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

July 18, 2003

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

THRU: Brian W. Smith, Acting Chief
Special Projects Section
Special Projects and Inspection Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

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

SUBJECT: JUNE 2-4, 2003, MEETING SUMMARY: MEETING WITH DUKE COGEMA STONE & WEBSTER TO DISCUSS CHEMICAL SAFETY RELATED TO MIXED OXIDE FUEL FABRICATION FACILITY

On June 2-4, 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 chemical safety issues related to the construction authorization request (CAR) for the MFFF. The meeting agenda, summary, handouts, and attendance list, are attached. (Attachments 1, 2, 3, and 4 respectively).

Docket: 70-3098

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

cc:
P. Hastings, DCS
J. Johnson, DOE
H. Porter, SCDHEC
J. Conway, DNFSB
L. Zeller, BREDL
G. Carroll, GANE
D. Curran, GANE
D. Silverman, DCS

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

THRU: Brian W. Smith, Acting Chief
Special Projects Section
Special Projects and Inspection Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

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

SUBJECT: JUNE 2-4, 2003, MEETING SUMMARY: MEETING WITH DUKE COGEMA STONE & WEBSTER TO DISCUSS CHEMICAL SAFETY RELATED TO MIXED OXIDE FUEL FABRICATION FACILITY

On June 2-4, 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 chemical safety issues related to the construction authorization request (CAR) for the MFFF. The meeting agenda, summary, handouts, and attendance list, are attached. (Attachments 1, 2, 3, and 4 respectively

Docket: 70-3098

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

cc: P. Hastings, DCS
L. Zeller, BREDL
G. Carroll, GANE
J. Johnson, DOE
H. Porter, SCDHEC
J. Conway, DNFSB
D. Curran, GANE
D. Silverman, DCS

Docket: 70-3098

DISTRIBUTION: ADAMS PUBLIC SPIB r/f FCSS r/f
RPierson ELeeds Hearing File Attendees
WGloersen, RII JHull, OGC DAyres, RII RVirgilio,OSP

ADAMS Accession No.: ML031980110

G:\FCSS\SPB\AXP1\MeetingSummaries\MOXmtgsumm 6-3-03 (chemsafety) R2.wpd

OFC	SPIB		SPIB		SPIB		SPIB	
NAME	APersinko*		W/Troskoski*		LGross*		BSmith*	
DATE	7/15/03		7/15/03		7/18 /03		7/15/03	

*See previous concurrence **OFFICIAL RECORD COPY**

MEETING AGENDA
MOX FUEL FABRICATION FACILITY
June 2-4, 2003

June 2-4, 2003

9:00AM	Discussion of chemical safety open items
12:00NOON	Lunch
1:00PM	Discussion of chemical safety open items
5:00PM	Adjourn

Attachment 1

MEETING SUMMARY
MOX FUEL FABRICATION FACILITY
June 2-4, 2003

Purpose:

The purpose of the meeting was to discuss the draft Safety Evaluation Report (SER) chemical safety open items related to the construction authorization request (CAR) for the MOX Fuel Fabrication Facility (MFFF).

Meeting Summary:

The following issues were discussed:

1. CS-01, Red-Oil

Duke Cogema Stone and Webster (DCS) was informed that the staff was not prepared to approve a temperature limit of 135°C for the evaporators that are considered "closed systems," but would consider a proposal in the range of 110-120°C. The staff stated that this was based on preliminary information concerning temperature limits established at the Savannah River Site (SRS) and similar limits used in foreign processes, and a recent Unreviewed Safety Question Determination (USQD) from the Defense Nuclear Facility Safety (DNFS) Board website. The staff also noted that control of the amount of organic material that could credibly be introduced into the evaporator was still open.

DCS stated that any temperature below 120°C would require a subatmospheric evaporator because they would not be able to physically concentrate nitric acid to 13M at 120°C and atmospheric pressure. Additionally, the higher temperature is needed in the Oxalic Acid Mother Liquor evaporator to destroy any remaining oxalic acid in that part of the process. With the steam temperature limited to 133°C, the nitric acid solution would not exceed its azeotrope of about 120°C for a 13M concentration. A design change to employ a subatmospheric evaporator would have a substantial impact.

As a result of further discussions, it was agreed to contact several entities to formally establish what temperatures were employed in similar process components, and the amount of venting/evaporative cooling used in the process design. DCS agreed to contact both the Savannah River Plant (the site involved with the USQD) and a foreign facility, and the U.S. Nuclear Regulatory Commission (NRC) agreed to contact the foreign regulator. DCS also requested NRC to identify the licensees reference on page 8.35 of the draft SER, who run with evaporators at 90°C, in order to determine whether that process had any relevant similarities to the DCS evaporator.

DCS also indicated that its safety strategy would assume that organic material would be introduced into the evaporator with no specific mass limit assumed. Instead, its strategy would assure a certain amount of nitric acid/water to sustain evaporative cooling. NRC asked how an adequate aqueous inventory would be assured to maintain evaporative cooling, and DCS indicated that they were considering several possibilities, including use of either an existing thermocouple to directly measure solution temperature or by

providing a specific flowrate of nitric acid. The exact method would be determined during the Integrated Safety Analysis (ISA).

During the discussions, it was noted that there was a discrepancy between the steam temperature referenced in the CAR (135°C) and subsequent correspondence (133°C). DCS confirmed the 133°C value and committed to updating the CAR.

This item remains open pending resolution of the maximum allowable solution temperature for closed systems.

2. CS-02, HAN/Hydrazine Analysis

The staff discussed the applicant's response to CS-02 contained in its letter of May 30, 2003. It was noted that the applicant chose not to use the Instability Index as developed by U.S. Department of Energy (DOE) in Technical Report DOE/EH-0555 because: (1) the index does not take into account the influence of plutonium (catalysis and radiolysis), (2) computational problems with the logarithmic function at low Hydroxylamine Nitrate (HAN) concentrations, and (3) the effects of impurities are restricted to iron. DCS indicated that their proposed model better accounted for the effects of plutonium reoxidation, as plutonium is the dominant metal ion species in systems containing HAN. Additionally, the effects of other metal impurities would be determined during the ISA.

DCS performed a number of computer runs using the model and the proposed limits without considering the effects of hydrazine and compared the results to the Instability Index. At higher HAN concentrations, the model results was more conservative than the Index. It was noted that the safety margin would be more conservative if the effects of hydrazine were considered. The concentration of HAN added to the stripping column would be nominally 1.9M, while the applicant is assuming a minimum concentration of 0.46M.

The staff had no further questions and will continue its review of the proposed model.

3. CS-05b, Indoor Air Speed

This item involved the effect of indoor airspeed on the calculational model used for determining whether a hot nitric acid spill in a cell could result in exceeding the performance criteria in 10 CFR Part 70. The applicant determined that for an uncontained spill and an average indoor airspeed of 0.01 m/sec, no consequence limits would be exceeded. The staff was concerned that the 0.01 m/sec airspeed was not realistic due to possible air duct locations near floor level that could significantly affect the evaporation rate of an uncontained spill. Specifically, the evaporation model is very sensitive to airspeed above the spill and an increase to 1 m/sec could exceed the low consequence limits. Additionally, the evaporation rates increase with temperature and could be substantial for temperatures above 110°C.

The staff conducted independent calculations using three different techniques (the guidance in NUREG/CR-6410, Nuclear Fuel Cycle Facility Accident Analysis Handbook, ALOHA and EPICode) and determined that the indoor air speed would conservatively have to be greater than a factor of five times the assumed average wind speed of 0.01 m/sec. to exceed the ERPG-2 value for a hot nitric acid spill (119°C) in the C-105 cell floor to exceed the low consequence limits for the site worker. The calculations assumed that the spill covered the entire 60m^2 floor area and did not take into account the conservative effects of the spill catch pan under the tank that is designed to contain the entire tank volume, or cooling from contact with the floor surface.

In addition to the above, DCS will do a cell by cell review during the ISA to confirm that low consequence limits will not be exceeded for any uncontained spill. Should the limit be exceeded, DCS indicated that the existing spill catch pan, already a principal structure systems and component (PSSC) for other scenarios, would be upgraded to a PSSC for this scenario. Since (1) there is a substantial indoor airspeed margin, (2) a cell by cell review will be conducted during the ISA, and (3) should the low consequence limits be exceeded for any cell assuming an uncontained spill (i.e., no catch pan), the applicant will upgrade the existing devices to PSSCs without impact on any construction activities, the staff considers this item closed.

4. CS-09, AP-02, AP-08 and AP-09, Lower Flammability Limits (LFL)

These items involve the use of 25% vs. 50% of the LFL for the design bases of solvent temperature, electrolyzer generated gases, offgas system flammable gases and vapors, and solvent flashpoint vapor pressure. DCS indicate that it still believed the 50% LFL value to be acceptable. NRC indicated that it still thought 25% LFL was an appropriate limit. NRC indicated that they would consult with the fire protection reviewers regarding applicability of certain National Fire Protection Association (NFPA) standards to closed systems without ignition sources.

5. CS-10, Control Room Habitability

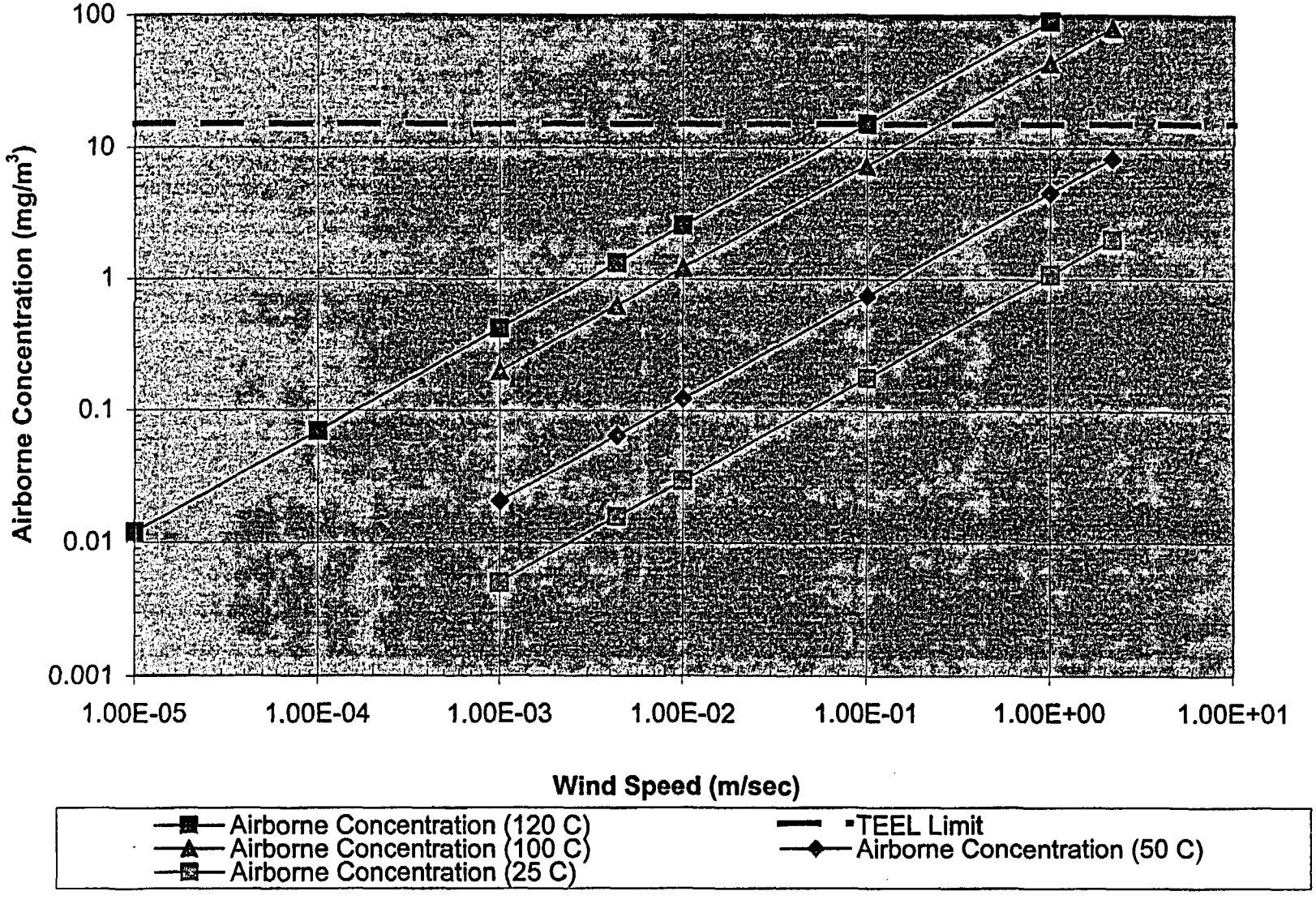
This item concerns the establishment of hazardous chemical concentration limits in the control room that would require operator use of protective equipment (breathing air, etc.) in order to assure that they could remain in the control room to perform required safety functions. The staff noted that operating reactors used Regulatory Guide 1.78, which references Immediately dangerous to life and health (IDLH) values. At these levels, operators have two minutes to don appropriate protective equipment without becoming incapacitated. DCS stated that they would use the IDLH values where available and TEEL-2s for any hazardous chemicals without established IDLH levels. DCS stated that Chapter 8 of the revised construction authorization request would be updated to include a table of the values to be used by the control room operators. The staff found this to be acceptable.

This item will be closed upon submittal of the revised CAR pages, including a separate table for hazardous chemical limits.

DUKE COGEMA STONE&WEBSTER SLIDES
CHEMICAL SAFETY
MOX FUEL FABRICATION FACILITY
June 2-4, 2003

Attachment 3

Resulting Airborne Concentration as a Function of Wind Speed Over the Spill (500 liters of 13.6 N Nitric Acid Spilled over 50 sq. m)



MEETING ATTENDEES

NAME	AFFILIATION
Andrew Persinko	Nuclear Regulatory Commission (NRC)
David Brown	NRC
Bill Troskoski	NRC
Joel Klein	NRC
Scott Gordon	NRC
Norma Garcia-Santos	NRC
Brian Smith	NRC
Wilkins Smith	NRC
Ken Ashe	Duke Cogema Stone & Webster (DCS)
Peter Hastings	DCS
Gary Kaplan	DCS
Steve Kimura	DCS
Marc Klasky	DCS
Marc Vial	DCS
Dave Alberstein	Department of Energy (DOE)
Jamie Johnson	DOE