

October 2, 2003

MEMORANDUM TO: Brian Smith, Acting Chief  
Special Projects and Inspection Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

FROM: Andrew Persinko, Sr. Nuclear Engineer */RA/*  
Special Projects Section  
Special Projects and Inspection Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

SUBJECT: SEPTEMBER 11, 2003, MEETING SUMMARY: MEETING WITH DUKE  
COGEMA STONE & WEBSTER TO DISCUSS NUCLEAR CRITICALITY  
SAFETY RELATED TO MIXED OXIDE FUEL FABRICATION FACILITY  
REVISED CONSTRUCTION AUTHORIZATION REPORT

On September 11, 2003, U.S. Nuclear Regulatory Commission (NRC) staff met with Duke Cogema Stone & Webster (DCS), the mixed oxide fuel fabrication facility (MFFF) applicant, to discuss the validation of nuclear criticality safety computer codes related to the revised construction authorization request (CAR or revised CAR) submitted to NRC on October 31, 2002. The meeting agenda, summary, DCS handouts, attendance list, and NRC handouts are attached (Attachments 1, 2, 3, 4, and 5 respectively).

Docket: 70-3098

Attachments: 1. Meeting Agenda  
2. Meeting Summary  
3. DCS Handouts  
4. Attendance List  
5. NRC Handouts

cc:

P. Hastings, DCS  
J. Johnson, DOE  
H. Porter, SCDHEC  
J. Conway, DNFSB

L. Zeller, BREDL  
G. Carroll, GANE  
D. Silverman, DCS  
D. Curran, GANE

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NRC Attendees

**ML032740171**

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<b>OFC</b>	SPIB	E	SPIB	E	SPIB		SPIB	
<b>NAME</b>	APersinko:dw		MChatterton		LGross		BSmith	
<b>DATE</b>	10/ 01 /03		10/ 01 /03		10/ 01 /03		10/ /03	

**OFFICIAL RECORD COPY**

**MEETING AGENDA  
MIXED OXIDE FUEL FABRICATION FACILITY  
September 11, 2003**

September 11, 2003

9:00 AM	Introduction
9:10 AM	Discussions of nuclear criticality safety validation report
12:00 NOON	Lunch
1:00 PM	Discussions of nuclear criticality safety validation report
3:15	Summary / Actions
3:30	Adjourn

**MEETING SUMMARY**  
**MIXED OXIDE FUEL FABRICATION FACILITY**  
**September 11, 2003**

Purpose:

The purpose of the meeting was to discuss the unresolved nuclear criticality safety issue related to the Mixed Oxide (MOX) Fuel Fabrication Facility Construction Authorization Request (CAR) submitted by DCS on October 31, 2002, identified as NCS-4 in the NRC staff's Draft Safety Evaluation Report (DSER) dated April 30, 2003.

Summary:

The meeting was a technical, working level meeting that covered the remaining nuclear criticality safety unresolved issue, NCS-4, in detail. Handouts were provided by DCS as the basis for discussion. The handouts are provided in Attachment 3.

A summary of the issues discussed is provided below:

Nuclear Criticality Safety

NRC opened the meeting by asking DCS what methodology or methodologies it wants to use in its criticality validation report, and cited staff's memorandum dated September 10, 2003, that documented a phone call with DCS. The memorandum can be accessed in NRC'S ADAMS document system under ML032530534.

DCS stated that it proposes to place less reliance on the sensitivity/uncertainty (S/U) method and rely on a more traditional validation approach. Doing so would make many of the NRC questions regarding the S/U method moot. DCS, however, stated that it may rely on the S/U method at some future time as the method matures. The traditional methodology will be based on NUREG/CR- 6698, "Guide for Validation of Nuclear Criticality Safety Calculational Methodology." DCS's proposed approach, consisting of six steps, is described further in Attachment 3. During the meeting, DCS discussed these six steps.

With regard to steps 2 and 3, step 2 is to develop screening criteria and step 3 is to identify experiments within the screening criteria. NRC requested that DCS provide the bases for its screening criteria and justification for benchmark experiments that DCS intends to include even though they fall outside the screening criteria. NRC staff questioned the difference between "primary" and "secondary" parameters on slide 8. DCS responded that primary parameters can be quantified whereas secondary parameters are not, and are of lesser importance. DCS stated that it considers secondary criteria in addition to primary criteria in identifying key parameters. NRC questioned whether both the primary and secondary criteria had to be met to conclude that a benchmark should be included. DCS responded that mainly the primary screening criteria were used to select applicable benchmarks.

On slide 11, NRC staff stated that it appears that the screening criteria (including H/Pu ratio of 0-50) appear to be overly broad and not in agreement with NUREG/CR-6698. DCS responded that it did not literally apply the NUREG - it followed the steps in the NUREG, but not

necessarily the criteria given in Table 2.3. NRC staff asked what is the basis for including plutonium metal experiments and what is the basis for having an H/Pu ratio less than or equal to 50. NRC staff stated that it would need a technical basis for why screening criteria are applicable.

NRC staff questioned the Energy of Average Lethargy Causing Fission (EALF) values of 0.0 - 1E6 electron volts, since such a range would cover thermal, intermediate, and fast neutrons. DCS stated that most cases fell into the intermediate range.

Regarding slide 11, NRC staff questioned including lattice arrays in the MOX powder areas defined as AOA (4), and stated that DCS needs to justify the inclusion of lattice arrays. The SCALE code treats heterogeneous lattices differently from homogeneous systems.

DCS stated that the experiments should be broader than the range covered by design calculations in order to determine trends in the bias. NRC stated that it was not appropriate to define the area of applicability very broadly to include a large number of benchmarks; only experiments that are truly applicable should be included.

Individual benchmarks were then discussed. The NRC staff's preliminary comments on individual benchmarks are provided in Attachment 5.

In summary, NRC staff stated that DCS should:

1. Justify its screening criteria and justify use of experiments that fall outside of the screening criteria, and how bias and uncertainty is extrapolated beyond the data.
2. Describe how it is applying NUREG/CR-6698 (including use of primary and secondary criteria, and ranges in Table 2.3).

NRC staff stated that the questions in its September 10 memorandum are moot based on DCS' decision to follow a traditional validation methodology, except for questions 4 and 5 which still apply and need to be answered by DCS. The information contained in DCS' August 29, 2003, submittal is also moot, since this is no longer consistent with DCS' proposed methodology.

NRC staff stated that in its view, revision of Part II of the Validation Report was necessary to address the new approach. DCS agreed to evaluate this issue and provide a response.

**DUKE COGEMA STONE&WEBSTER SLIDES  
MOX FUEL FABRICATION FACILITY**

## MEETING ATTENDEES

<u>NAME</u>	<u>AFFILIATION</u>
Andrew Persinko	Nuclear Regulatory Commission (NRC)
Muffet Chatterton	NRC
Christopher Tripp	NRC
John Lubinski	NRC
Kathy Gibson	NRC
Linda Gross	NRC
David Brown	NRC
Brian Smith	NRC
Ken Ashe	Duke Cogema Stone & Webster (DCS)
Peter Hastings	DCS
Bob Foster	DCS
Charles Henkel	DCS
Thomas Doering	DCS
William Peters	DCS
Dan Moss	Numark Associates
Paloma Sarria	Numark Associates
Daniel Horner	McGraw-Hill

# **NRC HANDOUTS**