

**STATEMENT OF R. SHANE JOHNSON
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U.S. DEPARTMENT OF ENERGY
BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SUBCOMMITTEE ON CLEAN AIR, CLIMATE CHANGE
AND NUCLEAR SAFETY
UNITED STATES SENATE
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Chairman Voinovich, Senator Carper, and members of the Subcommittee, it is a pleasure to be here today to discuss the Department's activities associated with building new nuclear capacity in the United States and expanding the use of nuclear energy around the world. As the next generation of nuclear power plants is designed, licensed, and constructed, it is certain that these activities will have near- and long-term resource implications for the Nuclear Regulatory Commission (NRC). I will defer to Mr. Luis Reyes of the NRC who I understand is testifying before you today to present those specific impacts. However, I will present the status and projected progress of our nuclear programs that will likely form the basis of these resource requirements.

With dozens of new nuclear plants under construction, planned or under consideration world-wide, many countries around the world are clearly moving forward with new nuclear plants. In the U.S., we are nearing completion of the initial phase of preparations for a new generation of nuclear plants. Through the Nuclear Power 2010 program and incentives contained in the Energy Policy Act of 2005 (EPACT 2005), government and industry are working together to address regulatory and financial impediments that the first purchasers of new plants face.

In addition, the Department is committed to addressing the fundamental research and development issues necessary to establish the viability of next-generation nuclear energy system concepts. Successfully addressing the fundamental research and development issues of Generation IV system concepts that excel in safety, sustainability, cost-effectiveness and proliferation-resistance will allow these advanced systems to be considered for future commercial development and deployment by the private sector. Expectations for the development, demonstration and design, construction and operation of the Next Generation Nuclear Plant or NGNP, are clearly outlined in EPACT 2005. A decision on whether to proceed beyond the current R&D phase will be made in 2011.

Finally, we are implementing the Global Nuclear Energy Partnership, or GNEP, an initiative launched by the Department of Energy in February of this year. GNEP is a comprehensive approach to increase global energy security. It will seek the expanded use of nuclear power as a clean energy resource, while reducing the risk of nuclear proliferation.

NUCLEAR POWER 2010

The Nuclear Power 2010 program, launched in 2002, addresses the regulatory and financial uncertainties associated with siting and building new nuclear plants by working in cost-shared cooperation with industry to identify sites for new nuclear power plants, by developing and bringing advanced standardized plant designs to the market, and by demonstrating untested regulatory processes. Nuclear Power 2010 is focused on Generation III+ reactor technologies, which are advanced, light water reactor designs, offering advancements in safety, security, and economics over the Generation III designs certified by the NRC in the 1990's.

The Department is currently sponsoring cooperative projects for preparation of Early Site Permits (ESP) for three commercial sites. The ESP process includes resolution of site safety, environmental, and emergency planning issues in advance of a power company's decision to build a new nuclear plant. The three ESP applications are currently in various stages of NRC review, and licensing decisions are expected by the end of 2007.

In Fiscal Year 2005, the Department established competitively selected, cost-shared cooperative agreements with two power company-led consortia to obtain combined Construction and Operating Licenses (COL). The Department selected Dominion Energy and NuStart, a consortium of ten electric generating companies, to conduct the licensing demonstration projects to obtain NRC licenses and operate a total of two new nuclear power plants in the U.S. Dominion is preparing an application for the North Anna site in Virginia, and NuStart is preparing an application which will use DOE funding to move a COL forward on either the Bellefonte site in Alabama or the Grand Gulf site in Mississippi. The two project teams involved in these two licensing demonstration projects represent power generation companies that operate more than two-thirds of all the U.S. nuclear power plants producing electricity today. Both consortia are on track to submit COL applications to the NRC in late 2007. Joint efforts will continue to complete the necessary design certification steps to support two COL applications. Industry is planning for issuance of the NRC licenses by the end of 2010. It is possible that a utility decision to build a new plant could be announced as early as 2008, with construction starting in 2010, and a new plant operational by 2014.

Already this approach has encouraged power companies from these consortia to apply for COLs. Several have specifically stated that they are building on work being done in the Nuclear Power 2010 program as the basis for their applications. In addition, UniStar, a consortium of Constellation, AREVA and Bechtel Power, announced plans to pursue new nuclear plants. In June, NRG Energy, Inc. also announced plans to pursue construction of two additional reactors at their two-unit South Texas Project nuclear power station. Earlier last month, the NRC indicated that it expects 19 new combined COL applications for 27 new reactors.

FEDERAL GOVERNMENT RISK MANAGEMENT ACTIONS

Last year, the President proposed and Congress established the *Standby Support* provisions of EPACT 2005 (Section 638) to encourage the construction of new advanced nuclear power plants in the U.S. by addressing regulatory and litigation risks to first “movers” of these new plants. Under Section 638, the Secretary can enter into contracts to insure project sponsors against certain delays that are outside the control of the sponsors and to provide coverage for up to six reactors, but for no more than three different advanced reactor designs. The level of coverage is distinguished between the first “initial two reactors,” for which the Secretary will pay 100 percent of covered costs up to \$500 million per contract and “subsequent four reactors,” for which the Secretary will pay 50 percent of covered costs up to \$250 million per contract after an initial 180-day delay.

I am pleased to report that last month, prior to the first year anniversary of EPACT’s enactment, the Department issued the final rule for the Standby Support program.

EPACT 2005 contains other key provisions aimed at providing incentives to build new nuclear plants. One of these is the creation of a production tax credit program for new advanced nuclear generation. EPACT 2005 (section 1306) permits a taxpayer producing electricity at a qualified advanced nuclear power facility to claim a credit equal to 1.8 cents per kilowatt-hour of electricity produced for eight years. The provision also specifies a national megawatt capacity limitation of 6,000 megawatts for which tax credits could be given. The tax credit is administered by the Department of Treasury, in consultation with the Department of Energy. The Treasury Department recently published guidelines for approving these tax credits, allowing us to move ahead in this process.

Lastly, EPACT 2005 (Title 17) authorizes the Secretary of Energy to enter into loan guarantees for projects that avoid, reduce, or sequester air pollutants or emissions of greenhouse gases and that use new and significantly advanced energy technologies, including advanced nuclear power plants. In August 2006, the DOE published Guidelines for the Loan Guarantee Program in the *Federal Register* that specify the process by which DOE will solicit and review project proposals. Also in August 2006, DOE issued the first of multiple solicitation announcements inviting interested parties to submit project proposals. Although the first solicitation does not address nuclear projects, utilities interested in building new nuclear power plants will be eligible for future loan guarantee solicitations, which will help them lower the cost of borrowing the substantial up-front capital associated with these major projects. Combined with delay risk insurance, loan guarantees will reduce uncertainty and thereby reduce costs of obtaining investment capital for initial sponsors of new nuclear plants.

NEXT GENERATION NUCLEAR PLANT

EPACT 2005 (Sections 641 through 645) establishes expectations for research, development, design, construction, and operation of a prototype nuclear plant which will provide electricity and/or hydrogen.

These EPACT provisions establish two distinct phases for the project. In Phase I, to be completed by 2011, DOE is directed to select the hydrogen production technology, develop initial reactor design parameters, and, jointly with the NRC, develop a licensing strategy for the NGNP. Phase I is the research and planning part of the initiative and it is the phase in which the Department is currently engaged. EPACT 2005 also directs the Department to complete, as part of Phase II, the design, licensing and construction of the NGNP by 2021.

This year, we will begin working in earnest with the NRC to develop a licensing strategy for the technology, which pursuant to EPACT 2005 must be submitted to Congress by August 8, 2008. We have allocated \$2 million of our Fiscal Year 2007 budget towards this interagency collaboration. Licensing a prototype reactor by the NRC and obtaining certification of the nuclear system design will present a significant challenge and may be very difficult to accomplish in the timeframe contemplated. In developing a licensing strategy, DOE and NRC will examine mechanisms that are best suited for making information available to support a license application and for evaluating that information. In addition, the strategy will address staffing resources needed to support the licensing of both NGNP and new commercial reactors.

GLOBAL NUCLEAR ENERGY PARTNERSHIP

Partnerships between the U.S. Government, industry, and other nations can help to increase the use of nuclear power throughout the world. Cooperation and cost-sharing with other countries is also vital to ensure that other nations use nuclear power safely and securely. That is the basis of GNEP launched earlier this year by the Department and included in President Bush's *Advanced Energy Initiative*. This new initiative is based on a simple principle: energy and security can go hand in hand.

GNEP is a comprehensive strategy to lay the foundation for expanded use of nuclear energy in the U.S. and the world by demonstrating and deploying new technologies that recycle nuclear fuel, significantly reduce waste, and help to address proliferation concerns.

In addition to developing separations, fuel fabrication, and reactor technologies, we also propose to create an approach which provides fuel and reactors that are appropriately sized for the energy requirements of countries in need of nuclear energy. We also seek to encourage the future provision of fuel from fuel cycle nations in a way that allows new nations to enjoy the benefits of abundant sources of clean, safe nuclear energy in exchange for their commitment to forgo enrichment and reprocessing activities, to help address nuclear proliferation concerns. We have been working with other advanced

nuclear nations to build consensus on productive approaches, incentives and safeguards. If we expect countries to forgo fuel cycle activities, they should be assured a reliable access to fuel which could be backed by designated supplies, governmental entities, and international bodies such as the International Atomic Energy Agency (IAEA).

Along with promoting the benefits of nuclear energy, one of GNEP's goals is to develop and demonstrate advanced technologies with enhanced proliferation-resistance that are incorporated into the processing of spent nuclear fuel and also to reduce the amount of nuclear wastes requiring permanent geological disposal.

As you know, the Department is pursuing the development and deployment of integrated spent fuel recycling facilities in the U.S. These are technologies that do not result in a separated plutonium stream. Specifically, the Department proposes to develop and deploy the uranium extraction plus (UREX+) technology to separate the usable materials contained in spent fuel from the waste products. We also propose to deploy a fast reactor capable of consuming those usable products from the spent fuel while producing electricity.

Based on international and private sector response to GNEP, we believe there may be advanced technologies available to recycle used nuclear fuel ready for deployment in conjunction with those currently under development by DOE. In light of this information, DOE is investigating the feasibility of these advanced recycling technologies by proceeding with commercial demonstrations of these technologies. The technology, the scale and the pace of the technology demonstrations will depend in part on industry's response, including the business aspects of how to bring technology to full scale implementation.

Last month, DOE issued two requests for Expressions of Interest from domestic and international industry, seeking to investigate the interest and capacity of industry to deploy an integrated spent fuel recycling capability consisting of two facilities:

- A Consolidated Fuel Treatment Center, capable of separating the usable components contained in light water spent fuel from the waste products;
- An Advanced Burner Reactor, capable of consuming those usable products from the spent fuel while generating electricity;

The Department asked industry to provide input on the scale at which the technologies should be proven. Ultimately, as in the initial plan reported to the Congress in May, the Department ultimately seeks the full commercial-scale operations of these advanced technologies. It is premature, however, to say exactly what form or size the recycling facility will take until we analyze important feedback recently received from industry.

The integrated recycling facilities would include process storage of spent fuel prior to its recycling, on a scale proportionate to the scale of recycling operations. A third facility, the Advanced Fuel Cycle Facility - would be designed and directed through the

Department's national laboratories and would be a modern state-of-the-art fuels laboratory designed to serve the fuels research needs to support GNEP.

We are now in the process of reviewing industry's response to last month's request for Expressions of Interest. Based on our limited review thus far, I can tell you that industry has responded positively and we look forward to working with industry.

In addition, last month the Department issued a Financial Assistance Funding Opportunities Announcement, seeking applications by September 7, 2006, from private and/or public entities interested in hosting GNEP facilities. Specifically, the Department will award grants later this fall for site evaluation studies. Congress made \$20 million available [PL 109-474, FY 2006 Energy and Water Development Appropriations Bill], with a maximum of \$5 million available per site. The information generated from these site evaluation studies may be used in the preparation of National Environmental Policy Act (NEPA) documentation that will evaluate potential environmental impacts from each proposed GNEP facility.

Except for those facilities specifically identified in Section 202 of the Energy Reorganization Act, DOE regulates facilities which it operates or that are operated by contractors on DOE's behalf. DOE would expect that any GNEP facilities be designed, constructed, and operated in a manner suitable for NRC licensing and the application of IAEA safeguards, thereby facilitating the eventual commercialization of advanced recycling technologies.

We view GNEP and the Yucca Mountain repository as complementary endeavors. Under any scenario, the Yucca Mountain repository will be needed for legacy commercial spent fuel (that is, spent fuel already generated or generated in the future for which recycling capacity is not reasonably available), waste material resulting from recycling, and DOE spent fuel and defense high level waste.

If successful, GNEP will greatly expand the supply of affordable nuclear power around the world, while enhancing safeguards that help to enhance proliferation-resistance and assuring the availability of Yucca Mountain for generations to come.

CONCLUSION

As I describe in my testimony, the Department has numerous ambitious and concurrent initiatives underway which pave the way for the resurgence of nuclear power in the U.S. and the world. Each of these initiatives carries with it its own set of licensing issues and requirements, albeit on varying implementation schedules. NRC's ability to fulfill their licensing role in a timely and effective manner is a critical requirement for the successful resurgence of nuclear power in the U.S. and around the world.

Thank you. This concludes my formal statement. I would be pleased to answer any questions you may have at this time.