



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

April 28, 2016

MEMORANDUM TO: Bo Pham, Acting Deputy Director
Division of Spent Fuel Management, NMSS

FROM: Bernard White, Senior Project Manager /RA/
Spent Fuel Licensing Branch
Division of Spent Fuel Management, NMSS

SUBJECT: SUMMARY OF MARCH 31, 2016, MEETING WITH THE
DEPARTMENT OF ENERGY TO DISCUSS ADDING COBRA FUEL AS
AUTHORIZED CONTENTS IN THE MODEL NO. ATR FFSC
PACKAGE

Background

A meeting was held on March 31, 2016, in Rockville, Maryland, between the U.S. Nuclear Regulatory Commission (NRC), the Department of Energy, its contractor AREVA Federal Services (AREVA) and representatives from the BR2 Reactor at SCK-CEN in Belgium, to discuss a proposed amendment to add Cobra fuel as authorized contents in the Model No. ATR FFSC package.

The meeting was noticed on March 17, 2016 (see Agencywide Documents Access and Management System (ADAMS) Accession No. ML16077A274). The meeting attendance list is provided as Enclosure No. 1 and the presentation slides are provided in Enclosure No. 2.

Discussion

AREVA provided an overview of the ATR FFSC package and a description of the Cobra fuel assemblies. The ATR FFSC was developed to transport a single, unirradiated fuel element from the fuel manufacturer to the Advanced Test Reactor (ATR). Over time other research reactor fuel, loose plates, design demonstration fuel elements and small quantity payloads has been added as authorized contents.

SKC-CEN is in the process of converting the BR2 reactor from high-enriched uranium (HEU) to low-enriched uranium (LEU). As part of this conversion, there is a need to transport HEU and LEU fuel assemblies and loose plates by air. The proposed ^{235}U loadings are less than 420g ^{235}U per element for HEU fuel and less than 450g ^{235}U per element for LEU fuel assemblies.

AREVA discussed the proposed certification strategy for addition of Cobra fuel as authorized contents. For the criticality evaluation, the AREVA will evaluate the fuel assembly as if it were a slurry of fuel and water inside the ATR FFSC package along with up to 100 g of polyethylene. The burnable poison inside the fuel assembly will be ignored. This is an approach has already been used to certify small quantity payloads as authorized contents in the ATR FFSC package. AREVA stated that this approach is being used to simplify the review and will restrict the package's transport capacity because it will result in a criticality safety index of about 30 (which would allow transport of up to 3 packages in a consignment by exclusive use) but will meet the

current needs for transport. AREVA stated that another amendment will be submitted to evaluate the Cobra fuel assemblies utilizing geometry control with maximum plate spacing to reduce the criticality safety index.

The applicant is planning on adding a new fuel handling enclosure for the Cobra fuel. The fuel handling enclosures, are used to load the fuel element inside the packaging and protect the fuel from superficial damage during normal transport. The fuel handling enclosures do not have a safety function.

AREVA stated that the structural behavior will be very similar to existing contents and the fuel handling enclosure materials is similar to and the weight is less than existing weights of fuel handling enclosures already approved in the ATR FFSC package. The load path between Cobra fuel, its fuel handling enclosure and the ATR FFSC packaging is the same as existing contents and their fuel handling enclosures. Similar to structural evaluation, AREVA stated that the thermal behavior will be very similar to existing contents. Fuel materials and thermal mass are also similar to existing contents. The thermal pathway between packaging, fuel handling enclosure and Cobra fuel is the same as the existing contents. AREVA is not planning any new thermal analyses for this amendment.

To evaluate the package for air transport and address the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) 71.55(f), for air transport criticality safety, AREVA proposed evaluating reconfiguration of the packaging and contents into a spherical geometry. The criticality model will evaluate a sphere of materials of single package with ^{235}U contents arranged in most reactive configuration, reflected by 20 cm of water, neglecting burnable poison. AREVA noted that this method of evaluation has been approved by NRC for the Model No. ES-3100 package.

AREVA discussed its preliminary evaluation of 700g of ^{235}U LEU and 500g of ^{235}U HEU both modeled as a slurry. The maximum calculated k_{eff} was 0.9160, which results in a criticality safety index of 31.3. For air transport, AREVA evaluated 2,000 g of ^{235}U -235, as HEU fuel, which results in a k_{eff} of 0.574. AREVA said that it chose 2,000g so that it will bound other possible future payloads and the amendment will request approval by air transport for up to 2,000 g of ^{235}U .

Schedule:

AREVA expects to submit an application in mid-September 2016 and will request an expedited review so that a revised certificate can be issued by the end of March 2017, pending acceptable responses to a request for additional information, if one is needed.

Docket No.: 71-9330
TAC Number: L25097

Enclosures:

1. Meeting Attendees
2. Presentation Slides

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Distribution: NRC Attendees

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ADAMS P8 Package No.: ML16124A010 ADAMS P8 Memo No.: ML16124A011 Encl 2: ML16124A014

OFC	DSFM	DSFM	DSFM
NAME	BWhite	SFiguroa via email	SRuffin
DATE	4/21/16	4/22/16	4/28/16

Meeting Title: Meeting with the Department of Energy to discuss adding Cobra fuel as authorized contents in the Model No. ATR FFSC package

Participants: The Department of Energy, AREVA Federal Services, SCK-CEN and the NRC

Date: March 31, 2016, 9:00 – 11:00 a.m.

Location: U.S. NRC Headquarters, 3WFN 1-D-09

NAME	AFFILIATION
Bernie White	NRC
Zhian Li	NRC
Phil Noss	AREVA Federal Services
Eric Woolenstenhulme	Idaho National Laboratory
Brian Waud	DOE/NNSA/M3
Sven Van Den Berghe	SCK-CEN
Steven Van Dyck	SCK-CEN
Via phone	
Pierre Saverot	NRC
Camille Zozula	Westinghouse