

December 2, 2003

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

Docket No's. 50-413-OLA,
50-414-OLA

DUKE ENERGY CORPORATION

(Catawba Nuclear Station, Units 1 and 2)

**BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE'S
SECOND SUPPLEMENTAL PETITION TO INTERVENE**

I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.714, Blue Ridge Environmental Defense League ("BREDL") hereby amends its Supplemental Petition to Intervene to set forth late-filed Contentions 10, 11, 12, regarding Duke Energy Corporation's ("Duke's") application for a license amendment to allow the use of plutonium Mixed Oxide ("MOX") Lead Test Assemblies ("LTAs") at the Catawba nuclear power plant. Letter from M.S. Tuckman, Duke Power, to U.S. NRC, re: Proposed Amendments to the Facility Operating License and Technical Specifications to Allow Insertion of Mixed Oxide (MOX) Fuel Lead Assemblies and Request for Exemption from Certain Regulations in 10 CFR Part 50 (February 27, 2003) (hereinafter "License Amendment Application").

This Second Supplemental Petition to Intervene amends Blue Ridge Environmental Defense League's Supplemental Petition to Intervene (October 21, 2003) (hereinafter "First Supplemental Petition to Intervene").

Contentions 10 and 11 assert that Duke has failed to address the implications of plutonium MOX fuel characteristics on its analyses of design basis accidents and severe accidents. Contention 12 asserts that the implications of plutonium MOX fuel characteristics should be considered in the Environmental Report. Contention 13 asserts that environmental analyses prepared by the U.S. Department of Energy (“DOE”) with respect to the impacts of shipping plutonium to France and back are inadequate because they fail to consider the new information and significantly changed circumstances in the aftermath of the terrorist attacks of September 11, 2001. The contentions are supported by the attached Declaration of Dr. Edwin S. Lyman In Support of BREDL Contentions 10 Through 13 (December 1, 2003).

As discussed below in Section III, these contentions satisfy a balancing of the NRC’s late-filing criteria.

II. CONTENTIONS

The late-filed contentions fall into two categories: safety issues under the Atomic Energy Act and its implementing regulations, and environmental issues under the National Environmental Policy Act. The numbering of the contentions follows consecutively on the numbering of the contentions submitted by BREDL in its initial hearing request.

A. Safety Issues Under Atomic Energy Act And Implementing Regulations

Contention 10: Failure to account for uncertainties in MOX fuel assembly behavior during Loss of Coolant Accidents.

Duke's safety analysis for design-basis loss-of-coolant accidents ("LOCAs") in Section 3.7 of the LTA license amendment application is inadequate, because it fails to account for uncertainties in the technical understanding of the behavior of MOX fuel during LOCAs that may lead to significant deviations from low-enriched uranium ("LEU") fuel behavior.

Basis: In Section 3.7.1, Duke presents a deterministic analysis of the impacts of MOX fuel lead assemblies on LOCA analyses. According to Section 3.7.1, "MOX fuel phenomena that have the potential to affect LOCA results are addressed in Section 3.7.1.1." *Id.* at 3-20. The discussion in Section 3.7.1.1, however, does not include consideration of the fact that the experimental database for MOX fuel performance during LOCAs is woefully inadequate. As a result, there are uncertainties in aspects of MOX fuel behavior that may have a significant impact on Duke's LOCA analysis for the Catawba core with four plutonium MOX LTAs.

In a recent presentation to NRC staff, officials from the French safety authority Institut de Radioprotection et de Sûreté Nucléaire ("IRSN") proposed a series of tests at the Phébus experimental reactor to close gaps in the experimental database for both MOX fuel and high-burnup LEU. *See* slides presented by A. Mailliat and J.C. Mélis, IRSN, at "PHEBUS STLOC Meeting" with NRC Staff (October 23, 2003). A copy of a printout of the slides is attached. The fact that French safety authorities believe that these tests are necessary is highly significant, given NRC's dependence on foreign MOX data (or lack thereof) in evaluating MOX-related submittals.

The IRSN presentation points out that plutonium MOX fuel relocation has been observed at a lower temperature than LEU fuel relocation (stated at the meeting to be

200°C -300°C lower), i.e., that during a LOCA, the MOX fuel pellet column collapses into the lower part of the fuel rod sooner than LEU fuel. *Id.* at 6. This would increase power and negatively affect heat transfer, with a deleterious impact on important LOCA parameters. These parameters include increases in peak clad temperature (PCT) (stated at the meeting to be 100°C higher), clad oxidation (stated at the meeting to be a 5%-10% increase in the oxide layer) and clad hydrogen uptake. IRSN further pointed out that “this question is particularly important for end-of-life MOX fuel where power generation is not reduced, unlike for UO₂ fuel.” *Id.* at 21.

The IRSN presentation further points out that modern, low-tin, high ductility cladding materials, such as the M5 cladding that will be used in the MOX LTAs, will form bigger “balloons” than conventional Zircaloy and are likely to have higher blockage ratios. *Id.* at 24-25. This effect, combined with MOX-specific behavior, cannot be fully assessed in the absence of the integral LOCA MOX fuel-bundle tests that IRSN is proposing. Thus there is insufficient information to provide confidence that the MOX LTAs will not cause coolant blockage during a LOCA that could lead to an unacceptable loss of core coolable geometry and an uncontrolled core melt.

Because of these unknowns regarding the behavior of MOX fuel during a LOCA, Duke lacks a factual basis for assuring that the existing emergency core cooling systems at Catawba will meet the acceptance criteria in 10 CFR 50.46. Accordingly, the application should be denied.

Contention 11: Failure to consider uncertainties in MOX fuel assembly behavior on the probabilities and consequences of severe accidents.

Duke's analysis of the impact of the plutonium MOX LTAs on the probabilities and consequences of severe accidents is inadequate, because it fails to account for uncertainties in the technical understanding of the behavior of MOX fuel during severe accidents that may lead to significant deviations from low-enriched uranium ("LEU") fuel behavior.

Basis: In Section 3.8 of the license amendment application, Duke asserts the following:

Duke uses probabilistic risk assessment (PRA) analyses to evaluate the risk to public health and safety due to operation of its nuclear plants. PRA analyses quantify the probability and consequences of severe accidents that involve core melt and containment failure events. Key considerations in PRA analyses are equipment requirements to prevent core melt (success criteria); ice melt times, containment pressurization rates, and potential containment failures (containment performance); and doses to the public (offsite consequences). The attributes of MOX fuel that impact these areas are fundamentally similar to uranium fuel . . .

Id. at 3-36. The discussion in Section 3.8, however, does not include consideration of the fact that the experimental database for MOX fuel performance during severe accidents is woefully inadequate. As a result, there are uncertainties in aspects of MOX fuel behavior that may have a significant impact on Duke's risk analysis for the Catawba core with four plutonium MOX LTAs.

Another part of the IRSN Phébus proposal presented to NRC at the October 23 meeting was a plan to address uncertainties in the behavior of MOX fuel during severe accidents. *Id.* at 6. Phenomena that could affect the probabilities of severe accidents include the poorer performance of MOX fuel during a LOCA compared to LEU fuel, which could increase the chance that the accident cannot be mitigated, as discussed in the basis of Contention 10. Phenomena that could affect the consequences of severe

accidents include both higher release rates and higher release fractions for both fission products and actinides compared to LEU, as a result of the MOX fuel microstructure and different oxidation potential. *Id.* at 6.

As discussed above, the use of plutonium MOX fuel at the Catawba nuclear plant appears to pose a risk that plant safety systems will not be adequate to stop a LOCA from progressing to a core melt. At a minimum, the different characteristics of MOX fuel and LEU raise substantial uncertainties with respect to the probabilities and consequences of severe accidents for the MOX LTA core. Because of the potential for a significant increase in severe accident risk, these uncertainties should be fully analyzed in Duke's MOX LTA license amendment request.

B. Issues Under National Environmental Policy Act

Contention 12: Failure to consider effects of plutonium MOX fuel characteristics on severe accident potential.

Basis: As discussed above in Contentions 10 and 11, plutonium MOX fuel has characteristics that may affect the potential for and consequences of a LOCA or severe accident. The bases of these contentions are hereby adopted and incorporated by reference into this contention.

In Section 5.6.3.1 of its Environmental Report, Duke addresses the environmental impacts of design basis accidents. License Amendment Application at 5-8. In Section 5.6.3.2, Duke addresses the environmental impacts of severe accidents. *Id.* at 5-8 - 5-9. Neither section discusses the susceptibility of plutonium MOX fuel to slumping during a LOCA or the adverse effect that slumped fuel may have on the ability of the safety

injection system to cool the entire core. The Environmental Report should address the significance of these characteristics with respect to the potential for and consequences of a design basis accident or severe accident.

Contention 13: Failure to adequately address environmental impacts of plutonium shipments

Duke's license amendment application must be rejected because it is not supported by an adequate analysis of the security-related environmental impacts of shipping plutonium oxide to France, or the security-related impacts of shipping the LTAs from France back to the United States.

Basis: In Sections 5.3.2 and 5.3.4 of the license amendment application, Duke concedes that shipment of polished PuO₂ powder to France, and the return shipment of MOX fuel lead assemblies to the United States, are related actions whose environmental impacts must be considered. *Id.* at 5-3. Rather than providing such an analysis, Duke states that the analysis will be prepared by the DOE. *Id.* at 5-3. BREDL's Contention 8 challenged Duke's failure to address these impacts. *See* Petition to Intervene at 15.

In its November 11, 2003, response to Contention 8, Duke asserted that the DOE has "addressed the transportation question" in two documents: the 1996 Programmatic Environmental Impact Statement for Storage and Disposition of Weapons-Usable Fissile Materials (DOE/ES-229) (hereinafter "Storage and Disposition PEIS"); and DOE's November 2003 Supplemental Analysis, Fabrication of Mixed Oxide Fuel Lead Assemblies in Europe (DOE/EIS-0229-SA3) (hereinafter "Supplemental Analysis").

For a number of reasons, the 1996 Storage and the Supplemental Analysis are completely inadequate to support the shipment of plutonium to and from France. First,

the Supplemental Analysis does not address the existence of significantly changed circumstances since 1996, which cast grave doubt on the wisdom of overseas plutonium shipments. The 1996 Storage and Disposition PEIS predates the terrorist attacks of September 11, 2001, on the World Trade Center and the Pentagon. The September 11, 2001, attacks graphically demonstrated that the potential for terrorist attacks on U.S. facilities is far greater and more lethal than previously thought. Moreover, the measures that have been taken in response represent a sea change in the way the U.S. government views the threat of terrorist attacks and the importance of measures to address it. The federal government has reorganized and devoted enormous amounts of resources to identifying vulnerabilities in nuclear facilities and protecting against the terrorist threat. The NRC has also upgraded the licenses of every operating nuclear power plant and Category I facility in the United States to provide improved security measures. As summarized by then-Chairman Richard Meserve, security has become a “central concern” in the aftermath of these attacks, posing a significant challenge to the federal government. Speech by Dr. Richard A. Meserve at INFOCASE Conference (September 11, 2002).

Without any doubt, the events of September 11, 2001, the lessons learned from them, and the federal government’s response to those events, constitute the type of “significant new circumstances or information” that warrant revision and republication of the 1996 and 1999 draft EISs for public comment. *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 374 (1989). *See also Warm Springs Dam Task Force v. Gribble*, 621 F.2d 1017, 1023-24 (9th Cir. 1980); *Friends of the Clearwater v. Dombeck*, 222 F.3d 552, 558 (9th Cir. 2000).

There are a number of alternatives and mitigative measures that demand serious consideration in a newly issued EIS regarding disposition of weapons-grade materials. First, should the risk be mitigated by upgrading the outdated international standard for protection of plutonium under export licenses? Second, how can the potential for terrorist attacks be re-evaluated in light of what we now know about the motives and practices of terrorists? Third, how might the consequences of such attacks be affected by deliberate attempts to exacerbate the adverse effects of a plutonium release, for instance by causing a fire or explosion sufficient to reduce plutonium particles to an extremely fine size? It is woefully insufficient to merely cross-reference the DOE's discussion of accident impacts in the 1996 Storage and Disposition PEIS and 1999 SPDEIS.

Finally, the new information and changed circumstances that have come about since September 11, 2001, unequivocally call for reconsideration of the option of postponing fabrication of the plutonium MOX LTAs until the proposed MOX fabrication facility at the Savannah River Site is built. At the time the 1996 Storage and Disposition PEIS was prepared, the DOE did not give serious consideration to this alternative because it would delay the use of plutonium MOX fuel in nuclear plants. *See* Record of Decision for the Surplus Plutonium Disposition Final Environmental Impact Statement, 65 Fed. Reg. 1,608, 1,612 (January 11, 2000) (explaining that LTA fabrication at Los Alamos National Laboratory is the "preferred alternative" because infrastructure already exists). DOE's concerns about timeliness must now be balanced against the new concerns that have arisen since September 11, 2001, over the risks of (a) sending plutonium across the ocean in vessels with questionable security measures, (b) to a country whose measures for safeguarding the plutonium are shrouded in secrecy, (c) under international security

standards that are grossly outdated. Moreover, anticipated delays in carrying out the parallel U.S.-Russian MOX programs reduce any pressure on DOE to have the MOX LTAs manufactured in Europe on a rapid timeline.

Accordingly, these issues must be addressed in a new EIS for the disposition of weapons grade fissile material. Moreover, the EIS must be published in draft form, so that members of the public can be involved in the decision-making process.

II. THESE CONTENTIONS SATISFY A BALANCING OF THE NRC'S LATE-FILING CRITERIA.

These contentions satisfy a balancing of the NRC's late-filing criteria in 10 C.F.R. § (a)(1)(i)-(v). First, BREDL has good cause for filing late. Contentions 10, 11, and 12 are based on a slide presentation that was made at a meeting between IRSN and the NRC Staff on October 23, 2003. The slides were not available at the meeting, and were not placed in the NRC's CITRIX system until November 4, 2003. Contention 13 is based on the DOE's Supplemental Analysis, which was not provided to BREDL until November 11, 2003. Therefore, all the contentions are being filed within 30 days of receipt of the documents on which they are based.

BREDL also satisfies the other four elements of the late-filing standard. Aside from this proceeding, BREDL has no means of protecting its interest in ensuring that the testing of plutonium MOX lead test assemblies is conducted in a manner that adequately protects health and safety and complies with the environmental safeguards of NEPA. In addition, BREDL's participation in the proceeding may reasonably be expected to assist in the development of a sound record. BREDL will be presenting the views of Dr. Lyman, a highly qualified expert who has extensive experience regarding nuclear power

plant safety, environmental and security analyses. Moreover, there are no other parties who can represent BREDL's interests in this proceeding. Finally, while granting a hearing on BREDL's supplemental contentions may broaden the proceeding somewhat, these effects will not be unreasonable, given that the contentions are being filed early in the proceeding. Accordingly, a balancing of the late-filing factors favors the admission of the contentions.

IV. CONCLUSION

For the foregoing reasons, the ASLB should admit Contentions 10 through 13.

Respectfully submitted,

Diane Curran
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.
1726 M Street N.W., Suite 600
Washington, D.C. 20036
202/328-3500
e-mail: dcurran@harmoncurran.com

December 2, 2003