NUCLEAR POWER AND DUKE POWER IN THE POST-9/11 WORLD

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Introduction

When President Bush disclosed in his State of the Union address that "diagrams of American nuclear power plants" have been found among the items left by terrorists in Afghanistan, the President was sending a clear message to the American people that in the aftermath of the 9/11 attacks on the World Trade Center and the Pentagon, the 103 power reactors in this country are also potential targets for attack.

Only two days later the message was made even clearer. CNN disclosed that the operators of each of these plants had received an advisory from the Nuclear Regulatory Commission that "an al Qaeda senior operative…stated there would be a second airline attack in the U.S. The attack was already planned and three individuals were on the ground in the states recruiting non-Arabs to take part in the attack. The plan is to fly a commercial aircraft into a nuclear power plant to be chosen by the team on the ground." A high-level FBI source later told CNN that the threat "could not be verified, substantiated or dismissed." A spokesman for the Office of Homeland Security at the White House put it differently. "That information is uncorroborated," he said, but added that even if the threat could be discounted, "the continuing threat (to nuclear power plants) is still real."

These are chilling words for all Americans. But here in Charlotte, where the cooling towers of four nuclear power reactors are within sight of the city's bank towers and within a short boat ride of thousands of homes along Lake Wylie and Lake Norman, the danger is all the more immediate because it is uncomfortably close to home. The local utility company, Duke Power, which operates seven power reactors at three sites in the Carolinas, has a big financial stake in the safe and secure operation of these plants, but their customers have a bigger stake in assuring that saboteurs cannot turn power reactors into gigantic radiological weapons.

It is altogether fitting and in the highest public interest, therefore, that this "Conference on Nuclear Insecurity" is being held at this place and at this time. The Blue Ridge Environmental Defense League is to be commended for convening so many

leading experts and critics of the nuclear power industry for the purpose of allowing the people to learn about the special nuclear risks they face in the post 9/11 world---and what they can do to help mitigate or eliminate those risks. For too long, Carolinians have been hearing mostly one message---the one Duke Power wants them to hear---about the benefits of nuclear power.

I respect the civic leadership role that Duke plays in this community---most recently by providing a generous gift to the University of North Carolina in Charlotte to help establish a school of technology and by joining in the effort to help save Charlotte's National Basketball Association team. But it also has a civic responsibility to face up to and account for the risks its nuclear plants impose on this community. I am honored to have been invited to kick off this discussion of those risks, and I will try to help set the record straight.

In my remarks I will address three basic issues: first, the security situation at nuclear power plants both before and after 9/11; second, the additional safety and security risks that are associated with Duke Power's plan to introduce fuel made from warhead plutonium into its four power reactors near Charlotte, and finally, the related risks involved in the plan to process the plutonium and fabricate the fuel at the U.S. Government's Savannah River Site in South Carolina. I will close with some suggestions on how to limit the nuclear risks to the nation at large and to the Carolinas in particular in the present threat environment.

Nuclear Power Plant Insecurity Before and After 9/11

President Bush announced that terrorists were in possession of diagrams of nuclear plants, but he did not announce what measures he will take to prevent a successful attack on one of these plants. The NRC warned plant operators of a possible al Qaeda plan to attack a nuclear power plant from the air, but it has not come up with a sure-fire plan for either the industry or the government to prevent a commercial jet from hitting a plant. The NRC's rules and regulations exempt licensed operators from having to protect nuclear power plants against an "enemy of the United States," whether a government or a person, on the obvious assumption that the federal government will be available, if needed. Before 9/11, such a need was strictly hypothetical; today it is an imperative. Yet, Homeland Security Chief Tom Ridge last Sunday brushed off a question on "Meet the Press" about the need for a federal security force for nuclear power plants. The role of the federal government, he said, was to set a standard of security, and "those who own the nuclear power plants have to provide it."

Unfortunately, neither the White House Office of Homeland Security nor the Nuclear Regulatory Commission (NRC) have taken protective measures commensurate with the threat or with the unthinkable consequences of a successful attack on a nuclear power plant. These plants are vulnerable today, and that is intolerable.

U.S. nuclear power plants need immediate military protection---the placement of National Guard troops or other military forces in sufficient numbers to provide a visible

show of force and a credible deterrent against attack from the land, air or water. Anti-aircraft weapons, manned by the military, not the industry, under strict rules of engagement and command and control, are also needed as a last-resort measure in the event fighter interceptors cannot catch up with a jumbo jet headed for a suicidal hit on a plant.

For months, the NRC has been conducting a "top to bottom" review of its security procedures---"topless to bottomless" may be the better term because it has failed to take any action and NRC Chairman Richard Meserve is on record as saying that he does not see "any magic end date" for it. Perhaps nothing less than an "Osama-gram" will stir the NRC Commissioners to action. On September 11 and on a number of occasions since, Chairman Meserve has noted the absence of a credible, identified threat against a nuclear power plant. But since 1978, the NRC's own official, internal guidance has been to <u>not</u> rely on prior warning from law-enforcement or intelligence agencies as the basis for designing protection of nuclear power plants. In other words, be prepared to be surprised---but the NRC does not appear to take its own guidance seriously.

On September 11, the NRC did request of plant operators that they go on a heightened state of alert, but there is no reason to believe the measures taken even approach the substantially increased security that is needed <u>now</u> to defeat a large, coordinated attack on a scale of the 9/11 attacks. Thus far, nuclear power plants have assigned some additional guards and patrols, often by having private guards work double shifts, and have made use of a few state troopers and National Guard troops. In a number of states that did call up the National Guard for duty at nuclear plants---North and South Carolina not among them---these troops have since been withdrawn. Despite industry claims that the plants are protected by "well-paid, paramilitary forces," the guards at many plants are "rent-a-cops" receiving low wages, in some cases less than janitors are paid in these plants.

The immediate danger is underscored by the fact by that prior to September 11, nearly half of the nuclear plants tested in NRC-supervised security exercises have failed to repel mock terrorist attacks---indeed 7 out of 11 plants failed exercises run since the beginning of 2000. These exercises involve a small number of simulated attackers compared with the 19 terrorists who waged the four sophisticated, coordinated attacks of September 11. The NRC's mock terrorist exercises also severely limit the tactics, weapons and explosives used by the adversary; yet in almost half the tests they reached and simulated destruction of safety systems that in real attacks could have caused severe core damage, meltdown and catastrophic radioactive releases.

Now, in response to operator complaints and budgetary constraints, the NRC is actually preparing to shift responsibility for supervising these mock terrorist exercises to the operators themselves---that is, if the exercises are ever run again. They were cancelled by the NRC after 9/11 with the explanation that they were inappropriate in the present threat environment. Current events suggest that resumption of these tests is not only appropriate (with additional measures to secure the plant while the exercises are run)---but desperately needed to demonstrate ability to defend against a larger more

sophisticated adversary. And there should be stiff fines for plants that fail---something that has not been done to date. It should also be clear that nuclear power plant security is too important to be turned over to industry self-assessment.

It is important to underscore that the safety systems necessary for keeping the fuel cooled and preventing melting represent "soft targets" if reached by terrorists, as are the spent fuel pools. The pools are of special concern because they are generally outside of containment and hold several Chernobyl's worth of long-lived radioactivity. The zirconium cladding on the spent fuel in those pools can catch fire if terrorists succeeded in damaging the pools and causing them to lose their water coolant. The spent fuel pools are even more poorly protected than the reactors themselves, particularly at shut-down reactors. Nor has the defense of spent-fuel pools ever been tested in the mock-terrorist exercises supervised by the NRC.

Due to the NRC's inaction in the face of a real and growing threat, Senators Reid, Lieberman and Clinton and Representatives Markey and Lowey have introduced legislation which requires an increase in security to meet the new threat and also federalizes the nuclear plant security forces.

All of these issues have special relevance to Charlotte because of the close proximity of the McGuire and Catawba nuclear power plants to the city, a major banking center that could make it of more than routine interest to terrorists in search of a target. About 265,000 people live within 10 miles of these plants, according to a *Charlotte Observer* analysis of recent U.S. Census data. The evacuation zones include some of the fastest-growing communities in both Carolinas. Many of the new residents live in homes developed by a Duke Power sister company, Crescent Resources. The parent company, Duke Energy, the *Observer* reports, is the only U.S. nuclear plant operator to build subdivisions in its own evacuation zone.

According to one of Crescent Resources' brochures, "You can breathe a little easier and relax as you see Lake Wylie." There's no mention of the Catawba plant or of the fact that home insurance policies for Lake Wylie residents (as for homeowners everywhere) exclude compensation for consequences of a nuclear accident. Since Duke has no qualms about selling property within 5 miles of the plant, the least it could do is offer home insurance against a nuclear accident. It seems the neighborly thing to do.

Some local officials have estimated that it could take as long as 24 hours to evacuate everyone from the 10-mile emergency zone around the McGuire plant on Lake Norman. But a study conducted by Duke's consultants found that everyone would be evacuated in eight hours.

McGuire underwent the NRC-supervised mock terrorist exercise in 1995, Catawba in 1997 and Oconee in 2000. The results were classified, but the NRC told the *Observer* that Oconee performed least well of the three, with less significant weaknesses at McGuire and Catawba. It is now essential that all the Duke plants be tested again, this time against a larger and more formidable adversary than before. The fact that Duke has

replaced its previously outside-contractor guard force with one made up of Duke employees is all to the good. About 60 per cent of U.S. nuclear power plants use outide contractors to provide guards, and some of these guards are poorly paid, ill-trained “rent-a-cops. But Duke’s guards must be tested to the fullest because the consequences from a successful attack could be especially severe.

A major consideration for Charlotte in assessing the potential consequences of a terrorist attack against a nuclear plant is Duke's planned use of highly toxic warhead plutonium as fuel in the McGuire and Catawba reactors. This I will discuss in a moment.

Perhaps the most cogent assessment of the nuclear terrorism threat, and how best to prevent it, was presented in a letter to the governors of North and South Carolina by former U.S. Ambassador Mark Erwin. Drawing upon his observations of American intelligence-gathering and the terrorist mindset while ambassador to the East African island nations of Mauritius, the Seychelles and Comoros, he wrote: "Most likely, hundreds of operatives are in America today. They are meticulous planners and are patient beyond our understanding. . . .And if a terrorist were to be successful and take out a nuclear facility, it would make the World Trade Center pale in comparison." He warned that nuclear power plants "cannot withstand a direct hit from even a private jet loaded with explosives," and he concluded: "Our power plants need the equipment only available to our military, including ground-to-air missiles and heavy arms, as well as the trained soldiers to operate these weapons properly to protect these dangerously vulnerable sites."

In my view, the U.S. government should step in with military protection or it should be prepared to shut the plants down. Allowing the plants to continue operating with inadequate security, in some cases only tens of miles from major cities like New York, Philadelphia, Cleveland, Chicago and Los Angeles, as well as Charlotte, is unconscionable. Millions of people are at risk in the event of a successful attack causing severe damage to the reactor core or spent fuel pool at these plants.

The Dangers of Duke’s Plan to Use Warhead Plutonium as Reactor Fuel

- ***overview of history of plutonium disposition, goal of program***

In 1997, the U.S. Department of Energy (DOE) announced that it would pursue a "dual track" policy for the disposition of some 50 metric tons of plutonium produced for weapons programs that had been declared excess to military needs. Under one approach, plutonium would be used to produce MOX fuel assemblies, which would then be loaded and irradiated in U.S. commercial nuclear reactors. DOE initially planned to utilize this option for up to 33 metric tons of plutonium.

Under the other approach, known as immobilization, approximately 17 metric tons of excess plutonium in impure forms that would not be suitable for MOX fabrication without substantial additional processing would be incorporated into chemically stable ceramic discs

at a new facility to be constructed at the Savannah River Site in South Carolina. These discs would in turn be embedded in canisters of "vitrified" (glassified) high-level radioactive waste.

However, the Bush Administration announced two weeks ago that it would terminate all development and utilization of the immobilization approach. Over eight years of DOE research documenting the feasibility and cost-effectiveness of immobilization has been thrown out the window in deference to pro-plutonium forces in the nuclear industry and bureaucracy. Like last year's Cheney-Enron energy policy, this decision was formulated behind closed doors and is a full reversal of earlier DOE policy on plutonium disposition, a policy developed through an open public process.

By canceling plans to operate an immobilization facility at Savannah River, DOE's decision will require surplus plutonium that cannot be made into fuel be sent to another site yet to be determined. This approach is legally inconsistent with DOE's January 2000 Record of Decision on plutonium disposition, and thus faces major hurdles under the National Environmental Policy Act (NEPA). In addition, plutonium shipment to an unnamed DOE site will cause public controversy in whichever state is chosen to receive the deadly material. The Administration's reversal also complicates efforts to meet deadlines in the September 2000 U.S.-Russian plutonium disposition agreement. The resulting lengthy delays will require indefinite storage of plutonium at the Savannah River Site in a facility not designed for secure, long-term plutonium storage.

- ***Duke's efforts to join the program via consortium with DCS***

In 1998, Duke-Cogema-Stone & Webster, a consortium that includes two Duke Energy affiliates (Duke Power and Duke Engineering and Services), signed a contract with the Department of Energy to fabricate some 33 tons of plutonium recovered from dismantled nuclear warheads into mixed oxide (or "MOX") fuel for use in four Duke nuclear power reactors (McGuire 1 & 2, Catawba 1 & 2).

Duke portrays the plutonium MOX fuel program as a patriotic initiative to dispose of nuclear-bomb material that also would economically benefit the company. Nuclear Control Institute, along with many other public-interest organizations (a number of whom are represented here this evening), strongly objects to the use of weapons plutonium as fuel in civilian reactors because it poses a significant threat to public safety and the environment.

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 Duke 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. Duke'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.

- ***severe accident with MOX fuel presents grave risk to the Charlotte area***

Neither the United States nor Russia has had significant experience with MOX fuel in light-water reactors, and there is no experience anywhere with use of weapons-grade plutonium in MOX fuel. Use of MOX fuel reduces the stability of reactor cores, so that operators have less time to respond and maintain safety in the case of rapid changes in the state of the reactor; increases the severity of certain accidents, such as those that cause a sudden cooling of the core; and increases the amount of certain extremely toxic radionucleides in the reactor core by a factor of two (in the case of a reactor with a 40% MOX, 60% uranium-fuel core).

Dr. Edwin Lyman, NCI's Scientific Director, who is with us this evening, 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 might also increase the chance that such a severe accident would occur.

DOE and Duke 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 all had been similarly dismissed as highly unlikely or even "impossible" events.

- ***Duke's "eggshell containment": worst reactors for MOX mission***

Catawba and McGuire are among a handful of pressurized-water reactors (PWRs) worldwide with ice condenser containments --- typically thin steel shells that have only half the volume and failure pressure of the massive concrete containments which surround the reactor vessel at most other U.S. PWRs. Containments buildings are critical in preventing catastrophic releases of radioactive materials during an accident. Ice condenser plants are equipped with channels filled with blocks of ice that are supposed to cool any steam blasted into them during a core-melt accident and condense it to water, thus reducing the threat of containment rupture.

A study prepared for the NRC by Sandia National Laboratory and released in April 2000 found that for accidents in which the hydrogen igniters were not available, such as during "station blackouts" in which both off- and on-site power is lost, the probability that hydrogen combustion would rupture the containment is 34% for Catawba and 58% for McGuire. In both cases, these values exceed the limit of 10%, which NRC considers an "acceptable risk" of containment failure.

NRC's response to our disclosure of the vulnerability of ice condensers to station blackout was to declare the question a "generic safety issue," meaning that NRC gets to evaluate the costs and benefits of fixing the problem. If the "benefits" --- that is, the number of deaths that would be averted if Catawba or McGuire didn't melt down and explode in a blackout --- don't justify the costs of making the necessary modifications, nothing has to be done. And NRC is taking its time in making this determination --- the Sandia report was released in April of 2000, and NRC hopes to have the technical analysis finished by this summer. Add on another year or so of industry lobbying and bureaucratic wrangling and it will be three years before NRC gets around to saying --- most likely --- that no changes to the regulations are needed.

- ***Importance of opposing MOX operating licenses and challenging renewal of licenses***

Federal law requires that, if MOX use is to be permitted, NRC will need to amend the licenses of the Duke reactors. 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 Duke to consume MOX fuel inefficiently compared with the conventional uranium fuel Duke's reactors now use. Also, the use of MOX fuel, which can accelerate aging of some plant components, may interfere with Duke's proposal to extend the licenses of the Catawba and McGuire nuclear power plants for another twenty years of operation.

Recently, NRC's Atomic Safety Licensing Board granted petitions by NIRS and BREDL to hold hearings on MOX-fuel safety issues to determine whether these issues must be addressed during NRC's upcoming consideration of Duke's applications to renew the operating licenses of the McGuire and Catawba reactors. Nuclear Control Institute was pleased to assist NIRS in the preparation of its successful petition. Duke attempted unsuccessfully to claim that MOX-fuel issues were unrelated to the extension of the operating lifetime of these reactors. We hope and believe that the Licensing Board will understand that the safety of the MOX fuel that Duke plans to use in these plants has an inextricable relationship to the question of whether they can be safely operated in the future.

Plutonium Disposition & Savannah River Site/South Carolina

- ***SRS chosen for all facilities for plutonium disposition mission***

In the January 23 announcement of its revised plutonium disposition strategy, DOE revealed that 6.4 metric tons of plutonium "previously destined for immobilization" were now slated for disposal via MOX-fuel irradiation. This 6.4 metric tons include plutonium materials which "would require extensive purification to use in MOX fuel," according to DOE. For such disposal to take place, DOE noted that this plutonium would first have to be sent through an "enhanced purification capability" at the MOX Fuel Fabrication Facility being planned for the Savannah River Site. Further, DOE stated that two metric tons of "very impure plutonium," which were also previously destined for immobilization, would be sent "directly to waste." No further information was given about the additional plutonium to be processed for use as MOX or about what equipment was needed for "enhanced purification."

The difficulty of utilizing plutonium previously destined for immobilization in the MOX program has been underscored in the licensing proceeding for the MOX Fuel Fabrication Facility now pending before NRC's Atomic Safety Licensing Board. In that proceeding, the license applicant, Duke Cogema Stone & Webster has flatly characterized this material as "plutonium that cannot be converted to mixed oxide fuel."

DOE never considered under NEPA the environmental implications of processing plutonium materials slated for immobilization for use as MOX. Among other things, DOE has carried out no NEPA analysis of the environmental impacts associated with operating equipment needed for "enhanced purification." It is clear that there will be significant waste streams associated with purification of these plutonium materials. Due to impurities in these materials, the waste streams will be different from those associated with the processing of plutonium materials earlier slated for use as MOX.

The impact on waste management at SRS, particularly the high-level waste tanks, thus requires analysis in a Supplemental Environmental Impact Statement. Given that DOE selected SRS as the site for both the immobilization and MOX missions, South Carolina and Georgia are most subject to any environmental and health impacts associated with the dramatic increase in the amount of plutonium processed at the site. Thus, it is only through a public, in-depth Supplemental Environmental Impact Statement

that public concerns and environmental impacts to the area around SRS can be fully analyzed, and today Nuclear Control Institute sent a formal request to Secretary of Energy Abraham seeking this review and analysis.

It seems that South Carolina Governor Hodges was right. Despite DOE's reassurances, the Savannah River Site could become a long-term plutonium storage facility. Many obstacles remain to the MOX program: cost, licensing, technical hurdles, and progress on plutonium disposition in Russia. We strongly urge Governor Hodges to support NCI's call for a supplemental environmental impact statement on MOX and plutonium processing at SRS.

- ***DCS role in licensing of MOX plant***

Under federal law, third parties may intervene in the MOX fuel fabrication plant's permitting process and request a public hearing by submitting contentions that describe their concerns about whether public health and safety and the environment will be protected under the proposed permit. Last December, the NRC's Atomic Safety and Licensing Board awarded Georgians Against Nuclear Energy (GANE) the right to a public evidentiary hearing to investigate unresolved issues concerning the MOX fuel-fabrication facility to be constructed at SRS. In a hearing currently scheduled to begin in October 2002, GANE will be allowed to litigate a range of criticisms of the application to construct the MOX-fuel facility, including its failure to protect the public from excessive radiation doses, inadequate provision for high-level nuclear waste storage, poorly prepared seismic analysis, lack of a cost/benefit analysis in the environmental review, and security. Nuclear Control Institute is pleased to be assisting GANE in this proceeding.

Conclusion

The plutonium immobilization option is still the best – least cost, least environmental and health risk, and least proliferation risk. Technical studies by the National Academy of Sciences and DOE conclude that plutonium immobilization is feasible, and could be utilized to dispose of all surplus warhead plutonium in the United States and Russia. Immobilization could be done at the Savannah River Site utilizing existing high-level waste. 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.

Duke should withdraw from participation in all aspects of the plutonium disposition program. Duke 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. Participation in the MOX program is an imprudent risk that Duke Power should not undertake.

Pursuing MOX and killing off immobilization poses a nuclear proliferation as well as a nuclear terrorism risk. If this happens, the world's best hope for getting rid of excess military and civilian plutonium will be lost. In this post 9/11 world, plutonium poses an existential danger we cannot afford to ignore.