenclature*, lists acronyms, abbreviations, relevant terminology and explanations or descriptions. Appendix 1.3.2, *Packaging General Arrangement Drawings*, provides a listing of HUFPP design drawings followed immediately by clearly legible B-sized (11" by 17") versions of the drawings. The following drawings revisions were included in the SARP.

- 41199-10, 1 sheet, HUFPP Assembly, Revision 2
- 41199-20, 6 sheets, HUFPP Body Assembly, Revision 7
- 41199-30, 3 sheets, HUFPP Impact Limiter, Revision 5
- 41199-40, 2 sheets, HUFPP Core Component Container Adapter, Revision 5
- 41199-50, 10 sheets, HUFPP Core Component Container, Revision 3

All drawings, except 41199-10, have new revision numbers when compared to the previously approved SARP drawings. None of the drawing revisions has any impact on the safety performance of HUFPP.

## **1.4 Findings**

Based on review of the statements and drawings given in the application, the DOE PCP concludes that the revisions to these drawings and related text have no impact on the safety performance of the HUFPP.

## **1.5 Conditions of Approval**

The revised CoC will list the revised drawings.

# **2. STRUCTURAL REVIEW**

There was one revision to Chapter 2, *Structural Evaluation*, of the *Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, Nov. 2009)*. Figure 2.12.7-1 was revised to establish maximum thickness for fillet welds.

## **2.1 Areas of Review**

Thickness of fillet welds.

## **2.2 Regulatory Requirements**

ASME Section XI and AWS require the weld size not to exceed the thickness of the base material.

## **2.3 Review Procedures**

There is no need to specify review procedures for the current review.

## **2.4 Findings**

Based on review of the statements and drawings given in the application, the DOE PCP concludes that the revision to Chapter 2 of the SARP has no impact on the safety performance of HUFPP.

## **2.5 Conditions of Approval**

Approval of this application does not require special structural conditions.

# **3. THERMAL REVIEW**

There was no revision to Chapter 3, *Thermal Evaluation*, of the *Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009)*. This chapter is identical to *Thermal Evaluation* of the previously approved SARP.

## **4. CONTAINMENT REVIEW**

There was no revision to Chapter 4, Containment, of the Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009). This chapter is identical to Containment of the previously approved SARP.

## **5. SHIELDING REVIEW**

There was no revision to Chapter 5, Shielding Evaluation, of the Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009). This chapter is identical to Shielding Evaluation of the previously approved SARP.

## **6. CRITICALITY REVIEW**

There was no revision to Chapter 6, Criticality Evaluation, of the Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009). This chapter is identical to Criticality Evaluation of the previously approved SARP.

## **7. PACKAGE OPERATIONS REVIEW**

A minor revision was incorporated into Chapter 7, Package Operations, of the Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009). Section 7.1.2.1, Loading of Contents into Core Component Container, was revised to allow the use of Never Seez #NS-160 to coat threads of socket head cap screws (SHCS) that secure the CCC lid to the CCC body. Otherwise, the content of Chapter 7 is identical to Package Operations of the previously approved SARP.

### **7.1 Areas of Review**

The area of review was limited to the new option that allow the use of Never Seez #NS-160 to coat threads of socket head cap screws prior to assembly. The screws secure the CCC lid to the CCC body.

### **7.2 Regulatory Requirements**

The requirements are in 10 CFR 71.107 and 71.109.

### **7.3 Review Procedures**

The impact of using Never Seez #NS-160 on the safety performance of HUFPP was evaluated.

## **7.4 Findings**

The 2008 SARP allowed the use of a low-halogen nickel based nuclear lubricant. The 2009 SARP allowed the used of a low-halogen nickel based nuclear lubricant, or Never Seez #NS-160. It was determined that this new option has no impact on the safety performance of HUFPP. Based on the review of the statements and representations presented in the application, the DOE PCP concludes that HUFPP operating procedures meet the requirements of 10 CFR 71, 49 CFR 173, and DOE Order 460.1B and that the procedures are adequate to assure the package will be operated in a manner consistent with its evaluation for approval.

## **7.5 Conditions of Approval**

Because they represent the framework from which HUFPP users/shippers will develop formal, site-specific operating procedures, the procedural steps for operating the HUFPP specified in Chapter 7 of the SARP will be incorporated in their entirety into the Certificate of Compliance as a condition of package approval.

# **8. ACCEPTANCE TESTS AND MAINTENANCE PROGRAM REVIEW**

One revision was incorporated into Chapter 8, Acceptance Tests and Maintenance Program, of the Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009). Section 8.1.4.2, Helium Leakage Rate Testing the Containment Structure Integrity, was revised to allow fabrication leakage rate testing to be performed with a test lid and test body. Otherwise, the content of Chapter 8 is identical to Acceptance Tests and Maintenance Program of the previously approved SARP.

## **8.1 Areas of Review**

The area of review was limited to the new option of allowing fabrication leakage rate testing to be performed with a test lid and test body.

## **8.2 Regulatory Requirements**

The requirements of ANSI N14.5 are applicable to fabrication leakage rate testing.

## **8.3 Review Procedures**

The impact of the new test option on the safety performance of HUFPP was evaluated. The new option allows the HUFPP body to be tested using a test lid and the HUFPP closure lid to be tested using a test body.

## **8.4 Findings**

The 2009 SARP allowed fabrication leakage rate testing to be performed with a test lid and test body. It was determined that performing a test according to this new option has no impact on the safety performance of HUFPP. Based on the DOE PCP Staff's review of

the statements and representations given in the application, the DOE PCP concludes that the Acceptance Tests for the Hanford Unirradiated Fuel Package meet the requirements of 10 CFR 71, and that the Maintenance Program is adequate to assure regulatory-compliant packaging performance during its service life. The DOE PCP also concludes that the information provided for the Acceptance Tests and Maintenance Program is adequate.

## **8.5 Conditions of Approval**

The Acceptance Tests and Maintenance Program Chapter (Chapter 8) of the SARP will be incorporated into the CoC as a condition of package approval.

# **9. QUALITY ASSURANCE REVIEW**

A review and evaluation of Chapter 9, Quality Assurance, of the Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009) was performed by the DOE PCP Staff with respect to the requirements given in 10 CFR 71. The review and evaluation was focused on the revisions incorporated into this chapter. The revisions can be summarized as follows.

- Text was revised in several places to reflect the new contract, Central Plateau Remediation Contract, and contract manager, CH2MHill Plateau Remediation Company (CHPRC).
- CHPRC functional classifications were subcategorized as Quality Class/Level that were described and compared with Q-Categories of RG 7.10.
- A statement declaring that thirteen already-shipped HUFPP, USA/9905/B(U)F-96 (DOE), units were fabricated, tested, received, loaded, and shipped under DOE Certificate of Compliance 9905, Revision 0, dated August 29, 2008 and Safety Analysis Report for Packaging for Hanford Unirradiated Fuel Package (HUFPP), HNF-28554, Revision 2, August 2008.
- The use of a commercial grade dedication process was allowed in Section 9.3.1, Design Control.
- “Penetrant examination (PT) on final pass” was revised to “PT on root and final pass on indicated welds” in Section 9.3.1, Design Control.
- Three new appendices, 9.19.5 through 9.19.7, were added to document computer codes verification records and test report. These codes were used in Structural Evaluation, Shielding Evaluation, and Criticality Evaluation.
- One appendix, 9.19.8, was added to document 15 Requests for Clarification or Information that were exchanged between CHPRC and the fabricator.

## **9.1 Area Reviewed**

The areas of review were limited to the revisions summarized previously.

## 9.2 Regulatory Requirements

The regulatory requirements of 10 CFR 71 applicable to the Quality Assurance review are those given in the Packaging Review Guide.

## 9.3 Review Procedures

The impact of the revisions to Chapter 9 on the safety performance of HUFPP was evaluated. The revisions involved functional classifications and quality classes/levels, commercial grade dedication, penetrant examination of root and final pass of certain welds, and complete sets of documentation including computer codes verification records and test report and requests for clarification or information.

## 9.4 Findings

It was determined that none of the revisions to Chapter 9 listed previously has any impact on the safety performance of HUFPP. Based on review of the statements and representations in the SARP, the DOE PCP Staff concludes that the applicant's QA program has been adequately described and meets the QA requirements of 10 CFR 71. Package-specific QA requirements are adequate to assure that the package is designed, fabricated, assembled, tested, used, maintained, modified, and repaired in a manner consistent with its evaluation.

## 9.5 Conditions of Approval

Any organization involved in the design, procurement, fabrication, handling, shipping, storage, cleaning, assembly, operation, inspection, testing, maintenance, repair, modification, and use of the HUFPP shall maintain and follow an appropriate QA program that is compliant with the requirements specified in 10 CFR 71, Subpart H.

## References

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- [i] CH2MHILL Plateau Remediation Company, *Safety Analysis Report for Packaging, Hanford Unirradiated Fuel Package (CHPRC-00164, Revision 1, November 2009)*.
  - [ii] Title 10, Code of Federal Regulations, Part 71 (10 CFR 71), *Packaging and Transportation of Radioactive Materials*.
  - [iii] Title 49, Code of Federal Regulations, Part 173 (49 CFR 173), *Shippers General Requirements for Shipments and Packagings*.
  - [iv] Fluor Hanford, Inc., *Hanford Unirradiated Fuel Package Safety Analysis Report for Packaging*, HNF-28554, Revision 2, August 2008.
  - [v] A.A. DiSabatino, et al., *Packaging Review Guide for Reviewing Safety Analysis Reports for Packagings*, UCID-21218, Revision 3, Lawrence Livermore National Laboratory (February 2008).