ANTI-PLUTONIUM CAMPAIGN WINS CONCESSIONS
A REPORT BY THE BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE

On March 10, 2005 the three judge panel of the Atomic Safety and Licensing Board of the U.S Nuclear Regulatory Commission issued its final decision on the Blue Ridge Environmental Defense League's legal challenge to Duke Power's request to amend its operating license to test plutonium fuel at the Catawba nuclear power station. We are grateful for the expert technical consultation provided by Dr. Edwin Lyman of the Union of Concerned Scientists. Our attorney in this action is Diane Curran whose experience in nuclear issues was critical.

In its application to amend its operating license at Catawba, Duke requested exemptions from post-9/11 federal requirements designed to protect plutonium and other nuclear materials from theft or sabotage. The ASLB judges granted the exemption but determined that some Category I security requirements do apply to plutonium fuel tests at the Catawba plant and that Duke must comply. As a result of the League's legal intervention, the ruling imposes four conditions that Duke is required to meet before it can receive the fuel at Catawba. They are:

1. Duke shall modify its security procedures regarding plutonium fuel.

2. Duke must demonstrate its ability to counter an attempt at theft of plutonium fuel by undertaking tabletop and force-on-force exercises.

3. Duke must upgrade its security monitoring procedures during acceptance of plutonium fuel.

4. Duke must establish and have in place all procedures identified during the intervention hearings for accepting the plutonium fuel. These measures include coordinating transfer of plutonium fuel from DOE, coordinating with local law enforcement agencies and ensuring that armed responders are dedicated to the protection of the plutonium fuel.

The plutonium fuel tests necessitate the insertion of four *lead test assemblies* (LTA) into the Catawba reactor for at least two fuel cycles. Duke sought to exempt Catawba Nuclear Power Station from the regulations for Category I facilities which have *special strategic nuclear materials* such as 2 kilograms or more of plutonium. Duke's Catawba nuclear station would contain 80 kilograms of plutonium during the proposed plutonium fuel tests.

The particular regulations which Duke objected to involve worker security clearances, access and search provisions, physical protection barriers, and tactical team response capabilities [Federal Regulations 10 C.F.R. §§ 11.11(b), 10 C.F.R. §§ 73.46(d)(9), 10 C.F.R. §§ 73.46(c)(1), 10 C.F.R. §§ 73.46(h)(3) and (b)(3-12), respectively] According

to federal regulations, such exemptions cannot be granted unless they will not constitute an undue risk to the common defense and security, nor endanger life or property. The benchmark for such a determination is the *design basis threat* (DBT); that is, the conceivable theft, diversion, or sabotage which the owner-operator of a nuclear facility must be prepared to defend against. Standard nuclear power stations must meet one such standard, but a higher standard is required for facilities which handle Category I quantities of special strategic nuclear materials.

Duke and the NRC staff attempted to justify the exemption by asserting, among other things, that lead test assemblies weighing 1500 pounds were simply too unwieldy for terrorists to handle. The ASLB judges wrote:

> The relative attractiveness of the MOX LTAs has been a central argument of Duke and the Staff as to why the level of protection for them need not be as stringent as those for other NRC Category I SSNM, such as that found in fuel fabrication facilities. [ASLB Decision, April 18, 2005, Section III. C.]

The ASLB judges found this argument wanting partly because of statements made by former Secretary of Energy Spencer Abraham which directed the implementation of an elite federal security force to protect facilities handling *any* amount of special strategic nuclear materials. The League's attorney made a special effort to include the ex-Secretary's statement in support of our belief that public safety is paramount. In the end, the judges agreed, saying:

> Our ruling herein…implicitly rests on the critical need to protect the material in the MOX LTAs at issue herein from any possible terrorists gaining access to it. [ASLB Decision, April 18, 2005, Section III. C.]

The ASLB approved Duke's license amendment and exemption subject to the four conditions being met prior to the receipt of plutonium fuel at Catawba. Under the ruling, Duke must carry out *force-on-force* exercises to prevent plutonium theft as well as sabotage.

Security Issues: The Problems of Theft and Sabotage

Plutonium use raises security issues because of its use in atomic weapons. Duke Energy will have 180 pounds (80 kilograms) of plutonium on site during the proposed tests at the Catawba plant. Less than 18 pounds of plutonium is sufficient to make a nuclear weapon. The atomic bomb which leveled Nagasaki in 1945 contained just 13 pounds of plutonium.

The Blue Ridge Environmental Defense League's legal intervention raised the issue of nuclear plant vulnerability to theft and sabotage. The judges' ruling was a result of

BREDL security contention number V which had been taken up by the Atomic Safety and Licensing Board. Our contention stated:

> 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)]

In response to the terrorist attacks of September 11, 2001, the NRC deemed *special strategic nuclear materials* a unique concern because they are the key components of atomic bombs. The ASLB judges stated:

> The plutonium contained in the MOX fuel assemblies that are the subject of Duke's [license amendment request] will, during the limited time after delivery and prior to irradiation in the core of the reactor, be weapons-usable material. [ASLB Decision, April 18, 2005, Section IV]

The Atomic Safety and Licensing Board accepted our view that the theft of plutonium is fundamentally different from sabotage and therefore requires an extra level of protection.

The legal precedents established by the ruling could affect the plutonium fuel program in the United States and Russia. Although Duke's exemption opens the door to further rollbacks of regulations here and abroad, the added conditions resulting from the League's lawsuit may prompt better security measures in the future.

Plant Safety Issues

Duke's license amendment request sought permission to test a new type of nuclear fuel, one which contains plutonium from dismantled nuclear warheads. In 2003 the League petitioned the NRC, outlining nine disputes with Duke's request and won status as an intervener. Our line of reasoning was based on the safety problems which we identified centering on the use of weapons-grade plutonium in a commercial nuclear power plantthe first such use anywhere in the world.

Duke's license amendment did not take into account the known differences between plutonium fuel and conventional fuel during accidents involving the loss of cooling water. Slumping and ballooning of zirconium clad fuel has been observed in French fuel tests, altering core geometry and restricting water flow. Sandia National Laboratories evaluated the reactor containment structures at Catawba and McGuire [NUREG/CR-6427, Assessment of the Direct Containment Heating Issue for Plants With Ice Condenser Containments, April 2000] and found that if an accident involving hydrogen ignition occurs, the concrete containment will almost certainly fail. Safety measures proposed by the NRC [GSI-189] to prevent hydrogen ignition have not been

implemented. Catawba and McGuire nuclear plants utilize ice condenser containments, baskets of borated ice, to reduce heat and pressure in the event of an accident. Such systems are particularly vulnerable to reactor sump clogging; numerous problems with ice condensers have been identified during the last two decades of operation.

We raised these reactor safety issues in our intervention before the licensing board; all were narrowly dismissed by the NRC.

The Next Campaign Against Plutonium Fuel: The Full Core

The US Department of Energy has designated 34 tons of weapons-grade plutonium for disposal. Duke is part of an industrial consortium which is under DOE contract to manufacture and use weapons-grade plutonium fuel in the McGuire and Catawba nuclear power stations near Charlotte, NC and Rock Hill, SC. Following the cycle of plutonium lead test assembles, Duke would have to submit another license amendment request and receive subsequent approval from the NRC before fueling the two reactors at both nuclear stations with "batch loads," in which plutonium fuel comprises 40% of the full core. Safety issues dismissed during the test phase will loom larger during full core use.

With plutonium fuel loaded into the reactor, the power station becomes more dangerous because plutonium releases energy in a different way than uranium. Plutonium has a higher neutron flux, meaning higher energy particles at higher speeds. This and other nuclear phenomena break down metal reactor parts quicker; a process called embrittlement. So, embrittlement would be accelerated in any reactor using plutonium fuel. Greater embrittlement means the reactor vessel may fail under circumstances which would otherwise not cause a problem. If and when failure happens and radioactive materials are released from the plant, more dangerous radionuclides are released from a reactor containing plutonium fuel, including greater quantities of radioactive elements which pose hazards to human health.

Duke has indicated that their lead test assembly security plan will also apply to batch plutonium fuel use: "Duke requests that these exemptions be granted to both McGuire and Catawba to support the use of MOX fuel lead assemblies (in either McGuire or Catawba) and the eventual use of batch quantities of MOX fuel in both facilities." Notwithstanding Duke's request, Category I exemptions allowed during plutonium fuel tests will receive renewed scrutiny during the request to handle batch quantities.

Plutonium Fuel, Nuclear Waste and Global Nuclear Weapons Proliferation

In the 1970's the United States rejected plutonium fuel and breeder reactors because of the environmental and proliferation dangers. Throughout the administrations of Presidents Ford, Carter, Reagan, and George H.W. Bush, the policy of the Federal Government banned the use of plutonium in commercial nuclear power plants due to the risk that the plutonium could be diverted to terrorists and to nations that have not renounced the use of nuclear weapons. Today we face a new and more complex

international security picture. The Blue Ridge Environmental Defense League has opposed plutonium fuel since the first public hearings on the project in 1999.

While we applaud the dismantling of strategic nuclear weapons, we are deeply troubled by the provisions of the U.S./Russian bilateral agreement which allows each nation to use 34 metric tons of weapons-grade plutonium in civilian nuclear electric power plants. Our concerns are shared by many Russian environmental groups.

Plutonium fuel requires transportation of weapons grade plutonium and fresh fuel across thousands of miles of open country, making security difficulttransports are vulnerable to terrorist attacks and theft. We oppose the reprocessing of plutonium as commercial fuel because it presents unsupportable risks to public safety and the environment. Manufacturing plutonium fuel would create vast quantities of radioactive waste. The plutonium fuel contractor for the US estimates *annual* waste outputs of up to 21,000 gallons of high activity radioactive waste containing 84,000 Curies of americium, 46,000 gallons of plutonium- and uranium-bearing wastes, and 385,000 gallons of low-level radioactive waste. [*Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 1 & 2*, Duke COGEMA Stone & Webster, 11 July 2002, (tables 3-3 and 3-4)]

The plutonium fuel program undermines international agreements for nuclear non-proliferation. The circulation of plutonium fuel in the commercial sector would increase the risk of diversion. There is no way to ensure that plutonium reprocessing facilities for electric power will not be turned to military use. For example, chemical processing facilities for plutonium fuel can also be used to make plutonium pits for nuclear weapons. There is no way to separate good plutonium from bad plutonium. Radioactive waste from the Cold War should not be transmuted into a plutonium-fueled economy. A global movement for a world without nuclear weapons must also halt the drive for plutonium power.

Louis Zeller
April 22, 2005

End Notes

Commercial nuclear fuel typically contains the oxide form of uranium. The nuclear industry's term for this novel fuel is "MOX" because it is a mixed oxide containing both uranium and plutonium. But the *primary fissile isotope* of the fuel is plutonium, so we use the more accurate term "plutonium fuel."

Our case required access to sensitive documents, making many of the legal proceedings closed to the public. Relevant information was provided only to our technical consultant, Dr. Edwin Lyman of the Union of Concerned Scientists, and to our attorney Diane Curran, of Harmon Curran Spielberg and Eisenberg, who complied with all security requirements. The Atomic Safety and Licensing Board's ruling, originally issued on March 10th, required additional review and approval before it could be released to the

public in censored format on April 18th. The redacted version is freely available and is posted on our website.
