

HFIR SPENT FUEL SHIPMENTS - A SUCCESS STORY

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Introduction

The Department of Energy High Flux Isotope Reactor (HFIR) at Oak Ridge, Tennessee in the U. S. is an operating 85 mw research reactor with a mission of isotope production (including medical), material irradiation, neutron scattering, and neutron activation analysis. The reactor was built in 1965 and originally operated at the 100 mw power level but was downgraded in 1989 because of a vessel hydrogen embrittlement issue. The element design has inner and outer aluminum elements containing 93% fuel in an U3 08 aluminum matrix.

The refueling cycle is about 23 days and the reactor produces about 11 spent fuel cores a year. The Record of Decision for the National Spent Fuel Programmatic Environmental Impact Statement specifies that aluminum fuels are to be sent to the DOE Savannah River Site for safe interim storage. This site is about 300 miles from HFIR and highway transportation is the method of shipment. The first HFIR shipment was made on July 18, 1996, and shipments average about one per month.

This presentation gives a summary of the Health Physics activities involved in shipping preparation, shipment inspection, and transportation. Photographs provide actual coverage of facilities and equipment.

Description

HFIR spent fuel elements are stored in the reactor pool until shipment to the Savannah River Site. The cask used for spent fuel shipments in the 1970s and early 1980s was decertified in 1986 for QA issues and a new spent fuel cask design was attempted but did not succeed due to changing design requirements. About that time, the General Electric Company obtained NRC certification for and built a state-of-the-art spent fuel cask identified as a GE-2000 cask. It is a type B cask with a decay heat limitation of 2000 watts, fissile content less than 500 grams U-235 equivalent mass, and a payload capacity of 5,450 lbs. DOE at Oak Ridge obtained funding and purchased a GE-2000 cask system from GE for use by the HFIR reactor. The HFIR GE-2000 cask is the third cask of this type to be built and as a part of the procurement, DOE also contracted with GE for specific support services, three insert (basket) designs and corresponding certificate amendments. Different baskets adapt the cask to accommodate various fuel types.

In the U.S., federal government regulations control the design of the cask, its use, and shipment inspections. These are under the control of 10CFR 71. States within the U.S. have also implemented regulations for spent fuel and hazardous material shipments on their roads but most have adopted a common set of inspections for ease of interstate shipment. A Commercial Vehicle Safety Alliance Inspection Program for the transport vehicle has been adopted by many states as a uniform inspection standard.

A HFIR specific Transportation Plan has been developed to define responsibilities and focal points in the event of an emergency during shipment, identifies primary and alternative shipment routes, and specifies the state personnel to be contacted for the 10-day notification requirement. The DOE TRANSCOM system provides satellite tracking during the shipment.

Numerous lessons learned during HFIR element shipments will be identified during the presentation.