

BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE

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December 15, 2004

Nils J. Diaz, Chairman
Nuclear Regulatory Commission
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

**Re: Predecisional Enforcement Conference with Duke Energy Corporation
Docket Nos. 50-413 and 50-414**

Dear Mr. Diaz:

On behalf of the Blue Ridge Environmental Defense League (BREDL), I write to request that the Nuclear Regulatory Commission deny Duke Energy's request to test plutonium fuel and halt all plutonium fuel decision making until correct information can be evaluated. Also, the testing of two different, unpredictable fuels in the same nuclear reactor at the same time is unacceptable; we ask the Commission to prohibit such testing. Finally, the NRC's security regime for the plutonium fuel program should be strengthened, not riven with loopholes.

We understand that Duke Energy Corporation has apparently violated federal laws by underestimating radiation dose to the public and by failing to disclose plans to test yet another new experimental nuclear fuel, so-called Next Generation Fuel, at the Catawba Nuclear Station located in Rock Hill, South Carolina. NRC Inspection Report No. 05000413,414/2004010 dated November 3, 2004 details three apparent violations: two in which Duke's license request for plutonium/MOX fuel was incomplete and inaccurate and one in which Duke failed to provide updated information to the Nuclear Regulatory Commission. The Commission has scheduled a Predecisional Enforcement Conference on December 17th to discuss these violations and to obtain further information.

As you know, Duke Energy submitted a license amendment request on February 27, 2003 (LAR) to test plutonium fuel lead test assemblies (LTA), also known as MOX, at its Catawba Unit 1 reactor. Apparently, Duke based its accident scenarios for plutonium testing on outdated radiation dose information. This is a violation of federal regulations and, because of this error, Duke's submissions to NRC incorrectly estimate radiation dose to the public during an accidental release from the nuclear reactor core. Finally, Duke failed to submit an obligatory safety update which contributed to the errors in its license amendment request for plutonium fuel. The NRC must determine why the company's engineers used the wrong table from the Catawba safety analysis report. These transgressions and other errors warrant an NRC decision to prohibit the plan to test plutonium fuel at Catawba.

In addition to testing plutonium fuel, Duke wants to test Next Generation Fuel (NGF) manufactured by Westinghouse in the same reactor simultaneously. However, Duke failed to disclose this fact in their LAR for plutonium fuel, rendering the LTA LAR application incomplete and its conclusions inaccurate. At issue are peak temperature estimates in the reactor leading to core meltdown.

The Nuclear Regulatory Commission addressed these three apparent violations (AV) in a letter to Duke's Catawba Site Vice President on November 3rd. The letter states:

In the first AV, DEC's [Duke Energy Corporation's] February 27, 2003 license amendment request and supplements were not complete and accurate, in that the submittals failed to identify that the reactor core would also include eight NGF LTAs as part of the complete core loading of 193 fuel assemblies. In the second, DEC's February 27, 2003 submittal and supplements used inaccurate radiation dose information for the proposed reactor core composition. This information was material to the NRC in that, as part of the license amendment review, substantial further inquiry by the NRC was necessary to review the acceptability of the thermal-hydraulic conditions, mechanical design, and radiation doses for the actual intended core composition. The third AV involves DEC's failure to periodically update Table 15-14 of the USFAR, based on changes that have been made in the facility.

The letter also spells out the terms of the enforcement conference scheduled for December 17th at NRC Headquarters in Rockville, Maryland.

Duke Energy Violations of Federal Nuclear Power Plant Regulations

Failure to Provide Complete and Accurate Information Involving MOX Amendment Fuel Assemblies, AV 05000413,414/2004010-01

Duke proposes to test two types of experimental nuclear fuel in the same reactor at the same time. In addition to testing plutonium/mixed oxide fuel, Duke plans to test NGF, or next generation fuel, in Catawba Unit 1. However, Duke failed to disclose this in their February 2003 license amendment request to use plutonium fuel or in subsequent documents as required by 10 CFR 50.9. NRC did not discover the omission until April 2004. Therefore, Duke's is in violation of federal regulations because its license request is incomplete and its conclusions inaccurate.

On May 14, 2004 the Nuclear Regulatory Commission met with Duke Energy to discuss plutonium/MOX fuel tests and NGF. At the meeting in Charlotte, BREDL raised questions about the proposed simultaneous testing of plutonium/MOX fuel and Next Generation Fuel which is produced by Westinghouse. Issues raised include power peaking factors, hydraulic performance, and exclusion zones for NGF and MOX fuel assemblies.

For over a year BREDL has challenged the safety and predictability of Duke Energy's plan to test plutonium fuel at its Catawba nuclear station. We maintain that Duke's plan is inadequate because experimental data reveal that plutonium/MOX fuel rods may rupture during a serious accident, leading to core meltdown. BREDL's safety concerns are based on evidence that plutonium fuel rods fail at far lower temperatures 400 to 570 degrees-F lower than conventional

uranium fuel rods. The metal sheath, or cladding, which holds the fuel rod together forms “balloons” which block cooling water, leading to an uncontrolled core meltdown.

The French safety authority Institut de Radioprotection et de Sûreté Nucléaire (IRSN) has demonstrated that during a loss of coolant accident (LOCA), MOX fuel pellet columns collapse into the lower part of the fuel rod sooner than LEU fuel, which is called fuel relocation. The IRSN data indicates that M5 fuel rod cladding which would be used during the plutonium/MOX tests at Catawba would not perform as well as conventional Zircaloy cladding. More severe ballooning and the resultant change on core geometry, reduce coolant flow during a loss of coolant accident. The IRSN has presented these data to the NRC.

The debate about fuel rod failure centers on peak cladding temperature (PCT) estimates during a LOCA. In testimony before the NRC judges in support of BREDL contentions, Dr. Edwin Lyman of the Union of Concerned Scientists argued that Duke’s lead test assembly license amendment request (LTA LAR) lacks experimental support. Dr. Lyman showed that Duke’s estimates of PCT were too low. He said, “According to the MOX LTA LAR at 3-43, the peak temperature at the hot pin rupture location is 1841 degrees-F. If the 313 degree-F increase in clad temperatures associated with fuel relocation...is added to this value, the resulting clad temperature at the rupture location is 2154 degrees-F. From Figure 11 in Duke’s testimony, the PCT in a rod where relocation occurs appears to be about 20 degrees-F greater than the maximum temperature at the rupture location. Therefore, the peak clad temperature associated with an LEU rod with a 0.7 filling ratio due to relocation could be as high as 2174 degrees-F a value with substantially less margin to the 10 CFR 50.46 limit. Consideration of additional MOX effects, such as greater filling ratio, could shrink this margin even further.” [Rebuttal Testimony of Dr. Edwin S. Lyman Regarding BREDL Contention I, Docket Nos. 50-413-OLA, 50-414-OLA, July 8, 2004, page 2]

The margin of safety at Catawba during plutonium/MOX fuel tests may be further reduced or eliminated with the simultaneous introduction of NGF. Duke Energy submitted responses to NRC’s request for additional information regarding Next Generation Fuel in which the company estimated a peak cladding temperature increase of 111 degrees-F above that for conventional LEU fuel [Duke Energy Response to Request for Additional Information, Docket Nos. 50-413, 50-414, June 17, 2004, page 6]. (see Appendix A) Federal regulations for emergency core cooling systems prohibit a calculated peak cladding temperature in excess of 2200 degrees-F [10 CFR 50.46(b)(1)].

Failure to Provide Complete and Accurate Information Involving MOX Amendment Dose Calculations, AV 05000413,414/2004010-02

Duke Energy submitted its license amendment request for plutonium fuel based on outdated information on radiation dosages expected during a design basis accident [DBA]. Duke engineers used the wrong table from the Catawba Updated Final Safety Analysis Report (UFSAR). This is a violation of federal regulations under 10 CFR 50.9 and, because of this error, Duke’s February 2003 license amendment request to use plutonium fuel incorrectly estimates radiation dose to the public during an accidental release from the nuclear reactor core.

Failure to Update the FSAR Involving Dose Calculations, AV 05000413,414/2004010-03

During a previous license amendment to the operating license for Catawba Unit One (the plant slated for plutonium fuel tests), outdated radiation dose calculations were revised by Duke to reflect more accurate exposure levels. Federal regulations [10 CFR 50.71(e)] require nuclear plant operators to update their Safety Analysis Reports, such as Catawba's UFSAR. Duke failed to submit the obligatory update which may account for the errors in its 2003 license amendment request for plutonium fuel.

Security Issues Regarding Catawba and Plutonium Fuel

BREDL submitted to the NRC security contention number V which was admitted by Atomic Safety Licensing Board. Our contention states:

Duke has failed to show, under 10 C.F.R. §§ 11.9 and 73.5, that the requested exemptions from 10 C.F.R. § 73.46, subsections (c)(1); (h)(3) and (b)(3)-(12); and (d)(9) are authorized by law, will not constitute an undue risk to the common defense and security, and otherwise would be consistent with law and in the public interest. [LBP-04-10, 59 NRC 296, 352 (2004)]

For the last year BREDL has been forced to run a legal gauntlet, attempting to gain access to necessary documents to make our case. Critical documents regarding Category I facility design basis threat (DBT) are still being withheld, even though our technical expert and our attorney have submitted to and complied with all required security measures. Meanwhile, Duke seeks exemptions from post-9/11 security requirements.

On December 8, 2004 the Nuclear Regulatory Commission denied BREDL's motion requesting access to classified documents regarding the protection of Category I facilities. The Commission's ruling is related to the request by Duke Energy to exempt Catawba Nuclear Power Station from regulations for Category I facilities. According to the NRC, Category I sites must be protected against radiological sabotage or theft because they possess Strategic Special Nuclear Material (SSNM) such as 2 kilograms or more of plutonium. Duke's Catawba nuclear station would contain 80 kilograms of plutonium during the proposed plutonium/MOX fuel tests scheduled to begin in 2006.

The exemptions would set a dangerous precedent. According to Dr. Edwin Lyman, "NRC is on the verge of approving a required level of protection of un-irradiated MOX fuel that is far weaker than the stored weapons standard recommended by the National Academy of Sciences in 1993."

BREDL contends that the security measures proposed by the Commission are inadequate and that Duke will not be able to defend the plutonium fuel if the exemptions are granted. Further, the NRC is attempting to sidestep the law by creating a special category for plutonium fuel without a formal rulemaking. The Commission may be on the verge of a colossal blunder which would have consequences for the nation, indeed the whole world.

Mr. Diaz, I live about a hundred miles from Duke's McGuire nuclear power plant which has two of the reactors scheduled to use plutonium fuel. Duke's license amendment request to test weapons-grade plutonium in its nuclear fuel at the Catawba plant affects me, my family, and thousands of our members in North Carolina and South Carolina.

I plan to attend the Predecisional Enforcement Conference this Friday at NRC headquarters in Rockville, Maryland. I would appreciate an opportunity to address the Commission before the meeting is adjourned.

Respectfully submitted,

Louis A Zeller
December 15, 2004

Attachment

Appendix A

Further specific RAIs:

- a. What is the differential peak cladding temperature (ΔPCT) for RFA vs. NGF?

Response

A large break loss of coolant accident (LOCA) sensitivity case was performed using the reference transient described in the Catawba Updated Final Safety Analysis Report (UFSAR).

The impact of a NGF assembly on core PCT was calculated by comparing (i) the PCT in a core consisting of one NGF assembly (the hot assembly) co-resident with RFA fuel with (ii) the PCT for a core composed of all RFA fuel. Assuming the same peaking factors, an increase in PCT of 111°F was calculated for the NGF assembly. To offset this potential increase in PCT, peaking factor penalties were developed to lower the expected PCT. The development of the peaking penalties is discussed below.

A second NGF LTA sensitivity case was performed which reduced the LTA peaking factors F_Q , $F_{\Delta H}$, and the hot assembly peaking (P_{HA}) by 5% to assess reduction in PCT attributable to a reduction in peaking. The PCT decreased by 198°F for this case. Based on these sensitivity cases, a peaking penalty of 2.8% is required to offset the increase in PCT caused by the insertion of the NGF assemblies. Based on prior calculations it was also determined that a reduction of 3.2% in only the $F_{\Delta H}$ and P_{HA} values is equivalent to the 2.8% reduction in all three peaking factors (F_Q , $F_{\Delta H}$, and P_{HA}). This 3.2% penalty was used in the C1C15 reload analysis.