



Department of Energy

Washington, DC 20585

June 28, 2012

Attention: Document Control Desk
Michael Waters,
Chief Licensing Branch
Division of Spent Fuel Storage and Transportation,
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

The U. S. Department of Energy (DOE) is requesting the renewal U. S. Nuclear Regulatory Commission (NRC) Certificate of Compliance (CoC) USA/5797/B(U)F, for the Inner HFIR Unirradiated Fuel Element Shipping Container and Outer HFIR Unirradiated Fuel Element Shipping Container. The current certificate, Revision 17, expires September 30, 2012, and the DOE has a continued programmatic need for this certificate. This request meets the "timely renewal" requirements of 10 CFR 71.38(b).

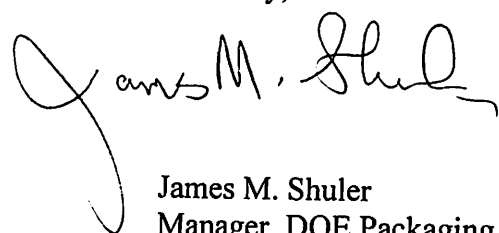
The submittal includes minor updates to two of the container drawing and four of the fuel drawings, replacement of the fuel specification with the latest revision, and all associated document page changes. The revisions have all been issued "for information only" and will not be issued for use until the CoC has been renewed by the NRC. All changes to the drawing and specification have been summarized in an enclosed table where their impacts of the structural, nuclear criticality and thermal analyses of the SARP are evaluated. The changes to the fuel drawing and specification accommodate improved fuel inspection techniques, more appropriate standards, and current intermediate material specifications. The fuel design and base fabrication process is unchanged so the physical form of the fuel is unchanged. The change to the container drawings is to add marking in compliance with 49 CFR 172 Appendix B. None of these changes to the fuel drawing or specification or the container drawing have any effect on the analyses described in the SARP.

One hard copy of this letter and supporting documentation is being delivered to the NRC Document Control Deck. An additional hard copy of this letter and supporting documentation and two disks containing the supporting documentation will be delivered to you or a member of your staff.



Technical questions may be directed to Dave Rosine, DOE Oak Ridge National Laboratory Site Office (OSO) at 865-574-8640; Dana Willaford, DOE Oak Ridge Office (ORO) at 865-576-5338; Angie McGee, UT-Battelle, LLC at 865-574-9458; or you may contact me at 301 903-5513.

Sincerely,



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SAFETY ANALYSIS REPORT FOR PACKAGING:
THE ORNL HFIR UNIRRADIATED FUEL
ELEMENT SHIPPING CONTAINER
VOLUME 2

Complied by

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Latest Revision — Revision 10
Date of Revision — June 29, 2012

OAK RIDGE NATIONAL LABORATORY
Research Reactors Division
Oak Ridge, Tennessee 37831
managed by
UT-Battelle, LLC
for the
U. S. DEPARTMENT OF ENERGY
under contract DE-AC05-00OR22725

LIST OF EFFECTIVE PAGES

Volume 2

<u>Page</u>	<u>Revision</u>
Cover Page	10
ii thru iii (Table of Contents)	8/7/98
iv (List of Figures)	8/7/98
v (List of Tables)	8/7/98
vi (Summary of Revision 10 Changes)	10
6-1	4
6-2	0
6-3	2
6-4	1
6-5	7
6-6 thru 6-9	4
6-9a thru 6-12	2
6-13 thru 6-18	1
6-19	3
6-20 thru 6-25	1
6-26	3
6-27	1
6-35 thru 6-37	4
6-A-1	4
6-B-1	4
6-C-1	4
6-D-1	4
7-1 thru 7-3	4
8-1 thru 8-4	4
8-5	0
9-1	4
9-2 thru 9-5	2
9-6 thru 9-10	4
9-11 thru 9-13	10
9-14	4
9-15	10

**Summary of Revision 10 Changes
Volume 2**

Page	Description of Change
Cover Page	Listed new SARP revision and date
List of Effective Pages	Pages changed in this revision were labeled Revision 10.
vi	Updated to list changes in Revision 10.
9-11 thru 9-12	Updated reference to final specification and replaced DOE-HQ with NRC as regulator.
9-13, 9-15	Updated reference to fuel specification.

9.3.2.1 Personnel Training. Individuals who perform specific functions related to either the container or the fuel fabrication must be trained to ensure that personnel can fulfill fabrication, inspection, maintenance, and operation requirements.

9.3.3 Design Control

The ORNL HFIR unirradiated fuel element shipping containers (inner and outer) were designed and fabricated by ORNL Engineering in 1965. The fabrication work on these containers was performed prior to the requirements for a formal quality assurance program. At the time of fabrication, the containers were inspected by ORNL shop inspectors and were found to be acceptable.

As part of the SARP revision process, an extensive reinspection of all containers was performed in 1989 by qualified quality assurance inspectors. The drawings included in the SARP reflect an accurate "As-built" condition of the containers.

Any changes or modifications to the package that varies from the approved licensed configuration or specifications are PROHIBITED. The statement, "Licensing Restrictions Apply", has been placed on the package drawings (refer to Chapter 1, Figures 1.3 through 1.10, 1.12 through 1.17) to prevent revisions from being made to the drawings without the proper approval. Revisions are not be made to the drawings without appropriate reviews and approvals (to include NRC).

Current specifications for the HFIR fuel are contained in the controlled document, *Specification for High Flux Isotope Reactor Fuel Elements*, RRD-FE-3. (NOTE: This document is found as Appendix C in Chapter 4, "Containment".)

The following activities are representative of the design control process that would affect the existing and future containers.

Design Control on Existing Containers:

1. Identification of a needed modification to the container packaging that would affect the approved licensed configuration. Initial notification must be given to NRC that a change is required for a specific reason.
2. Identification of applicable design codes and standards pertinent to modifications or additions to be made to the HFIR unirradiated fuel casks. Review and approval by both RRD and NRC must be requested and received for each revision that affects the approved licensed configuration.

3. Documentation of the design/modification process. All design calculations must be documented and reviewed by an individual who is independent from the design process.
4. All modifications must be reflected in the SARP.

Design Control on Future Containers that May be Fabricated:

1. Project engineer is selected to coordinate communications on design activities; to include interfaces among RRD sections, ORNL Divisions and Departments, suppliers, and DOE.
2. Project engineer reviews the SARP to identify design criteria, specifications, drawings, procurement specifications, and procedural documents required for container fabrication.
3. Project engineer ensures that the necessary documents are prepared for fabrication to include procurement documents, work orders, and quality assurance inspection requirements and requests.
4. Project engineer ensures that appropriate fabrication verification is performed; to include quality assurance inspections as required. Also, verifies that the container was fabricated according the conditions of the certificate of compliance.
5. Project engineer ensures that design documentation and QA records are developed and maintained.
6. Project engineer ensures that adequate controls are placed on the fabrication process to attain the required quality and verification of quality.

Design Control on the HFIR Fuel Specifications

It should be noted that the fuel fabrication process has not been altered significantly in over 45 years of HFIR operations and it is not anticipated that the fabrication process will vary significantly from what is presented in Chapter 4, Appendix C, of the SARP. When necessary, revisions to the fuel specification are made under the RRD configuration management program for safety-related documents. Revisions are not made to the specification without appropriate reviews and approvals (to include NRC).

9.3.4 Procurement Document Control

9.3.4.1 Packaging Procurement. The packaging procurement is divided into three components; packaging procured prior to 1980, those containers to be fabricated, and the fuel elements. The casks were originally fabricated at ORNL. Therefore, no supplier certificate of compliance documents are available. However, other documents such as signed inspection checklists and as-built drawings are available as documentation of verification activities conducted during fabrication, use and maintenance of the casks.

9.3.4.2 Replacement Parts Procurement. All replacement parts will be based on a one-for-one replacement. No substitutions are to be made to the container parts without the documented approval of NRC and a corresponding revision made to the SARP specifications. The procurement of replacement parts important to safety are reviewed by QA personnel to ensure that appropriate technical and QA requirements are included in purchase orders. Purchase orders are placed with qualified vendors. RRD will assure itself that the replacement parts meet requirements as defined by this SARP.

Procurement documentation is initiated by RRD personnel. The standard requisition contains both the technical and quality requirements.

9.3.5 Instructions, Procedures and Drawings

Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished must also be documented.

Current specifications for the HFIR fuel are contained in the controlled document *Specification for High Flux Isotope Reactor Fuel Elements*, RRD-FE-3. (NOTE: This document is found as Appendix C in Chapter 4, "Containment.")

The fuel fabricator must implement a program that contains appropriate instructions, procedures, and drawings to comply with the specifications document, RRD-FE-3.

9.3.6 Document Control

All documents used to accomplish and/or verify quality-related activities are controlled. The controlled documents used in transportation activities include (but are not limited to) the following: this QAPP, Research Reactors Administrative Procedures (RRAP), Quality Assurance Research Reactor Procedures (QA-RRP), fuel fabrication procedures, and *Specifications for the High Flux Isotope Reactor Fuel Elements*, RRD-FE-3.

9.3.7 Control of Purchased Items and Services

The results of supplier evaluations are documented, filed, and retained by Purchasing as long as the supplier is a current or prospective procurement source.

Contractors are controlled after contract placement by means of visits by qualified QA personnel performing audits and inspections. The contractors involved with fuel fabrication are also under routine surveillance.

9.3.8 Identification and Control of Items

Quality assurance inspections are used to ensure that only correct and accepted items are used or installed. Identification shall be maintained on the items or in documents traceable to the items, or in a manner that ensures that identification is established and maintained.

QA requirements imposed on vendors require methods and facilities to control the identification, handling, and storage of raw and fabricated materials from the time of receipt until delivery of the completed item.

Verifying the proper identification of project materials, parts, and components classified as Quality Level A "Critical" is the specific responsibility of the project Quality Assurance Specialist or a qualified alternate.

9.3.9 Control of Processes

Control of Processes Affecting the Container Package:

Should packaging require major repairs necessitating the use of special processes, e.g. welding or heat treating, procedures will be established to ensure that the special processes are controlled in accordance with the following criteria:

1. Procedures, equipment, and personnel are qualified in accordance with applicable codes, standards, and specifications.
2. The operations are performed by qualified personnel and accomplished in accordance with written process sheets with recorded evidence of verification.
3. Qualification records of procedures, equipment, and personnel are established, filed, and kept current.

Control of Processes Affecting the Fuel Elements:

Welding performed on the fuel elements in accordance with the specifications identified in the controlled document *Specification for High Flux Isotope Reactor Fuel Elements*, RRD-FE-3. (NOTE: This document is found as Appendix C in Chapter 4, "Containment".)

In general, all welds must be made only by qualified welders or welding operators. Work must be performed in compliance with approved procedures that have been qualified in accordance with Section X of the fuel specification document. The fuel fabricator must submit for approval by RRD, prior to the start of fabrication, detailed welding procedures that conform to requirements of the fuel element specification.

9.3.10 Inspection

Inspections will be performed to verify conformance of a HFIR cask-related item or activity to identified standards and requirements. These inspections are categorized as in-process, final, and inservice.

Inprocess and final inspections of HFIR cask-related items produced by ORNL for the Research Reactors Division will be performed to demonstrate item conformance and acceptance. Additional modifications, repairs, or replacements of cask items require reinspection to verify acceptability.

An inservice inspection is performed to ensure adequate operation and maintenance of packaging. This inspection is performed during fuel shipments to the HFIR by certified quality assurance inspectors.

Items verified prior to a shipment include the following:

- Packages are properly assembled
- All shipping papers are properly completed
- Packages are conspicuously and durably marked as required by DOT regulations
- Measures are established to ensure that an individual designated by the user of the packages signs the shipping tags or indicators before authorization for shipping.

Visual inspections are conducted as part of the preparation process for shipping unirradiated fuel. These inspections include the following: a visual inspection of the inside of container, a visual inspection of the outside of the container, a check for contamination, a verification that all lid bolts are present, an inspection of the gasket surface and replacement if signs of degradation are observed, and an inspection of the lid-lifting blocking device to insure all parts are in place and in working condition.

All inprocess, final, and inservice inspections and inspection personnel will be independent from the individual(s) performing the activity being inspected.

9.3.11 Test Control

Test requirements are defined in applicable specifications or in other special project documents.

9.3.11.1 Acceptance Tests - Use of the Package. Test control measures are employed to ensure that the necessary tests are planned, are performed properly to specified requirements, and are documented to indicate that items have demonstrated their ability to perform satisfactorily in service. A test plan will be prepared for each test required on each container.

9.3.11.2 Maintenance Tests. Maintenance on the containers is performed every three years or if needed before or after a fuel shipment. Previous inspections of these packages over the last 25 years have normally required that the containers be repainted on a 3-year interval.

Visual inspections are conducted as part of the preparation process for shipping unirradiated fuel. These inspections include the following: a visual inspection of the inside of container, a visual inspection of the outside of the container, a check for contamination, a verification that all lid bolts are present, an inspection of the gasket surface and replacement if signs of degradation are observed, and an inspection of the lid-lifting blocking device to ensure all parts are in place and in working condition.

Qualified quality assurance inspectors inspect the cask for external and internal physical damage to the container to include identification of dents and scratches on the outer container, water damage to the plywood, and wear of the gasket. The cask is considered unacceptable for use if the paint has been scratched such that labeling is unclear or incomplete. Dents that have perforated the container will render the cask unacceptable for immediate use until further evaluations or modifications can be made. Plywood will be replaced if water damage has occurred. Gaskets will be replaced prior to use if gaskets are worn or brittle.

Maintenance is performed as needed based on the results of the inspections.

Maintenance of the HFIR fuel is not addressed in this section. The fuel is enclosed in a fuel assembly. As such, after the initial fabrication and testing, no maintenance is performed.