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**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

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ATOMIC SAFETY AND LICENSING BOARD September 25, 2002 (2:28PM)

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

**OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF**

In the Matter of)

DUKE COGEMA STONE & WEBSTER)

(Savannah River Mixed Oxide Fuel
Fabrication Facility))

Docket No. 0-70-03098-ML

ASLBP No. 01-790-01-ML

**GEORGIANS AGAINST NUCLEAR ENERGY
NEW AND AMENDED CONTENTIONS
OPPOSING AUTHORIZATION FOR DUKE COGEMA STONE & WEBSTER
TO CONSTRUCT A PLUTONIUM FUEL FACTORY
AT SAVANNAH RIVER SITE**

Georgians Against Nuclear Energy (GANE) hereby submits contentions regarding Duke COGEMA Stone & Webster's Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 1 & 2 (ER) concerning the proposal by Duke COGEMA Stone & Webster (DCS) to receive a license to build a facility to manufacture reactor fuel from weapons-grade plutonium (MOX) at the Savannah River Site. Notice that the ER had been added to the MOX hearing file was provided by a letter from the NRC Staff on August 7, 2002. As discussed below, these contentions meet the NRC's standard for late-filing.

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SECY-02

Amended Contention 9. Inadequate cost-benefit analysis

This contention amends GANE's Contention 9, which was submitted on August 13, 2001. The language below is intended to substitute for the language that appeared in the original contention.

Contention: The comparison of costs provided in the ER is inadequate, because it fails to account for significant potential costs of the proposed MOX Facility.

Basis: In its original ER, DCS did not provide any analysis of the costs and benefits of the proposed MOX Facility. In Section 6, DCS has now provided some information, but it is inadequate.

DCS fails to provide any evaluation of the potential costs of accidents at the proposed MOX Facility. DCS simply assumes that they will not occur. As discussed below in Contention 14, NEPA requires consideration of all foreseeable impacts, including foreseeable low-probability accidents. Appendix G of the ER lists a number of potential accidents involving MOX waste. The ER should discuss the potential costs of such accidents. In fact, the ER does not evaluate the costs even of the bounding accident which it uses, a hydrogen explosion. Another example of such a potential accident is a red oil explosion. See Contention 14 below. The ER does not adequately address the impacts of a severe explosion, or the costs of measures that may be needed to prevent or mitigate such an explosion. NEPA also requires analysis of the cost to human health and clean-up of contamination should an accident occur. The two accidents described above, hydrogen and red oil explosions are not the only type of severe accident for which costs must be considered, other accidents are identified at pp. G-28, 29 of the ER.

Moreover, DCS has not discussed the costs that would be incurred if DCS's predictions regarding the methods to be used for waste processing and disposal do not come to fruition. For instance, the ER does not address the costs to store the MOX waste, or the costs associated with any environmental risks it may pose, if it will not be accepted at WIPP. As demonstrated below in Amended Contention 11, these risks may be considerable.

Amended Contention 11. Inadequate Discussion of Measures for Disposal of Waste

This contention amends GANE's Contention 11, which was submitted on August 13, 2001. The language below is intended to substitute for the language that appeared in the original contention.

Contention: The ER provides an inadequate discussion of the environmental impacts of the waste material generated by the proposed MOX Facility, because it fails to address the viability of proposed measures for the processing and disposal of waste that would be generated by the Facility. Therefore, it is insufficient to comply with the National Environmental Policy Act.

Basis: According to the ER, the Waste Solidification Building (WSB) is not part of the NRC-licensed MOX Facility. ER at G-1. DCS expects the Department of Energy ("DOE") to build and operate the WSB. ER at ES-3. Nevertheless, the ER generally describes a method for waste processing that will be used in the WSB. ER at 3.3.2.9, Appendix G.

According to the ER, the waste generated by the proposed MOX Facility includes high-alpha waste, which is proposed to be solidified and blended with cement to produce

a form of transuranic waste for disposal at the Waste Isolation Pilot Project (“WIPP”). ER at 3-19. However, the ER gives no indication that the Department of Energy has made any commitment to build the WSB or use the technology described in the ER or has budgeted any funds to do so; nor has the DOE prepared an Environmental Impact Statement for the WSB and its process. Moreover, the ER provides no analysis that indicates whether the form of radioactive waste that will be generated at the WSB will meet federal and state acceptance criteria for disposal at WIPP. WIPP is regulated by EPA. Neither the DOE 1996 application nor the EPA 1998 certification considered MOX waste. Therefore any MOX TRU waste would have to be certified before it could be accepted at WIPP. It has also not been established whether MOX waste would be commercial or defense waste. This is important because WIPP only accepts defense waste by Act of Congress. (Public Law 102-579, as amended by Public Law 104-201, 106 STAT 4777) Further, the State of New Mexico’s RCRA regulations do not address disposal of MOX waste. MOX waste disposal would require a Class III permit modification that will take several years, is a public process, and which decision is also open to appeal. Finally, WIPP has capacity limits that may exclude all or part of any MOX TRU waste.

The Revised ER exhibits an unexplained reduction in the volume of MOX waste proposed to be generated by the MOX facility — from 81,000 gallons to current claims of 68,898 gallons annually (ER, Table 3-3 at 3-53). The total plutonium throughput for the MOX facility increased from 36.4 tons (original ER, p. ES-2) to 37.5 tons (revised ER, p. ES-2). While the revised ER proposes to process an additional 1.1 tons of

plutonium, including impure plutonium feedstocks, the waste figures in the revised ER are some 12,000 gallons per year less than previously analyzed. *Id.* These waste figures are inconsistent with the waste stream to be expected from enhanced aqueous polishing of impure plutonium which would generate greater, not lesser, volumes of alpha-contaminated nitric acids.

In the absence of more accurate and concrete information about the prospects for building the WSB, using the processing system described in the ER, or meeting the acceptance criteria for disposal of the waste at WIPP, there is no basis for the ER's conclusion that waste disposal will have a negligible impact. ER at ES-6. GANE's concern about the lack of concrete plans for processing and disposing of the MOX Facility waste is based on bitter experience. At the moment, the Savannah River Site is host to 35,000,000 gallons of high-level liquid radioactive waste. This dangerous waste was generated in manufacturing plutonium over a period of 50 years without any firm plan, or any concern, as to how it would be ultimately disposed. Now it sits in decaying underground tanks which are beginning to leak and which pose an ever-increasing risk of leakage and contamination of the environment.¹

Under the circumstances, the ER should evaluate the costs and environmental impacts of generating radioactive waste that is neither processed nor disposed of off-site.

¹ These wastes have been extremely difficult to manage and the vitrification program to solidify the waste into a more stable form for storage at the Defense Waste Processing Facility is far behind schedule. It should be noted that MOX and its large volume of high-alpha waste compares negatively with the immobilization alternative for disposing of plutonium. Immobilization incorporates plutonium directly into the vitrification program for the existing high-level waste and is the cheaper, direct way to achieve the goal to render plutonium unavailable for nuclear weapons. *See* Contention 15 – Inadequate Discussion of Alternatives.

Contention 14. ER Fails to Address Risks of Red Oil Explosion

Contention: The ER is deficient because it fails to address the potential for a red oil explosion in the Waste Solidification Building, the environmental impacts of such an accident, or measures for avoiding or mitigating a red oil explosion. Because a red oil explosion is a credible event that may have significant impacts on the human environment, it should be addressed. 10 C.F.R. § 51.45, 42 U.S.C § 4332.

Basis: The ER identifies a red oil explosion in the High Activity Evaporator as one of several types of potential explosions in the Waste Solidification Building (“WSB”). ER at G-28. However, the ER does not address the environmental impacts of a red oil explosion. Instead, the ER lists a number of measures that are designed to keep a red oil explosion from happening. *Id.*

DCS’s unquestioning reliance on the plant design is not consistent with NEPA, because there is no indication that DCS has evaluated the reliability of the protective systems that it lists. Even low probability accidents must be considered, as long as their probability is not so low as to be remote and speculative. 40 C.F.R. § 1502.22(b)(1) (environmental impacts that must be considered in an EIS include “reasonably foreseeable” impacts which have “catastrophic consequences, even if their probability of occurrence is low”). *See also Limerick Ecology Action v. NRC*, 869 F.2d 719, 745 (3rd Cir. 1989), citing *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 551 (1978) (environmental impacts that are “remote and speculative” need not be considered). The ER gives no indication regarding the potential that these protective systems will fail.

The NRC Staff has also raised a concern about the sufficiency of DCS's systems to prevent a red oil explosion, albeit in a different part of the process. In Section 5.1.5.4 of the Draft Safety Evaluation Report, at page 5.0-28, the Staff states that:

The controlling event in the TBP-Nitrate (Red Oil) explosion class is a process related chemical explosion involving red oil formation in the AP boiler, vessel, or tank and results in loss of confinement and dispersal of nuclear materials. The applicant has determined that the consequences from this event sequences are above the 10 CFR 70.61(c) threshold for the facility worker, site worker and the public and has opted to meet the performance requirements using a strategy of prevention. The principal SSCs listed for prevention of this event are Process Safety I&C Systems to ensure that the evaporator process temperature conditions do not exceed 135 degrees C in the presence of TBP. Clarification of the system name and description in regard to process safety I&C has been requested from DCS (Reference 5.3.8, Enclosure B, page 3). In addition, the staff concludes that the red oil phenomena analysis is not complete and that PSSCs and their functions and design bases for preventing red oil explosions are not adequate for all potentially affected components. At a minimum, this applies to the following areas: purification, solvent recovery, calciner, oxalic mother liquor, acid recovery, and offgas. The staff considers the above concerns to be open items. (DSER Section 8.1.2.5.2.5).

The NRC staff has raised concerns about several other aspects of the red oil explosion risk. The Staff points out that DCS proposes an approach of a single safety control of a temperature of 275° F (135° C) which is insufficient and does not provide adequate assurances of safety. DSER Section 8.1.2.5.2.5. Extended contact between heated mixtures of TBP and nitric acid, nitrates, and/or heavy metal nitrate salts can form degradation products and intermediates (including nitrated esters and adducts) that, under certain conditions, may lead to violent exothermic reactions of potentially explosive force (References DSER 8.3.18, 8.3.31, 8.3.36, 8.3.39, and 8.3.41-8.3.43). Several explosive incidents have occurred in the U.S. (SRS in 1953 and 1975, Hanford in 1953) (DSER Reference 8.3.31., 8.3.42, and 8.3.43). The former Soviet Union has had explosions also at Tomsk-7 in 1993 (DSER Reference 8.3.9, 8.3.20 and 8.3.35).

These unresolved issues of the NRC staff confirm GANE's concern that the red oil explosion must be addressed.

Contention 15. Inadequate Discussion of Alternatives

Contention: The ER is inadequate because it does not discuss the alternative of immobilization for the 6.4 tons of impure weapons-grade plutonium which was previously analyzed to be preferred for immobilization and is now proposed to be remanufactured into MOX.

Basis: NRC regulations require that the ER must address alternatives to the proposed action. 10 C.F.R. § 51.45(b)(3). Immobilization of plutonium is an alternative that formerly was seriously pursued by the Department of Energy (DOE). DOE has now dropped its consideration of immobilization. Immobilization was dropped from the U.S. dual-track plutonium disposition program at the direction of the current Administration, for reasons unrelated to environmental protection.

Immobilization is an alternative that has significant environmental advantages over processing of plutonium into MOX. The most obvious advantage is that it permanently removes plutonium from circulation. In this era of increasing terrorist threat, that is an extremely important environmental consideration. Immobilization will also be less costly, according to National Nuclear Security Administration in its "Report to Congress: Disposition of Surplus Defense Plutonium at Savannah River Site," Tables ES-1 and 5.2. DOE concluded that immobilization "achieves full disposition of 34 MT of U.S. plutonium inventory at the lowest cost." *Id.*, p. 4-23.

One of the most significant environmental benefits of immobilization is its alleviation of the nuclear waste burden at SRS. Immobilization would support the current program at SRS to manage 35,000,000 gallons of high-level liquid radioactive waste in leaking 50-year-old tanks over the most significant aquifer in North America by vitrifying it into solid two-ton glass logs. The plutonium would be placed at the center of the logs and the heavy, lethally hot logs will effectively protect the plutonium from theft or re-use as weapons. Where MOX would generate large volumes of high-alpha waste adding to the burden, immobilization appears likely to generate far less waste. (GANE notes that the waste stream from immobilization has not been previously analyzed in any EIS or ER.)

The socio-economic benefits of immobilization also appear to outweigh any benefits from MOX. According to DOE, 2,992 jobs will be provided to construct an immobilization facility as compared to 2,150 to construct the MOX facility (1999 DOE Surplus Plutonium Disposition Environmental Impact Statement, Table 4-36 at 4-53).

NEPA's fundamental purpose is to "help public officials make decisions that are based on understanding of environmental consequences, and take decisions that protect, restore, and enhance the environment." 40 C.F.R. § 1500.1. Thus, it requires federal agencies to take an objective look at the consequences of their actions, irrespective of political considerations. NEPA is also an "action-forcing" statute, designed to "ensure that the policies and goals defined in the [National Environmental Policy] Act are infused into the ongoing programs and actions of the Federal Government." 40 C.F.R. § 1502.1. The thorough and objective analysis of environmental impacts, alternatives, and

comparative costs and benefits that is contained in an EIS ultimately may sway the public decisionmaking process. That process cannot take place if an EIS or ER avoids discussing obviously reasonable alternatives because they have been rejected for some policy reason unrelated to their environmental impacts. The ER should discuss the alternative of immobilization, and also compare its costs and benefits with those of the preferred alternative.

Contention 16. Inadequate Analysis of Plutonium Stranded by Disposition Program Changes.

Contention: Cancellation of the immobilization program has stranded several tons of plutonium covered by the U.S.-Russian Agreement without a disposition path. MOX is under analysis to be the sole disposition path for the nation's surplus plutonium.

Therefore environmental impacts of this significant gap in the MOX program should have been analyzed in the ER as required under NEPA.

Basis: The evaluation of the MOX option must consider the disposition of plutonium previously designated for immobilization that has been "stranded" by cancellation of the immobilization program. Cancellation of the immobilization program has stranded at least two MT of plutonium of the 34 MT covered by the U.S.-Russian Agreement and nominally to be converted to MOX without a disposition path, since DOE has said that the material is too difficult to convert to a form suitable for MOX fabrication. In addition, at least eight MT of surplus warhead plutonium previously designated for immobilization but not covered by the U.S.-Russian Agreement has also been stranded. The environmental and security risks posed by this weapons-grade material, orphaned in

the recent programmatic change, must be fully evaluated in considering the MOX alternative.

It would seem to be the responsibility of DOE to address this issue by performing a supplemental EIS for its plutonium disposition program. However, there is no indication that DOE intends to address this large gap in NEPA analysis which falls within the scope of the MOX program. There is great potential harm to the public for the construction authorization process of a massive undertaking such as the MOX fabrication facility to move forward with unanswered questions about several tons of weapons-grade plutonium that are included in the program but yet are not planned for processing into MOX, or indeed, for any processing whatsoever. Environmental impacts from various potential fates of the orphaned plutonium must be evaluated under NEPA. One of NEPA's express purposes is to protect the public from such gaps as the orphaned plutonium presents. Otherwise, absent NEPA, such gaps are likely to be overlooked in a complex effort, such as MOX, which requires coordination of several segments and multiple federal agencies.

Contention 17. Inadequate Analysis of MOX Production Rate and Reactor Availability.

Contention: Additional reactors required to process 3.5 MT of plutonium per year have not been identified and committed to the MOX plan. The environmental impacts of the eventuality of MOX output exceeding reactor usage and fresh MOX fuel containing weapons-grade plutonium accumulating at SRS including alternatives for coping with

this problem must be analyzed to fulfill NEPA requirements that all foreseeable environmental impacts must be analyzed.

Basis: Additional reactors are to be included in the MOX program to accommodate the increased rate of plutonium disposition called for in DOE's revised disposition strategy. Report to Congress: Disposition of Surplus Defense Plutonium at Savannah River Site, National Nuclear Security Administration, February 15, 2002, p. 5-10. At least three additional reactors, rather than the two reactors that DOE has said would be sufficient, will be required to dispose of 3.5 MT of plutonium per year. NCI Comments on the Revision of the NRC's Draft EIS on the Proposed Mixed Oxide Fuel Fabrication Facility to Accommodate Plutonium Disposition Program Changes, August 30, 2002. The additional reactors are needed to avoid an increase in the MOX core fraction above the 40% now planned. There is a distinct possibility that DOE will not be able to locate any additional reactors willing to accept the costs and risks of MOX use. In such an eventuality, the increased disposition rates required by the addition of 6.4 tons of impure plutonium to the MOX program could only be accomplished by increasing the MOX core fraction above 40% in the four Catawba and McGuire reactors currently committed to the project.

The ER fails to address these new situations and attendant environmental risks presented by the increased output goal of the MOX factory as a result of DOE changes to the plutonium disposition program. Not only is it required to analyze the environmental and security risks posed by accumulating a backlog of unused MOX fuel containing weapons-grade plutonium at SRS — contrary to the stated non-proliferation goals of the

MOX program — but alternatives to sufficient reactors to use MOX fuel must be analyzed.

One such alternative which must be contemplated is increasing the MOX core fraction from 40%. That pathway must be considered in light of the additional public health and environmental risks posed by the substitution of MOX fuel for uranium fuel in light-water reactors which have been well documented but have not been adequately considered in any environmental documentation to date on the U.S. plutonium disposition program. E. Lyman, "Public Health Risks of Substituting Mixed-Oxide for Uranium Fuel in Pressurized-Water Reactors," *Science and Global Security* 9 (1) 33-79.

Increasing the MOX core fraction is a risky alternative to committing sufficient reactors for MOX. New information has recently come to light that suggests that the additional risks posed by MOX fuel compared to uranium fuel are even greater than previously assumed. During the recent NRC expert elicitation exercise on accident source terms from MOX fuel, some expert panel members were of the opinion that available experimental data indicates that "higher in-vessel releases (and faster rates of releases) are expected for MOX fuels as compared with LEU fuels." Accident Source Terms for Light-Water Nuclear Power Plants: High-Burnup and Mixed Oxide Fuels, draft, ERI/NRC 02-202, March 2002, p. 50. This observation, if validated, means that MOX source terms pose greater radiological risks than uranium source terms not only with respect to radionuclide inventories, but also with respect to the magnitude and timing of releases. In addition, the uncertainties in low-volatile release fractions associated with MOX fuel are very high as a result of a lack of experimental data. This

information must be considered in contemplating increasing the MOX core fraction if new reactors are never identified for MOX.

For the reasons stated above, the environmental impacts from unused MOX fuel backing up at SRS because of lack of reactor availability to load the material must be analyzed. Other impacts may also result from this lop-sided situation including newly identified risks of using MOX fuel in reactors coupled with the possibility of attempting to load greater-than-40% MOX cores. All these problems raise questions which must be analyzed prior to authorizing construction to build a MOX fuel factory at SRS.

THESE CONTENTIONS SATISFY THE LATE-FILED CONTENTION STANDARD.

The contentions described above satisfy the NRC's standards for late-filed contentions in 10 C.F.R. § (a)(1)(i)-(v). First, GANE has good cause for filing late. In its Memorandum and Order of February 12, 2002, the Licensing Board stated that contentions will be considered to presumptively meet the good cause requirement if they are filed within 30 days of the issuance of a document. GANE meets this requirement. The contentions are based on the revised ER, which was not available at the time that GANE filed its original contentions in August of 2001. GANE learned of the availability of the ER through a letter from the NRC Staff, dated August 27, 2002. The letter was served by first-class mail, and was not sent electronically. GANE has filed these contentions within 35 days of the issuance of notice by the NRC Staff (30 days plus five for first-class mailing.)

GANE also satisfies the other four elements of the late-filing standard. Aside from this proceeding, GANE has no means for protecting their interest in a full and fair environmental analysis of the application for the proposed MOX Facility. In addition, GANE's participation may reasonably be expected to assist in the development of a sound record. GANE is being advised in this proceeding by Dr. Edwin Lyman of the Nuclear Control Institute, and hopes to present testimony by Dr. Lyman. Dr. Lyman is a highly qualified expert on the issue of plutonium disposition. In addition, GANE's contentions present legal issues of significant import, on which it has the assistance of its legal advisor, Diane Curran.

CONCLUSION

For the foregoing reasons, the ASLB should admit GANE's new and amended contentions.

Respectfully submitted,



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Dated September 11, 2002
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² This pleading was prepared with substantial assistance from GANE's legal adviser, Diane Curran.

CERTIFICATE OF SERVICE
by Georgians Against Nuclear Energy
(Docket # 70-3098, ASLBP # 01-790-01-ML)

I hereby certify that Georgians Against Nuclear Energy's New and Amended Contentions
Opposing Authorization for Duke COGEMA Stone & Webster to Construct a Plutonium
Fuel Factory at Savannah River Site was e-mailed to the following with hard copies
served by First Class U.S. Mail.

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