July 25, 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 **/RA/**
Special Projects Section
Special Projects and Inspection Branch
Division of Fuel Cycle Safety
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and Safeguards

FROM: David Brown, Health Physicist **/RA/**
Special Projects Section
Special Projects and Inspection Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

SUBJECT: JULY 24, 2003 SUMMARY OF PHONE CALL WITH THE APPLICANT: RESOLUTION OF OPEN ITEMS IN THE APRIL 30, 2003 DRAFT SAFETY EVALUATION REPORT FOR THE MIXED OXIDE (MOX) FUEL FABRICATION FACILITY

On July 24, 2003, the U.S. Nuclear Regulatory Commission (NRC) reviewed outstanding open items with Duke Cogema Stone & Webster (DCS) via phone. The open items are associated with the Revised Construction Authorization Request (CAR) for the Mixed Oxide Fuel Fabrication Facility (MFFF) submitted by DCS on October 30, 2002. The purpose of this memorandum is to document statements and requests that were made by NRC staff regarding the ongoing review of open items. The statements are provided as Attachment 1.

Attachment: 1. JULY 24, 2003 PHONE CALL TO DCS.

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

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Docket: 70-3098

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DATE	7 / 25 / 03		7 / 25 / 03		7 / 25 / 03			

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JULY 24, 2003, PHONE CALL TO DCS

The following statements and requests were read by David Brown and Christopher Tripp of the NRC staff during a 3:00 pm phone call July 24, 2003, with Gary Kaplan, Vincent Chevalier, Mark Klasky, Marc Vial, Robert Foster, and Steve Kimera of DCS:

NUCLEAR CRITICALITY SAFETY

NCS-4 VALIDATION REPORT

These questions include staff review of the revised Validation Report submitted July 2, 2003. Because the review is ongoing, this list of additional questions is subject to change.

1. Demonstrate that the code is valid for those portions of the AOAs in which the parametric range entitled “Validated AOA” in the Validation Report exceeds the range covered by the chosen benchmark experiments. In particular, justify the following areas:

   AOA(1): Clarify whether the footnote to Table 5-2 means that AOA(1) is considered validated for all possible applications containing borated concrete and cadmium, or if this is confined to those design applications discussed in the footnote. If considered validated for all applications containing these materials, describe and justify the range of these materials considered within the scope of AOA(1).

   AOA(4): Justify including the use of depleted uranium in Table 5-2 of Part II of the Validation Report. Justify the value of the bias chosen for design applications exceeding the maximum EALF value of the benchmarks (1740 eV). Figure 6-6 of Part II shows a net decrease in k-effective with increasing EALF, and Table 5-2 shows the “Validated AOA” range extending up to 3751 eV.

   AOA(5): Justify including the use of borated concrete and cadmium in Table 5-2 of Part III of the Validation Report. Footnote 2 to this table states that the analysis in Part I is applicable to design applications covered by AOA(5), but does not justify this. Demonstrate that this analysis is applicable to AOA(5). Describe and justify the range of these materials considered within the scope of AOA(5). In addition, the parametric range of H/Pu values appears to be incorrect. The benchmark experiments shown in the tables of Attachment 4 and Figure 6-6 show benchmark data going up to H/Pu = 210, not 858 as claimed in Table 5-2. Address this apparent inconsistency.

2. Describe how the bias and uncertainty in the bias will be extrapolated for design applications that fall outside the range of parameters covered by the benchmark experiments, including those within the range labeled “Validated AOA” but outside the range labeled “Benchmark” in the applicable tables.

3. Tables 3-4 through 3-6 and 3-8 through 3-14 of Part II of the Validation Report contain a list of the c_k values exceeding 0.8 for each design application. This does not contain all c_k values determined using the sensitivity/uncertainty analysis. However, Reference 25 (ORNL/TM-2001/262), Appendix B, contains a complete list of c_k and E_{sum} values for design applications compared to all the candidate experiments. Many of these show a very low level of correlation between certain design applications and those benchmarks

included in AOA(3) or AOA(4). Justify including benchmarks that have been shown to be inapplicable to portions of each AOA in the validation.

4. Provide the following information for each design application (e.g., AOA 3-1) used in the sensitivity/uncertainty analysis for Part II of the Validation Report: (1) the atom densities for the fissile material; (2) the dimensions of the different geometric regions; and (3) the composition and thickness of any reflecting materials.

5. A comparison of Tables 5-1 and 5-2 of Part II of the Validation Report with the description of the design applications (e.g., AOA 3-1) shows that the design applications cover only portions of the "Validated AOA", in terms of H/(U+Pu) and EALF. Given the large variation in the c_k values across this range, demonstrate that the design applications chosen are sufficient to show the code is validated across the entire range.

6. Validation Report Part II section 3.6.1 provides justification for using the ck value of 0.8 or higher to determine acceptance of a benchmark for validation of a design application. Provide further justification for using 0.8 vs. 0.9. In particular, provide justification showing that the MOX design applications (PuO2 and MOX powder) are similar enough to the low-enriched uranium systems used in the Generalized Linear Least Squares Methodology analysis to ensure that the results of this analysis can be applied to the MOX design applications.

FIRE SAFETY

FS-2 FIRE BARRIERS
In fire areas where the design basis time-temperature curve is briefly exceeded, either identify design bases or justify why none are required to ensure that fire barriers will retain structural integrity.

CHEMICAL SAFETY

CS-1 RED OIL EXPLOSIONS
For closed systems, identify a PSSC and design basis for solution temperature control. A design basis value of 120 C, which staff understands to be the boiling point of the water-nitric acid azetrope, would be acceptable to the staff. Also, provide authorization basis documentation regarding red oil hazards at the SRS H-canyon evaporators.

CS-2 HAN EXPLOSIONS

1. For chemical concentrations and temperature, what are the design basis values? Provide a basis for the values, including the safety margin.

2. Address HNO_2 as a initial condition relied upon in the safety assessment.

3. Provide an explanation of the "path forward" - including confirmatory laboratory tests, Monte Carlo modeling - that will validate the model and design basis values derived therefrom.

4. Staff would like to see that DCS has performed parametric studies using the model, such as would be performed to define the design basis values [e.g., sensitivity analyses for HNO_2].

5. Has DCS compared model data with any experimental results other than those presented in section 7.2 in the calculation?

6. Explain why flow controls were removed as a design basis function in the May 30, letter.

CS-5b USE OF TEELS
This issue continues to be reviewed by NRC.

CS-9, AP-2, AP-9, AP-8
FLAMMABLE GASES
Staff expect a letter report from DCS to address these open items.

CS-10 EMERGENCY CONTROL ROOM HABITABILITY
Staff expect a letter report from DCS to address this open items, including CAR page changes with table of proposed values based on IDLHs and a 2-minute time limit. Where IDLH is not available, DCS will rely on TEEL-2 values.

AP-3 TITANIUM FIRE
Regarding the DCS response dated May 23, 2003, staff have reviewed the proposed design basis code (NFPA 70) for overcurrent protection and find that it may not apply. Regarding safety design bases during maintenance outages, DCS confirmed that there was an incorrect reference in the May 23 letter. Therefore, DCS had committed to revising the response.

MP-1 URANIUM BURNBACK
DCS must adequately address uranium burnback as a hazard that could damage the final HEPA filters. As stated in the April 30, 2003 DSER, the February 18, 2003 letter did not address concerns about fine uranium oxide particles reaching the final HEPA filters.