



## VIRGINIA POWER'S PLAN TO USE BOMB-PLUTONIUM FUEL CONCEALS HIDDEN DANGERS AND COSTS

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### Introduction

In 1998, Duke-Cogema-Stone & Webster (DCS), a consortium that includes Virginia Power, signed a contract with the U.S. Department of Energy (DOE) to fabricate some 33 tons of plutonium recovered from dismantled nuclear warheads into so-called mixed oxide ("MOX") fuel for use in two Virginia Power reactors (North Anna 1 & 2) and four Duke Power nuclear power reactors (McGuire 1 & 2, Catawba 1 & 2). Plutonium is both a nuclear explosive and a radioactive poison, requiring extraordinary security and safety measures.

The plutonium MOX fuel program is portrayed by the consortium as a patriotic initiative to dispose of nuclear-bomb material that also would economically benefit the company. Public-interest organizations nationwide strongly object to the use of weapons plutonium as fuel in civilian reactors because it poses a significant threat to public safety, security and the environment, and runs counter to 25 years of U.S. nuclear non-proliferation policy. The proposed use of MOX fuel also presents Virginia Power with hidden costs and financial risks.

- **MOX fuel may not receive regulatory approval.** Federal law requires that the U.S. Nuclear Regulatory Commission (NRC) amend the licenses of the Virginia Power reactors to allow MOX use. However, there is no guarantee that such licenses can be granted without severe restrictions on reactor operation. There are significant additional risks to the public associated with use of MOX fuel that will require detailed regulatory scrutiny and may even exceed recently established NRC risk guidelines. For instance, because MOX fuel is inferior to uranium fuel at "high burn-up" levels (i.e., irradiating or "burning" the fuel in a reactor for extended periods), NRC may impose limits on MOX burn-up, and thereby require Virginia Power to consume MOX fuel inefficiently compared with the conventional uranium fuel Virginia Power's reactors now use. Also, the use of MOX fuel, which can accelerate aging of some plant components, may interfere with Virginia Power's ability to extend the operating licenses of the North Anna nuclear power plants at some point in the future.
- **MOX fuel may end up costing Virginia Power money, rather than generating fuel-cost savings.** MOX is several times more expensive than conventional uranium fuel. The 'cost savings' claimed by the consortium, if realized, would in fact be hundreds of millions of dollars in government subsidies built into the MOX contract, paid for by federal taxes. But even these "savings" are only estimates, based upon a complex reimbursement formula. DOE is requiring the consortium to negotiate a "cap" or ceiling on the total amount which Virginia Power and its partners can be reimbursed for cost overruns. Given that MOX fuel has never been used on a commercial scale in the United States, and that DOE's projects historically end up costing several times more than originally estimated, Virginia Power's cost overruns may exceed the amount DOE is willing to pay. In addition, the already low costs of uranium fuel may drop even further, making MOX fuel a money loser for Virginia Power. Virginia Power has not disclosed to its shareholders how much money it believes it will save, or what additional costs it might incur. In fact, Virginia Power cannot guarantee any savings at all.
- **MOX fuel poses risks to efficient, economic operation of Virginia Power nuclear plants.** DOE will not permit construction of a plant for manufacturing MOX fuel, now planned for the Savannah River Site (SRS) in South Carolina, to proceed until an agreement governing the disposal of warhead plutonium is concluded between the United States and Russia. To date no agreement has been reached, and negotiations are years behind schedule. Even if an agreement is reached, Congress and DOE have repeatedly stated that the U.S. MOX program will not be allowed to proceed unless Russia actually disposes of its plutonium as well. But Russia has no money to do so. Such an unreliable plutonium-fuel plan could jeopardize Virginia Power's future competitiveness in a deregulated electricity market. Costly disruptions in refueling schedules could result from sudden, unpredictable changes in Russian policies. Virginia Power should not link the future of its nuclear-power program to the fate of an unstable Russian government and economy.

- ***MOX fuel requires heavy security.*** DOE insists that weapons-plutonium MOX fuel must receive the same degree of security as that required for nuclear weapons. This will necessitate greater security expenses at Virginia Power's reactors, including more armed guards who are trained and authorized to use deadly force. These measures could spark controversy for Virginia Power in communities near the reactors.
- ***MOX fuel poses a grave safety threat.*** Dr. Edwin Lyman, NCI Scientific Director, conducted a MOX fuel safety study using the same computer codes employed by DOE and the Nuclear Regulatory Commission. Dr. Lyman's study concluded that, in the event of a severe accident resulting in a large radioactive release, an average of 25% more people would die of cancer if the reactor were using a partial core of plutonium-MOX fuel, as opposed to a full core of conventional uranium fuel. DOE itself has concurred with many of Dr. Lyman's findings. Dr. Lyman also found that the impact of MOX fuel on certain reactor characteristics may also increase the chance that such a severe accident would occur. DOE and the consortium dismiss such accidents as extremely improbable, but it must be remembered that the accidents that took place at Three Mile Island, Chernobyl, and the Tokai nuclear-fuel plant in Japan last September all had been similarly dismissed as highly unlikely or even "impossible" events.
- ***MOX fuel exposes Virginia Power to potentially enormous future costs.*** The factories in which plutonium MOX fuel is fabricated are susceptible to problems caused by 'hold up' of significant amounts of plutonium that get caught in process equipment rather than end up in the final fuel product. The Plutonium Fuel Production Facility (PFPF), a MOX factory in Japan, accumulated a 'hold-up' of more than 70 kilograms of plutonium during its first several years of operation. International nuclear regulators required Japan to clean out the plant and upgrade its equipment at a total estimated cost of over \$100 million. When queried by the Nuclear Control Institute (NCI) at a February meeting with the U.S. Nuclear Regulatory Commission (NRC) staff, Duke Power technical representatives claimed they had "never heard of" this problem, and this is likely also the case for Virginia Power's experts, because this Japanese MOX problem received little attention in the United States. The PFPF plant was based upon technology from Cogema, the same French company that is designing the MOX plant which will fabricate fuel for Virginia Power's reactors. Virginia Power could therefore confront similar problems and expenses at the DCS consortium's MOX fuel-fabrication factory.

Because plutonium MOX fuel has never been used commercially in the United States and is now generating concerns and controversy in nations where it is being produced and used, Virginia Power's MOX fuel program will be subject to greater scrutiny and possibly a heavier regulatory burden from NRC. For example, recent revelations that British Nuclear Fuels Ltd. (BNFL) cut costs by making up fictional quality-control data for MOX fuel produced for Japanese, German and Swiss utility customers has resulted in those customers canceling orders for MOX fuel. Quality-control problems with MOX fuel produced by Virginia Power's consortium partner, Cogema, have recently been uncovered in Germany, triggering a national regulatory review of all German reactors using Cogema's MOX fuel. This is likely to result in NRC imposing costly quality-control requirements on MOX fuel fabricated for Virginia Power's reactors.

- ***MOX fuel using warhead plutonium is experimental and untested.*** The consortium claims that "many years of experience" in European reactors shows MOX to be safe and effective. But the plutonium in European MOX fuel was recovered from used nuclear-power plant fuel, *not* from nuclear bombs. Warhead plutonium is of a different isotopic composition, responds differently in reactors, and has *never* been tested on a commercial scale. DOE began test irradiation of a few MOX pellets in an experimental reactor in early 1998, and will not have any results for years. Warhead-plutonium MOX fuel remains an unproven technology with significant risks associated with its use.
- ***MOX fuel violates U.S. nuclear non-proliferation efforts.*** Using plutonium MOX fuel in U.S. reactors would contradict a 25-year U.S. nuclear non-proliferation initiative, begun in the Ford and Carter administrations, to oppose plutonium fuel cycles at home and abroad. The Virginia Power MOX program would encourage Europe and Japan to accelerate programs to recover hundreds of tons of bomb-usable plutonium from the spent fuel of their nuclear reactors, creating a grave proliferation and terrorism risk. Virginia Power's MOX program also would serve as an example to nations in volatile regions (including Taiwan, South Korea, and Iran) to pursue plutonium fuel cycles, risking regional instability by establishing a pathway to nuclear weapons.
- ***MOX fuel is not needed to dispose of plutonium from dismantled warheads.*** DOE is actually pursuing a 'dual-track' approach to warhead plutonium disposition, and plans to dispose of some 17 tons of plutonium directly as waste by immobilizing it in steel cylinders filled with glassified, highly radioactive waste, instead of turning it into MOX fuel. Technical studies by the National Academy of Sciences and DOE conclude that this immobilization technology is feasible, and could be utilized to dispose of all surplus warhead plutonium in the United States and Russia. There is no arms-control justification for the riskier MOX approach, but it is supported by the nuclear industry as a way to subsidize nuclear utilities at taxpayer expense.

## Conclusion

Virginia Power is jeopardizing the future viability and economic competitiveness of its nuclear-power program in exchange for possible future savings amounting to only a small fraction of its nuclear-fuel costs. A shareholder resolution opposing the MOX fuel program was tabled at Duke's 1999 annual meeting by Duke shareholders. The initiative received 7.7 percent of the vote, enough to qualify a similar initiative for consideration at the shareholders meeting this year. Duke sought to deny a democratic voice to its shareholders by engaging in legal maneuvers to keep a new resolution off the 2000 proxy ballot. These efforts were rejected by the Securities and Exchange Commission, which required Duke to include the anti-MOX resolution as "Shareholder Proposal 4: Use of Mixed Oxide Fuel in Nuclear Reactors" on the proxy for its 2000 annual meeting, scheduled for April 20 in Charlotte, NC.

There is no anti-MOX shareholder initiative on this year's proxy ballot for Dominion's annual meeting, but Virginia Power's shareholders may well have concerns about the financial, safety and security risks associated with MOX fuel once they become informed of the liabilities of this program. The MOX-fuel program is an imprudent risk that Virginia Power shareholders and ratepayers should not allow the company to undertake on their behalf.

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*Founded in 1981, the Nuclear Control Institute (NCI), a nuclear non-proliferation research and advocacy center, opposes the use of weapons plutonium in civilian commerce. For further information about the risks of Virginia Power's MOX-fuel program, contact Steven Dolley, Nuclear Control Institute (1000 Connecticut Ave. NW, Suite 804, Washington, DC, 20036; phone 202-822-8444; [nci@nci.org](mailto:nci@nci.org)), or visit the NCI website at <http://www.nci.org/nci-wpu.htm>*

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