November 3, 2001

MEMORANDUM TO: Eric J. Leeds, Chief
Special Projects Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Thru: Joseph G. Giitter, Chief
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FROM: Andrew Persinko, Sr. Nuclear Engineer
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SUBJECT: OCTOBER 11, 2001, MEETING SUMMARY: DUKE COGEMA STONE & WEBSTER RESPONSE TO U.S. NUCLEAR REGULATORY COMMISSION REQUEST FOR ADDITIONAL INFORMATION FOR THE MIXED OXIDE FUEL FABRICATION FACILITY

On October 11, 2001, U.S. Nuclear Regulatory Commission (NRC) staff met with representatives from Duke Cogema Stone & Webster (DCS) to discuss DCS responses, dated August 31, 2001, to NRC's request for additional information (RAI), dated June 21, 2001, associated with the construction authorization request (CAR) for the mixed oxide fuel fabrication facility (MOXFFF). Technical matters discussed included controlled area boundary, heavy loads/material handling, nuclear criticality safety, confinement ventilation, safety analysis, confinement related to the furnace, human factors, and electrical/instrumentation and control (I&C). Some of the discussions were closed to the public in order to discuss proprietary information. Except for electrical/I&C, DCS made no formal presentations. Rather, DCS responded to questions from NRC staff. The attendance list and meeting agenda are attached (Attachments 1 and 2, respectively). The agenda shows a two day meeting as originally planned, however, the meeting was completed in one day.

In his opening remarks, Mr. Persinko stated that: 1) some of the questions the staff has are on system descriptions and that while the regulations require the staff only approve the design bases of the principal structures, systems, and components (SSCs) at the construction stage, it

is important for the staff to understand the system in order to assess the design bases, 2) the staff is using, as a guidance document, Regulatory Guide 1.186, which endorses Nuclear Energy Institute (NEI) document NEI 97-04, “Design Basis Program Guidelines,” regarding the subject of design basis; even though it was written for reactors, there are analogous systems and examples of design basis level of detail that can assist the staff in its MOXFFF review; 3) some clarifications were obtained from DCS via phone before the meeting, however, information provided and actions resulting from the phone calls will be presented at this meeting to assure that DCS understands the information that it will confirm in a letter; and 4) NRC staff will likely visit DCS offices in Charlotte during the week of October 15 to review CAR supporting information.

The technical matters discussed at the meeting are summarized in the following paragraphs.

1. Controlled Area Boundary

With respect to controlled area boundary, the staff stated that 10 CFR 70.61(f) requires that applicants/licensees establish a controlled area boundary, as defined in 10 CFR 20.1003. Section 20.1003 of 10 CFR defines the controlled area as an area outside of the restricted area but inside the site boundary, access to which can be restricted by the licensee for any reason. There are two regulations concerning this issue, 10 CFR Part 70 that deals with performance requirements (i.e., combinations of likelihoods and consequences) and 10 CFR Part 20 that deals with doses. Section 70.61(f)(2) of 10 CFR allows individuals who are not workers, defined in 10 CFR 70.4 as individuals who receive an occupational dose, who perform ongoing activities in the controlled area to satisfy worker performance requirements described in 70.61(b) and (c) if those individuals receive training that satisfies 10 CFR 19.12(1)-(5). Part 20 of 10 CFR defines occupational dose as dose received by an individual in the course of employment in which the individual’s assigned duties involve exposure to radiation or to radioactive material from licensed and unlicensed sources of radiation. The important clause is “...in the course of employment in which the individual’s assigned duties involve exposure to radiation or to radioactive material....” As a result of this clause, NRC regulations allow Savannah River employees to be treated either as members of the public subject to 10 CFR 20.1301/dose limitations or as workers subject to 10 CFR 20.1201 dose limitations depending on the individual’s assigned duties. The NRC staff presented a draft slide that depicts this issue in flowchart form (Attachment 3).

2. Heavy Loads/Material Handling

DCS agreed to provide the following in a letter to NRC:

A. RAI 217: Clarify whether heavy lift crane(s) travel over principle SSCs. Clarify if other cranes will be classified as heavy lift cranes, e.g., the waste handling crane. Clarify the maximum lift height for the fresh fuel casks. Clarify the definition of, "material handling controls." Clarify MOX building drawing (Figure 11.1-16, MOXFFF Processing Area, Level 1) that show hatches in the fresh fuel handling hall.

B. RAI 219: The response to the NRC’s RAI indicates that operating experience at MELOX and La Hague has been incorporated into the design and operation of cranes at those facilities, but does not state whether this operating experience will be incorporated at the MOXFFF. Clarify whether this operational experience will be incorporated at the proposed MOXFFF.

C. RAI 186: With respect to the meaning of, "engineered equipment," clarify if the equipment in this response may have safety functions and whether they may be principal SSCs.
D. RAI 193: With respect to equipment that may contain greater than or equal to 50 micrograms of respirable plutonium that is not in a glovebox. DCS answered that the 1 gram of plutonium and the 50 micrograms of respirable plutonium are related by the release fraction that was not discussed in the CAR or the response to the RAI. The table provided in the response to the NRC's RAI is still valid. DCS will clarify the relationship between plutonium and respirable plutonium.
E. RAI 221: Clarify the editions of the Codes and Standards that will be used to design heavy lift cranes.

3. Nuclear Criticality Safety

DCS agreed to provide the following in a letter to NRC:
A. RAI 75: DCS agreed that there would be two criticality alarms over each area required to be covered, per 10 CFR 70.24.
B. RAI 83: DCS agreed to provide additional justification for parameters in Tables 6-1 and 6-2 (containing dominant controlled parameters by process step), which are assumed to be less than optimal values.
C. RAI 90: DCS understands NRC's position on ANSI standards ANSI/ANS-8.1, 8.3, 8.7, 8.15, 8.17, and 8.22, and will clarify its commitment to these ANSI standards.
D. RAI 103/104: DCS agreed to revise the wording in Tables 6-3 and 6-4 (permissible values of parameters), to further clarify that they are order-of-magnitude estimates that will not be used for criticality safety limits without further justification.

Summary of remaining criticality safety issues and associated actions:

E. RAI 40/41: DCS stated that it understands the staff's position that a simple commitment to double contingency (DC) is not sufficient to demonstrate high unlikelihood (HU). DCS prefers not to have a separate demonstration of HU and DC, but prefers a definition of DC that is sufficiently robust to ensure HU. DCS would like additional guidance from NRC regarding what is required for a qualitative demonstration of DC/HU. NRC agreed to see if this information can be provided. DCS stated that they would not generally rely on two simple administrative controls as the basis of DC (for example), and that their response would make this clear. Also, the NRC responded to the suggestion that they could commit to the qualitative aspects of the DCS response in RAI 39 (without committing to specific probability or quantitative indices), by stating that the general programmatic aspects discussed in RAI 39 were not sufficient to address the issue.
F. RAI 68: DCS seeks guidance, or at least an "analogous precedent" for NRC assertions that the qualifications discussed in the RAI response are insufficient. NRC will produce guidance on this issue, in a similar time frame to that on RAI 40/41.
G. RAI 80/81: DCS stated that its response relating to the use of either reliance on geometry control or dual parameter control would be clarified. In the case where geometry is the sole controlled parameter, DCS will still meet double contingency by ensuring that no single credible change in process conditions can produce a criticality. DCS further asserted that if there is no credible means for geometry to change, there is

no need for further controls. NRC agreed that this meets the wording and intent of the DCP.

With respect to the minimum subcritical margin (administrative margin) for AOA(1), in Part I of the Code Validation Report, NRC stated that additional justification is needed to make a determination of whether the margin of 0.05 delta-k is sufficient. The arguments of historical precedent (based on light-water-reactor fuel) and statistical methods were stated by NRC staff to be insufficient. DCS requested more specific licensing justification, and that NRC do a literature search of fuel facility safety evaluation reports and License Applications to determine what a suitable basis would be. NRC agreed to see if this information can be provided to DCS.

4. Confinement Ventilation

In the MOX construction application, DCS proposed a ventilation filtration system release fraction of 1E-4. The "Nuclear Fuel Cycle Facility Accident Analysis Handbook" recommends that for severe conditions a particulate removal efficiency of 95 to 99 percent be used for high efficiency particulate air (HEPA) filter systems. RAI 59 requested DCS to justify the leak path factor of 1E-4 for two banks of HEPAs filters under accident conditions. In its response, DCS provided a calculation of removal efficiency based on a method proposed by W. Bergman. DCS believes that the 1E-4 release fraction is justified based on the submitted analysis.

As background, NRC staff explained that there are substantial uncertainties in determining HEPA filter removal efficiencies under accident conditions, especially during fire scenarios. The proposed approach does not treat these uncertainties including chemical degradation effects of the various chemicals used in the MOX processes. Uncertainties also include filter aging effects.

DCS asked NRC staff to explain the basis for the removal efficiency recommendation in the Accident Analysis Handbook. NRC staff explained that it has confidence that in a well-designed ventilation filtration system that has features that are protective of the HEPA filters, that better than a 99 percent removal can be achieved under accident conditions. However, considering the wide variety of uncertainties, a margin of safety is needed. NRC recommends the use of a 99 percent removal efficiency in both fuel cycle facility and reactor applications. NRC staff explained that there have been fires at plutonium facilities that have resulted in failures of banks of HEPA filters and that the recommended removal efficiency of 99 percent reflected such experience.

DCS proposed to consider another calculation that would better define the accident conditions affecting the HEPA filters. NRC will further review the basis for the values in the "Nuclear Fuel Cycle Facility Accident Analysis Handbook."

5. Safety Analysis

A generic concern was the protection of the facility worker with "training and procedures." DCS directed NRC to RAI responses which provided some more detail to the typical worker response to an accident situation such as donning a mask. DCS agreed to provide more information on worker response. Another generic concern was the listing of a single major system (such as I&C) at the system level without providing the independent functions which

demonstrate the ability to prevent or mitigate an event while meeting the single failure criterion. DCS cited other sections of the CAR outside of the Safety Assessment Chapter which listed the functions that would in various instances be assigned to the major system in question but were not specifically cited for any one event. NRC noted that in some cases the Safety Assessment Chapter does list multiple independent functions for various major systems. DCS responded that the various systems were at different stages of design.

6. Confinement (Furnace)

RAI 144 requested justification for not enclosing the furnaces in gloveboxes. The response provided by DCS was proprietary and not included in the redacted version of the DCS response to the RAI. During the meeting, DCS stated that the glovebox is not used because of maintenance reasons and because the environment in the glovebox does not make enclosing the furnace necessary. DCS agreed to evaluate this issue further and to provide justification in a letter to NRC.

7. Human Factors

DCS agreed to provide the following in a letter to NRC:

A. RAI 224: Clarify its response that NUREG-0700 and all of the NUREG/CR references in Chapter 12 of the standard review plan as guidance documents would be used as appropriate during the detailed design process for human performance activities associated with maintenance of MOXFFF automated systems.
B. RAI 225: Clarify its response by more explicitly defining what is meant by "significant human-system interface" for the protective control system. DCS agreed to consider and evaluate the potential for personnel errors of commission that might result in overriding or defeating safety systems. DCS also agreed to provide a cross-reference(s) to appropriate parts of Chapter 11 of the CAR.
C. RAI 227: Clarify its response by more explicitly defining what is meant by "other deterministic design basis accident assumptions and scenarios," and also to consider and evaluate the potential for personnel errors of commission that might result in overriding or defeating safety systems.
D. RAI 228: DCS agreed to reconsider its rationale for not using NUREG-0711 as guidance in their design review process. With respect to the status of the revision to IEEE Standard 1023, NRC stated that due to issues arising from the last balloting of the IEEE Standard 1023 revision, NRC would provide to DCS a draft in approximately a month, and the revision is scheduled to be issued some time in CY 2002.
E. RAI 230: Clarify its response by including both human errors of omission and commission in their evaluation of the probability of human error.
F. RAI 231, 233: Summarize significant events involving human performance as part of the review of operating experience at the MELOX and LaHague that were discussed at the meeting.

8. Electrical

DCS agreed to provide the following in a letter to NRC:

A. RAI 152: DCS response indicates that they will follow the guidance of IEEE Standard 338-1987. Regulatory Guide 1.118, Revision 3, endorses that IEEE standard with four

clarifications. DCS will consider following the additional guidance of the Regulatory Guide.

B. RAI 161:
   i. regarding whether DCS will meet all the test/analysis conditions and assumptions related to the IEEE Standard 384-1992, DCS stated that power cables associated with IROFS would be in conduits and not cable trays. DCS will confirm this.
   ii. table on Page 161-1 has incorrect entree for open trays in non-hazard area under IEEE Standard 384-1992. DCS will correct. Also, DCS stated that it committed to 1 ft/3 ft spacing and will confirm.
   iii. with respect to breaker testing, DCS stated that it will test per IEEE Standard 741 but test frequency has not been determined yet.
   Iv. on Page 11.5-14 of the CAR, the statement "except that a single circuit breaker or fuse tripped by overcurrent are not used as an isolation device" in the second paragraph will be clarified to state that DCS will use two devices in series.

A. RAI 156: IEEE Standard 387-1995 does not require a loss of offsite power (LOOP) test on a periodic basis. DCS stated that it would perform LOOP tests but did not specify the frequency at this time.

B. RAI 159: Regulatory Guide 1.100 addresses seismic qualification of electric and mechanical equipment. DCS has committed to IEEE Standard 344-1987 for seismic qualification of electrical equipment. DCS will clarify its commitment to Regulatory Guide 1.100, including providing design basis information with respect to seismic qualification of mechanical equipment.

C. RAI 180: DCS response indicates that they will follow the guidance in ISA-S67.04. DCS will clarify its commitment to the guidance in Regulatory Guide 1.105.

D. RAI 162: DCS has committed to follow the guidance of IEEE Standard 484. DCS will clarify its commitment to the guidance contained in Regulatory Guide 1.128.

DCS clarified that electrical and I&C equipment that need to be qualified will be qualified/dedicated and would have the appropriate quality assurance measures.

DCS provided a discussion of the electrical system design basis and design features. Some electrical one-line diagrams were also provided (Attachment 4).

9. <u>I&C</u>

DCS presented an overview of the I&C systems for the MOX facility (Attachment 5).

DCS suggested that NRC staff review the architectural block diagram of the application of the digital and electronic equipment used to control the facility processes and the associated SSCs at DCS offices in Charlotte. After the visit, if the staff decided that the information should be submitted, DCS would consider submitting it.

RAI 66: DCS will provide clarification that criticality prevention related to material inventory control is the only safety function that has been allocated to software. A list will be provided if there is more than one safety function allocated to software.

RAI 164: DCS stated that smoke is not a design basis condition for the facility electronics systems. DCS response covered fire prevention, movement of smoke, dispersal of

electronics, and housing of electronics in cabinets and panels as sufficient to minimize exposure to fire and smoke. Redundant digital control equipment will be located in separate fire areas. DCS stated that if such equipment becomes subjected to smoke, it will be renovated as necessary and tested before being placed back into service. DCS will confirm the above in a letter.

The following additional RAIs were briefly discussed and the NRC I&C reviewer indicated that he understood the DCS responses as worded in the DCS response to the RAI: 165, 166, 167, 168, 169, 170, 171, 173, 174, 175, 176, 177, 178, 179, 181, and 182.

Docket: 70-3098

Attachments: 1. Attendance List
2. Meeting Agenda
3. Controlled area boundary flowchart
4. DCS electrical drawings
5. DCS I&C slides

cc:
P. Hastings, DCS
J. Johnson, DOE
H. Porter, SCDHEC
J. Conway, DNFSB
D. Moniak, BREDL
G. Carroll, GANE
R. Thomas, Environmentalists, Inc.

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ATTENDEES AT THE MEETING ON OCTOBER 11, 2001

NAME	AFFILIATION
Andrew Persinko	Nuclear Regulatory Commission (NRC)
Timothy Johnson	NRC
Fred Burrows	NRC
Wilkins Smith	NRC
Alex Murray	NRC
Christopher Tripp	NRC
David Brown	NRC
Bill Gleaves	NRC
Joel Kramer	NRC
Mina Sheikh	NRC
Harry Felsher	NRC
Rex Wescott	NRC
Heather Astwood	NRC
Mike Layton	NRC
Joseph Giitter	NRC
Vanice Perin	NRC
John Calvert	NRC
Ed Brabazon	Duke Cogema Stone & Webster (DCS)
Peter Hastings	DCS
Bill Hennessy	DCS
Jon Tanner	DCS
Vincent Chevallier	DCS
Gary Kaplan	DCS
Ken Ashe	DCS
Tommy Touchstone	DCS
Ronald Jackson	DCS
Jamie Johnson	Department of Energy (DOE)
Norman Fletcher	DOE
John Connelly	DOE
Michael Hillman	DOE
Kathy Martin	DOE
Don Williams	Oak Ridge National Laboratory
David Alberstein	Los Alamos National Laboratory (LANL)
Faris Badwan	LANL
Edward Lyman	Nuclear Control Institute (NCI)
Carey Fleming	Winston & Strawn
Christi Byerly	Cogema, Inc.
Mark Orr	ATL
Andrea Jennetta	WNC

AGENDA (Rev. 1)
NRC-DCS Meeting to Discuss DCS RAI Response Dated August 31, 2001
October 11-12, 2001

October 11 (Room T8A1)

8:30 - 8:45	Introduction / Opening Remarks (NRC)
8:45 - 9:00	Opening Remarks (DCS)
9:00 - 12:00	Technical Discussions
12:00 - 1:00	Lunch
1:00 - 4:00	Technical Discussions
4:00 - 4:30	Summary / Actions

October 12 (Room T7A1)

8:30 - 8:45	Opening Remarks (NRC)
8:45 - 9:00	Opening Remarks (DCS)
9:00 - 12:00	Technical Discussions
12:00 - 1:00	Lunch
1:00 - 4:00	Technical Discussions
4:00 - 4:30	Summary / Actions

NOTE: Technical discussions expected to include, in chronological order:
controlled area boundary
heavy loads/material handling
nuclear criticality safety
confinement ventilation
safety analysis
confinement (proprietary)
human factors (proprietary)
electrical/I&C (proprietary)

No set times have been allocated per topic - discussions will begin at approximately 9:00 on October 11 and continue in the specified order until completed. Order of topic discussions may be changed and topics may be added or deleted, as necessary.