

RAS 5156

**RELATED CORRESPONDENCE**

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

**DOCKETED  
USNRC**

**ATOMIC SAFETY AND LICENSING BOARD**

December 27, 2002 (10:39AM)

**Before Administrative Judges:  
Thomas S. Moore, Chairman  
Charles N. Kelber  
Peter S. Lam**

**OFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF**

In the Matter of	)	December 20, 2002
DUKE COGEMA STONE & WEBSTER	)	Docket No. 070-03098-ML
(Savannah River Mixed Oxide Fuel Fabrication Facility)	)	ASLBP No. 01-790-01-ML

**DUKE COGEMA STONE & WEBSTER'S OBJECTIONS AND RESPONSES  
TO GEORGIANS AGAINST NUCLEAR ENERGY AND  
BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE  
SECOND SET OF INTERROGATORIES**

Applicant Duke Cogema Stone & Webster ("DCS") hereby provides the following objections and responses to the Georgians Against Nuclear Energy and Blue Ridge Environmental Defense League Second Set of Interrogatories.

**GENERAL OBJECTIONS**

1. DCS objects to these interrogatories to the extent the information sought is cumulative or duplicative, and to the extent that compliance would be unduly burdensome, expensive, or oppressive.
2. DCS objects to these interrogatories to the extent that they seek information that is not relevant, or not reasonably calculated to lead to the discovery of admissible evidence.

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SECY-02

## RESPONSES AND OBJECTIONS

All the foregoing objections shall be deemed reasserted as to each interrogatory to which they are applicable as if fully set forth in response to that interrogatory. In addition to the foregoing objections, and without waiver thereof, DCS provides the following responses:

INTERROGATORY NO. 1: Please provide your analysis of impurities from feed materials originating from sources other than the Pit Disassembly and Conversion Facility (PDCF), as described in Section 9.1.3.1 of the Revised Construction Authorization Request (CAR).

RESPONSE TO INTERROGATORY NO. 1: DCS objects to INTERROGATORY NO. 1 on the grounds that it is irrelevant to Contention 1 (Lack of Consideration of Safeguards in Facility Design). (See General Objection No. 2). Subject to and without waiving the foregoing objections, DCS responds as follows: Impurities in CAR Table 11.3.36 are incorporated into the source term analysis for radiation shielding for non-polished plutonium sources. Alternate feed stock impurities such as sodium and beryllium have an impact on the neutron intensities for feed material at the front end of the AP process due to the ( $\alpha$ , n) reaction. There is little effect on occupational doses outside of process cells due to thick concrete shielding in the original design and low access requirements. Neutron shielding is incorporated into the glovebox design to satisfy radiation protection design criteria. There is no impact on polished plutonium sources.

INTERROGATORY NO. 2: Please provide your analysis of impurities from feed materials originating from the PDCF.

RESPONSE TO INTERROGATORY NO. 2: DCS objects to INTERROGATORY NO. 2 on the grounds that it is irrelevant to Contention 1 (Lack of Consideration of

Safeguards in Facility Design). (See General Objection No. 2). Subject to and without waiving the foregoing objections, DCS responds as follows: Radiological source terms for PDCF sources are contained in Table 9-3 of the CAR, and the impurities are identified in Table 11.3-35 of the CAR.

INTERROGATORY NO. 3: Please provide your analysis of the impurity content of the items described in Table 11.3-36.

RESPONSE TO INTERROGATORY NO. 3: DCS objects to INTERROGATORY NO. 3 on the grounds that it is irrelevant to Contention 1 (Lack of Consideration of Safeguards in Facility Design). (See General Objection No. 2). Subject to and without waiving the foregoing objections, DCS responds as follows: The impurities listed in Table 11.3-36 of the CAR are the impurities in the feedstock originating from sources other than the PDCF, and are the subject of the analysis identified in CAR Section 9.1.3.1 and further described in the response to INTERROGATORY NO. 1 above. The results of our analysis of the impurity content are reflected in CAR Table 11.3-36.

INTERROGATORY NO. 4: Do you agree that the average plutonium content of the fuel produced at the proposed MOX Facility will be 4.37%?

a. If you disagree, please provide the average plutonium content that you assume, and explain the basis for the figure.

RESPONSE TO INTERROGATORY NO. 4: DCS agrees that the average plutonium content of the fuel produced at the MOX Facility is currently projected to be 4.37%.

INTERROGATORY NO. 5: According to Section 11.2.6 of the revised CAR, the throughput of the proposed MOX Facility will be 70 MT of MOX fuel. In making this statement, what did you assume would be the average plutonium content of the fuel?

RESPONSE TO INTERROGATORY NO. 5: Section 11.2.6 of the revised CAR states that the "MP process area is designed for a throughput of 70 MTHM/yr." No

assumption regarding average plutonium content of the MOX fuel was made in making this statement. 70 MT is a nominal capacity value.

**INTERROGATORY NO. 6:** In Section 1.1 of the Environmental Report, Rev. 2, DCS states that the throughput of the proposed MOX Facility will be 3.5 MT of plutonium per year. In making this statement, what did you assume would be the average plutonium content of the fuel?

**RESPONSE TO INTERROGATORY NO. 6:** Section 1.1 of the Environmental Report, Rev. 2, states that the "MFFF is designed...with an annual design throughput of 3.8 tons (3.5 metric tons)." No assumption regarding the average plutonium content of the MOX fuel was made in making this statement.

**INTERROGATORY NO. 7:** Please explain the reason(s) for any discrepancy between your answers to Interrogatories 5 and 6 above.

**RESPONSE TO INTERROGATORY NO. 7:** There are no discrepancies in the responses to INTERROGATORY NOS. 5 and 6 above.

**INTERROGATORY NO. 8:** Do you agree that for feed material containing impurities, non-destructive MC&A analysis may not be able to make precise measurements in an initial inventory?

**RESPONSE TO INTERROGATORY NO. 8:** No. The currently planned calorimetry-gamma spectroscopy measurement technique should provide sufficiently precise and accurate measurements for received feed material on inventory.

**INTERROGATORY NO. 9:** If your answer to Interrogatory No. 8 is yes, how does the MC&A design basis for the proposed MOX Facility provide for initial inventory of impure feed material?

**RESPONSE TO INTERROGATORY NO. 9:** Not applicable.

**INTERROGATORY NO. 10:** Did DCS design the MOX Facility to comply with classified NRC regulatory guidance documents that were sent from NRC to DCS on March 13, 2000, under cover of a letter from Michael F. Weber to Peter Hastings?

**RESPONSE TO INTERROGATORY NO. 10:** DCS is utilizing those guidance documents in the detailed design of the MOX Facility.

**INTERROGATORY NO. 11:** If your response to Interrogatory No. 10 is yes, were the elements of the MOX Facility design that were intended to comply with the above-identified regulatory guidance submitted to the NRC Staff for its review?

- a. If so, when were they submitted?
- b. If so, identify any statements or documents issued by the NRC Staff in which you have received approval of those design elements.

**RESPONSE TO INTERROGATORY NO. 11:** (a) DCS's design bases for physical security were provided in the revised CAR Section 13.1. Additional preliminary design details were presented to the NRC in a presentation dated March 8, 2002. (b) The NRC has not approved any physical security design elements to date.

**INTERROGATORY NO. 12:** In your evaluation of the probability of an earthquake at the Savannah River Site, have you considered the following paper: Chapman, M.C., G.A. Bollinger, M.S. Sibol, D.E. Stephensen, The influence of Coastal Plain Sedimentary wedge on strong ground motions from the 1886 Charleston, South Carolina, Earthquake, *Earthquake Spectra*, Vol. 6 No. 4, 617-640 (1990)? If so, explain how it has affected your analysis.

**RESPONSE TO INTERROGATORY NO. 12:** The DOE sponsored the paper cited in INTERROGATORY NO. 12. D.E. Stephenson, a co-author of the paper, was a member of the SRS team that was involved in the development of the SRS seismic design basis. The paper reflected some of the early thinking of the impact of site response on ground motion. SRS efforts to quantify the site response have evolved since that time, and the current understanding is reflected in the CAR and the cited references.

**INTERROGATORY NO. 13:** In your evaluation of the probability of an earthquake at the Savannah River Site, have you attempted to learn about any updates to the Chapman paper mentioned in Interrogatory No. 12 above? In particular, have you considered the following paper: Chapman, M.C., Ground motion attenuation in the Atlantic Coastal Plain near Charleston, South Carolina, submitted to *Bulletin of the Seismic Society of America* (2002)? If so, explain how it has affected your analysis.

**RESPONSE TO INTERROGATORY NO. 13:** WSRC has developed and implemented a process that allowed for the development of seismic design bases for the SRS that have kept pace with and contributed to current industry methodologies and practices. The MOX Facility seismic design basis as described in the CAR utilized current methodologies and practices and MOX Facility site-specific soil properties. The specific paper cited in INTERROGATORY NO. 13 is unpublished and, therefore, is not in the public domain for consideration.

**INTERROGATORY NO. 14:** Have the following sites been ruled out as potential epicenter [*sic*] for a Charleston-like earthquake?

- a. Bowman, South Carolina;
- b. Reidsville, Georgia;
- c. The offshore location of the March 12, 1960 earthquake;
- d. The offshore location of the November 8, 2002 earthquake.

**RESPONSE TO INTERROGATORY NO. 14:** Consistent with DOE Standards 1022 and 1023, the SRS-specific PSHA was developed using Electronic Power Research Institute (“EPRI”) and Lawrence Livermore National Laboratory (“LLNL”) hazard studies and SRS site properties (*see* CAR Section 1.3.6.3.6.1). The SRS-specific PSHA accommodates uncertainty with respect to earthquake sources and size and the occurrence rates of those sources. The seismic sources contained in the LLNL and EPRI studies cover the geographic region identified in INTERROGATORY NOS. 14 (a) - (d).

**INTERROGATORY NO. 15:** For those sites that have been ruled out in response to Interrogatory No. 14, please explain on what technical basis each site was ruled out. For each site that was not ruled out, please explain how you considered the site.

**RESPONSE TO INTERROGATORY NO. 15:** The SRS-specific PSHA has considered potential sources and occurrence rates of those sources, as discussed in DCS’s Response to INTERROGATORY NO. 14.

INTERROGATORY NO. 16: What level of certainty do you attribute to the uniqueness of the Charleston location as the only epicenter of a Charleston-like earthquake?

RESPONSE TO INTERROGATORY NO. 16: Consistent with DOE Standards 1022 and 1023, the SRS-specific PSHA was developed using EPRI and LLNL hazard studies and SRS site properties (*see* CAR Section 1.3.6.3.6.1). The SRS-specific PSHA accommodates uncertainty with respect to earthquake source locations and the occurrence rates of those sources. The seismic sources contained in the LLNL and EPRI studies cover the uncertainty with respect to location of a repeat of the 1886 Charleston earthquake.

INTERROGATORY NO. 17: In Section 1.3.6.3.4 of the Construction Authorization Request, you state that EPRI and LLNL hazard spectra were used to estimate the probability of exceedance of the spectra. Did you rely on the EPRI and LLNL hazard spectra alone, or did you consider any other factors? If you relied on other factors, please identify them and explain how they affected your analysis.

RESPONSE TO INTERROGATORY NO. 17: CAR Section 1.3.6.3.4 is part of the historical summary of the evolution of the SRS design basis. It describes an earlier spectrum for facilities in H-Area. The spectrum described in Section 1.3.6.3.4 was not used for the MOX Facility.

CAR Section 1.3.6.6 provides a summary of the methodology that was used for development of the SRS-specific PSHA. As explained in DCS's Response to INTERROGATORY NO. 22, EPRI and LLNL hazard studies were used to establish the bedrock hazard for the SRS, soil amplification functions were developed to propagate these motions to the ground surface for the establishment of the SRS PC-3 and PC-4 response spectra, and the PC-3 and PC-4 spectra were then used as input to select an NRC Reg. Guide-1.60 spectrum scaled to 0.2g peak ground acceleration ("PGA") at the ground surface for the design earthquake for the MOX Facility.

**INTERROGATORY NO. 18:** In estimating the probability of exceedance of the spectra as discussed in Section 1.3.6.3.4 of the Construction Authorization Request, did you consider any studies or data regarding the attenuation relationships specific to the path from Charleston to the Savannah River Site? If so, please identify those studies or data and explain how they affected your analysis.

**RESPONSE TO INTERROGATORY NO. 18:** Section 1.3.6.3.4 is part of the historical summary of the evolution of the SRS design basis. It describes an earlier spectrum for facilities in H-Area. The spectrum described was not used for the MOX Facility. CAR Section 1.3.6.4 discusses the methodology used for ground motion prediction that includes earthquake source, path, and site assumptions appropriate for SRS.

Also, WSRC, 2000b, *Natural Phenomena Hazards (NPH) Design Criteria and other Characterization Information for the Mixed Oxide (MOX) Fuel Fabrication Facility at Savannah River Site (U)*, WSRC-TC-2000-00454, and the studies and data cited therein, describe the information that was considered regarding attenuation from Charleston to SRS. This report was used as the basis for the MOX Facility spectra discussed in Section 1.3.6.6 of the CAR.

**INTERROGATORY NO. 19:** Do you agree that the Summerville-Middleton Place epicenter of the Charleston earthquake is active? If not, please explain your reasoning.

**RESPONSE TO INTERROGATORY NO. 19:** As discussed in CAR Section 1.3.6.6.4, and consistent with DOE Standard 1023, the SRS site-wide design spectra envelope the spectrum represented by a repeat of the 1886 Charleston earthquake. Historically, eastern United States coastal plain seismic activity has occurred in distinct zones superimposed on a regional background of very low level seismicity. The most active of these zones and the one assumed likely to be associated with the 1886 Charleston event is the Middleton Place-Summerville Seismic Zone (“MPSSZ”). The



MPSSZ lies some 20km (12 miles) northwest of Charleston, well within the mesoseismal area of the 1886 Charleston earthquake.

**INTERROGATORY NO. 20:** Do you agree that the Summerville-Middleton Place epicenter of the Charleston earthquake has been active for at least 6,000 years? If not, please explain your reasoning.

**RESPONSE TO INTERROGATORY NO. 20:** As discussed in CAR Section 1.3.6.6.4, and consistent with DOE Standard 1023, the SRS site-wide design spectra envelope the spectrum represented by a repeat of the 1886 Charleston earthquake. *Talwani and Schaeffer (2001)* developed two scenarios for the occurrence of large earthquakes in the coastal area of South Carolina based on the reanalysis of data from previous paleoliquefaction investigations. The liquefaction episodes summarized for each scenario in this paper include a liquefaction episode G, Magnitude 7+, at Charleston dating back to  $5800 \pm 500$  years before present.

**INTERROGATORY NO. 21:** Does your characterization of the Charleston earthquake differ in any way from the characterization in the LLNL and EPRI studies? If so, describe each way in which your characterization of the Charleston earthquake differs from the characterization in the LLNL and EPRI studies, and how the difference affects your computation of the probabilistic seismic hazard acceleration.

**RESPONSE TO INTERROGATORY NO. 21:** CAR Section 1.3.6.3.6.1 describes how the EPRI and LLNL hazard studies and SRS site properties were used to develop the SRS-specific PSHA. This section of the CAR states that “these evaluations did not revise or confirm in any way the experts’ evaluations of activity rates, seismic source zonation or the decay of ground motion with distance used in the EPRI and LLNL seismic hazard assessments.” DCS’s response to INTERROGATORY NO. 22 describes how DCS used the EPRI and LLNL seismic hazard assessments to derive the MOX Facility design earthquake spectrum.

INTERROGATORY NO. 22: In Section 1.3.6.6.3.2 of the Construction Authorization Request, DCS discusses the use of LLNL and EPRI values to obtain soil response values at the surface. Please explain whether DCS used a 0.2g value at the base of the Coastal Plain sediments and propagated it to the surface, or whether another value was scaled to a value of 0.2g at the surface? If another value was scaled to a value of 0.2g at the surface, what was the value at the base of the Coastal Plain?

RESPONSE TO INTERROGATORY NO. 22: CAR Section 1.3.6.6 summarizes the development of the SRS-specific PSHA. As described in CAR Section 1.3.6.6.3.2, the EPRI and LLNL hazard studies were used to establish bedrock hazard for the SRS, and soil amplification functions were developed to propagate these motions to the ground surface for the establishment of the SRS PC-3 and PC-4 response spectra. As described in CAR Section 1.3.6.7, using the PC-3 and PC-4 spectra as input, the design earthquake for the MOX Facility was selected to be an NRC Reg. Guide-1.60 spectrum scaled to 0.2g PGA at the ground surface. For evaluation of subsurface conditions, bedrock motions associated with the PC-3 bedrock spectrum were used, scaled such that when amplified through the MOX Facility site soil profile, the resulting surface ground motion will have 0.2g PGA (*see* CAR Section 1.3.6.7). The PC-3 bedrock spectrum and the scaling to produce 0.2g surface PGA are presented, with the details of associated analyses, in the MOX Facility Site Geotechnical Report submitted to the NRC in August, 2001.

Dated: December 20, 2002

For the Objections:  
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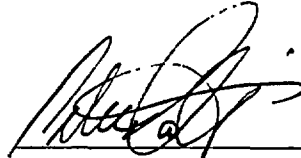
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**CERTIFICATION**

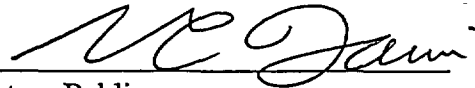
For the Answers:

I, PETER S. HASTINGS, the Manager, Licensing and Safety Analysis for Duke Cogema Stone & Webster, being duly sworn, hereby depose and say that the responses in the foregoing "Objections and Responses to Georgians Against Nuclear Energy and Blue Ridge Environmental Defense League Second Set of Interrogatories" were prepared by persons under my direction and supervision, and are true and correct to the best of my knowledge, information and belief.



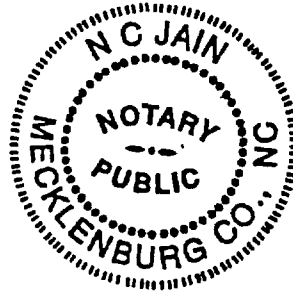
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Subscribed and sworn before me this 19th day of December, 2002.



Notary Public

My Commission Expires:  
MY COMMISSION EXPIRES NOVEMBER 25, 2006



**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD**

**Before Administrative Judges:  
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Charles N. Kelber  
Peter S. Lam**

In the Matter of	)	December 20, 2002
DUKE COGEMA STONE & WEBSTER	)	Docket No. 070-03098-ML
(Savannah River Mixed Oxide Fuel Fabrication Facility)	)	ASLBP No. 01-790-01-ML

**CERTIFICATE OF SERVICE**

I hereby certify that copies of "Duke Cogema Stone & Webster's Objections and Responses to Georgians Against Nuclear Energy and Blue Ridge Environmental Defense League Second Set of Interrogatories" were served this day upon the persons listed below:

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\* Original and 2 copies

  
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