A REVIEW OF THE NUCLEAR REGULATORY COMMISSION'S LICENSING PROCESS

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

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A REVIEW OF THE NUCLEAR REGULATORY COMMISSION'S LICENSING PROCESS

WEDNESDAY, JULY 29, 2015

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittee met, pursuant to call, at 9:04 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Randy Weber [Chairman of the Subcommittee] presiding.

LAMAR S. SMITH, Texas
CHAIRMAN

EDDIE BERNICE JOHNSON, Texas
RANKING MEMBER

Congress of the United States
House of Representatives
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Subcommittee on Energy

A Review of the Nuclear Regulatory Commission's Licensing Process

Wednesday, July 29, 2015
9:00 a.m. – 11:00 a.m.
2318 Rayburn House Office Building

Witness

The Honorable Stephen Burns, Chairman, U.S. Nuclear Regulatory Commission

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY

HEARING CHARTER

A Review of the Nuclear Regulatory Commission's Licensing Process

Wednesday, July 29, 2015
9:00 a.m. – 11:00 a.m.
2318 Rayburn House Office Building

Purpose

The Energy Subcommittee will hold a hearing titled *A Review of the Nuclear Regulatory Commission's Licensing Process* on July 29th at 9:00 a.m. in room 2318 of the Rayburn House Office Building. The hearing will examine the extent to which the Nuclear Regulatory Commission (NRC or the Commission) may provide technical assistance to the Department of Energy (DOE) in carrying out its mission to advance nuclear energy research and development. The hearing will also examine the extent to which the DOE may provide useful experience to NRC technical staff for licensing new concepts and designs for nuclear reactors.

Witnesses

- The Honorable Stephen G. Burns, Chairman, U.S. Nuclear Regulatory Commission

Background

The NRC is an independent regulatory agency that licenses and regulates the civilian use of nuclear energy and related activities, including medical, academic, and industrial uses.[1] The NRC is composed of five Commissioners, each with "equal responsibility and authority in all decisions and actions of the Commission."[2] One of the five Commissioners serves as the Chairman and "the official spokesman of the Commission in its relations with Congress, Government agencies, persons, or the public."[3]

Following World War II, Congress established the Atomic Energy Commission to promote and control nuclear sciences, systems, and technology for almost three decades. Later, the Atomic Energy Act of 1954 (the AEA) provided the fundamental legal mechanism which led

[1] See generally NRC website available here: http://www.nrc.gov/about-nrc.html. See also Energy Reorganization Act of 1974 §201, 42 U.S.C. §5841 (2013); See also Atomic Energy Act of 1954 §101, 42 U.S.C. §2131 (2013).
[2] Energy Reorganization Act of 1974 §201, 42 U.S.C. §5841(a)(1) (2013).
[3] *Id.*

to private development of nuclear energy and the authority for the federal government to regulate it. As a matter of United States policy, the AEA declares that "the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise."[4] The Energy Reorganization Act of 1974 (the ERA) abolished the Atomic Energy Commission and established the NRC as well as the Energy Research and Development Administration that would eventually become part of the DOE.

The ERA transferred licensing and related regulatory functions for civilian nuclear activities to the NRC,[5] but exempted most DOE R&D activities from NRC regulation, presumably to ensure that the DOE's responsibility to promote scientific progress would not be impaired.[6] Under the AEA and consistent with the ERA, the DOE has authority to "exercise its powers in such a manner as to ensure the continued conduct of research and development[7]... by private or public institutions or persons, and to assist in the acquisition of an ever expanding fund of theoretical and practical knowledge" related to the following (emphasis added):[8]

> *(1)* ***nuclear processes****;*
> *(2) the theory and* ***production of atomic energy, including processes, materials, and devices related to such production****;*
> *(3) utilization of special nuclear material and radioactive material for medical, biological, agricultural, health, or military purposes;*
> *(4)* ***utilization of special nuclear material, atomic energy, and radioactive material*** *and processes entailed in the utilization or production of atomic energy or such material for all other purposes,* ***including industrial or commercial uses,*** *the generation of usable energy, and the demonstration of advances in the commercial or industrial application of atomic energy;*
> *(5)* ***the protection of health and the promotion of safety during research and production activities****; and*
> *(6) the preservation and enhancement of a viable environment by developing more efficient methods to meet the Nation's energy needs.*

Currently, the DOE Office of Nuclear Energy provides funding for R&D to advance nuclear energy as a resource capable of contributing to the Nation's energy supply and

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[4] Atomic Energy Act of 1954, 42 U.S.C. §2011 (2013).
[5] Energy Reorganization Act of 1974 §201, 42 U.S.C. 5841 (2013).
[6] AEA §110, 42 U.S.C. § 2140 (2013). See also ERA §202, 42 U.S.C. 5842 (2013), Transferring Licensing and Related Regulatory Functions Respecting Selected Administration Facilities, including chapters 6, 7, 8, and 10 of the AEA and other specific activities including demonstration reactors operated for the purpose of demonstrating the suitability for commercial application, but not chapter 4 of the AEA, including research and development activities related to atomic energy.
[7] AEA §11, 42 U.S.C. §2014 (2013) defining "research and development" as "Theoretical analysis, exploration, or experimentation; or (2) the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, materials, and processes.

[8] *Id.* at §31, 42 U.S.C. §2051 (2013).

environmental and national security needs, including programs to support NRC licensing.[9] While the Atomic Energy Commission, as DOE's predecessor, once exercised its authority willingly to construct and operate experimental reactors to advance nuclear science and technology, the DOE has not completed an experimental reactor project in decades.[10] Moreover, many have questioned whether U.S. energy policy and law has kept pace with the nation's shift to a technology-based economy that now relies on the private sector to finance highly-regulated nuclear energy technology development.[11]

As the NRC must recover 90% of its budget from licensees, of which all reactor licensees use a light-water moderated reactor core, the Commission has concentrated its technical expertise on one reactor technology.[12] This has raised questions of whether the Commission will be capable of approving licenses for alternative reactor concepts in a timely manner, including experimental fusion and advanced fission reactors.[13] Since DOE has the mission to advance nuclear science and technology and the authority to construct and operate experimental reactors, new policy questions have arisen about whether the DOE should aggressively use its authority to rapidly expand practical knowledge of nuclear energy and enable the private sector to develop relevant intellectual property. While the DOE labs currently operate research reactors under DOE authority, the Department has not overseen the construction of a new reactor in decades and questions remain whether it can carry out this work without some form of technical assistance from the NRC.

Supplemental Material

- Congressional Research Services Memorandum, "NRC Licensing of Proposed DOE Nuclear Facilities," July 20, 2015.

[9] See generally DOE Office of Nuclear Energy website available here: http://www.energy.gov/ne/about-us. See also DOE Small Modular Reactor Licensing Technical Support program here: http://www.energy.gov/ne/nuclear-reactor-technologies/small-modular-nuclear-reactors.

[10] See, for example, Idaho National Laboratory's comprehensive list of experimental reactors here: http://www4vip.inl.gov/research/52-reactors/. See also DOE Hanford Fast Flux Test Facility here: http://www.hanford.gov/page.cfm/400areafftf.

[11] *The Future of Nuclear Energy: Hearing Before the Subcomm. on Energy of the H. Comm. on Science, Space, and Technology,* 113th Cong. (2014), available here: https://science.house.gov/hearing/energy-subcommittee-future-nuclear-energy. See also *Nuclear Energy Innovation and the National Labs Before the Subcomm. on Energy of the H. Comm. Science Space and Technology,* 114th Cong. (2015), available here: https://science.house.gov/hearing/subcommittee-energy-hearing-nuclear-energy-innovation-and-national-labs.

[12] 10 C.F.R. §§ 170, 171.

[13] See *The Future of Nuclear Energy*, *supra* note 11.

Chairman WEBER. The Subcommittee on Energy will come to order.

Without objection, the Chair is authorized to declare recesses of the Subcommittee at any time.

Welcome to today's hearing titled "A Review of the Nuclear Regulatory Commission's Licensing Process," and I recognize myself for five minutes for an opening statement.

Good morning, Chairman Burns. Welcome. Welcome to this hearing on the Nuclear Regulatory Commission's licensing process as it relates to the Department of Energy's nuclear R&D programs. Today, we're going to hear from the Honorable Stephen Burns, Chairman of the U.S. Nuclear Regulatory Commission (NRC), regarding the extent to which the NRC and the DOE may actually cooperate to enable vital nuclear energy research. Chairman Burns, we're looking forward to your testimony.

Over the next five minutes or so, I want to give you a quick overview of this Subcommittee's previous hearings that have actually led us to hold this hearing today. Last December, we heard from a startup company and an environmental institution explaining that tech companies trying to develop the next generation of nuclear technology need greater regulatory certainty to raise capital in today's market. They suggested that the DOE should use its national labs as a forum to allow private developers to carry out this work—interesting suggestion.

In May, we heard from another tech company explaining that research infrastructure to provide versatile neutron irradiation capabilities is vital for universities and the next-generation tech companies to research new materials and fuels. We also heard from the Director of DOE's Nuclear Energy Innovation Hub that the increased capabilities to model and simulate nuclear reactions will allow researchers to eliminate assumptions, which can speed up and lower the cost to develop new technologies across the board.

So what does all this mean? I'll keep it simple: we have the best engineers in the world that want to take on commercial risk and develop these next-generation technologies if we just give them the opportunity. These new technologies can do five things: number one, mitigate proliferation risk, which is important; number two, increase fuel utilization; number three, reduce waste yields; number four, achieve higher safety margins; and number five, reach higher levels of thermal efficiency.

The United States is at its best when we provide a clear path for our for our technology innovators to do what they do best: find creative solutions to the world's challenges.

So now I'll explain what we intend to discuss in today's hearing. This Committee has often found bipartisan support for the nation's open-access user facilities that provide unique capabilities for both basic and applied R&D. This is a particularly good model because the users ultimately take on whatever form of commercial risk they so choose while the government simply provides the infrastructure capability. The prospective DOE user facility we're considering today would be a fast-reactor-based neutron source. As a practical matter, the construction of such a facility will almost certainly require some form of technical assistance from the NRC, and that will be an interesting topic to explore.

Another issue, and perhaps the most challenging question for the Subcommittee, is how can the federal government can make the process simpler for entrepreneurs to conduct experiments that would enable them to translate theories for alternative reactor concepts into reality. The NRC has a regulatory process for non-power reactors, but the time required to issue a license appears to have created somewhat of a barrier to investment. So this raises a couple of important questions relevant to our discussion today. Number one, can the DOE use its authority to host private developers to conduct novel experiments advancing next-generation nuclear technology? And number two, could the NRC benefit in any way by allowing its staff to provide technical expertise and gain firsthand knowledge of such reactor experiments?

It is important that we work together to find solutions to these challenges. America cannot and must not lag behind our global competitors in this area of critical technology.

Again, we want to thank Chairman Burns for his testimony today, and we look forward to hearing from you on the NRC's role in advancing nuclear energy for our nation.

[The prepared statement of Chairman Weber follows:]

PREPARED STATEMENT OF SUBCOMMITTEE ON ENERGY
CHAIRMAN RANDY K. WEBER

Good morning and welcome to today's Energy Subcommittee hearing on the Nuclear Regulatory Commission's licensing process as it relates to the Department of Energy's Nuclear R&D programs. Today, we will hear from the Honorable Stephen Burns, Chairman of the U.S. Nuclear Regulatory Commission (NRC), regarding the extent to which the NRC and DOE may cooperate to enable vital nuclear energy research. Chairman Burns, we thank you for your attendance today.

Over the next five minutes or so, I want to give a quick overview of this Subcommittee's previous hearings that have led us to hold this hearing today.

Last December, we heard from a startup company and an environmental institution explaining that tech companies trying to develop the next generation of nuclear technology need greater regulatory certainty to raise capital in today's market. They suggested that the DOE should use its national labs as a forum to allow private developers to carry out this work.

In May, we heard from another tech company explaining that research infrastructure to provide versatile neutron irradiation capabilities is vital for universities and the next generation tech companies to research new materials and fuels. We also heard from the director of DOE's nuclear energy innovation HUB that the increased capabilities to model and simulate nuclear reactions will allow researchers to eliminate assumptions, which can speed up and lower the cost to develop new technologies across the board.

So what does this all mean? I'll keep it simple: we have the best engineers in the world that want to take on commercial risk and develop these next generation technologies if we just give them the opportunity.

These new technologies can:

- Mitigate proliferation risk
- Increase fuel utilization
- Reduce waste yields
- Achieve higher safety margins
- And reach high levels of thermal efficiency

The United States is at its best when we provide a clear path for our technology innovators to do what they do best - find creative solutions to the world's challenges. So now I'll explain what we intend to discuss today.

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Another issue, and perhaps the most challenging question for the Subcommittee, is how the federal government can make the process simpler for entrepreneurs to conduct experiments that would enable them to translate theories for alternative reactor concepts to reality. The NRC has a regulatory process for non-power reactors, but the time required to issue a license appears to have created a barrier to investment. This raises several important questions relevant to our discussion today. Can the DOE use its authority to host private developers to conduct novel experiments advancing next generation nuclear technology, and could the NRC benefit in any way by allowing its staff to provide technical expertise and gain firsthand knowledge of such reactor experiments?

It is important that we work together to find solutions to these challenges. America must not lag behind our global competitors in this area of critical technology.

Again, I thank Chairman Burns for his testimony today, and I look forward to hearing from you on the NRC's role in advancing nuclear energy for our nation.

Chairman WEBER. I now recognize the Ranking Member, the gentleman from Florida, for an opening statement.

Mr. GRAYSON. Thank you, Chairman Weber, for holding this hearing today, and thank you, Chairman Burns, for testifying this morning.

The Nuclear Regulatory Commission has a vital role to play in ensuring the health and safety of the American people. The importance of this role in protecting health and the environment cannot be overstated.

I look forward to learning more this morning about how the NRC is applying lessons learned during the Fukushima disaster in 2011, and lessons learned during the premature degradation of parts of the San Onofre Nuclear Generating Station in 2012, as well as similar incidents and accidents around the world.

Today we'll discuss new, advanced nuclear technologies that address the safety, waste, and cost issues associated with previous generations of nuclear power plants. Given that the bulk of NRC's expertise and resources are focused on licensing, and ensuring the safety of, current light-water reactors, the path for developing, commercializing, and licensing newer technologies is less clear. Should a breakthrough in nuclear fusion be achieved in the next decade, the path toward licensing a fusion reactor is to be determined. I look forward to working with you, Chairman Burns, to address these issues as they arise.

New technologies have a potential to change the world's energy landscape radically. They have the potential to meet our energy needs while significantly reducing the threat of climate disruption. We must give these new energy options the chance to prove themselves while also ensuring that they are not compromising our health or our safety in any way.

Chairman Burns. I look forward to hearing your testimony, and I yield back the balance of my time.

[The prepared statement of Mr. Grayson follows:]

PREPARED STATEMENT OF SUBCOMMITTEE ON ENERGY
MINORITY RANKING MEMBER ALAN GRAYSON

Thank you, Chairman Weber for holding this hearing today, and thank you to Chairman Burns for testifying this morning.

The Nuclear Regulatory Commission has a vital role to play in ensuring the health and safety of the American people. The importance of its role in protecting the environment, particularly in a time where recent events have led some to question the future of nuclear power, cannot be overstated. I look forward to learning more this morning about how the NRC is applying lessons learned during the Fukushima disaster in 2011, and lessons learned during the premature degradation of parts of the San Onofre Nuclear Generating Station in 2012, as well as similar incidents around the world.

Today, I hope you will discuss the potential for new, advanced nuclear technologies that address the safety, waste, and cost issues associated with previous generations of nuclear power plants. Given that the bulk of NRC's expertise and resources are focused on licensing, and ensuring the safety of, current light water reactors, the path for developing, commercializing, and licensing newer, and potentially far superior, technologies is less clear. Should a breakthrough in nuclear fusion be achieved within the next decade, the path toward licensing a fusion reactor is murky, at best.

I look forward to working with you, Chairman Burns, to address these issues as they arise. Advanced fission, and especially fusion energy, technologies have the potential to radically change the world's energy landscape. They have the potential to meet our energy needs while significantly reducing the threat of climate disruption. We must give these new energy options the chance to prove themselves while also ensuring that we are not compromising the health and safety of our citizens in any way.

Thank you, again, for being here, Mr. Burns. I look forward to hearing your testimony, and I yield back the balance of my time.

Chairman WEBER. Thank you, Mr. Grayson, and I recognize the Chairman of the full Committee, the gentleman from Texas, Mr. Smith.

Chairman SMITH. Thank you, Mr. Chairman.

Today's hearing will examine opportunities for advances in nuclear fission and fusion energy technologies. We will hear from the Chairman of the U.S. Nuclear Regulatory Commission, Stephen Burns, who will provide the regulatory perspective on matters of policy for the next generation of nuclear energy technology.

The Nuclear Regulatory Commission is an independent regulatory agency that licenses and regulates America's civilian nuclear material and technology. The NRC was established in 1974 when Congress separated the supportive nuclear research and development aspects of the Atomic Energy Commission from its regulatory side.

Currently, the Department of Energy supports nuclear R&D to advance nuclear science while the NRC licenses new technologies as the private sector brings them to the market.

Today we will get a better understanding of how DOE can more effectively advance innovation in nuclear energy and align its R&D priorities to fill gaps where the NRC is not permitted to do so.

Nuclear energy provides reliable, zero-emission power. This technology represents a great opportunity for innovation to increase our nation's economic prosperity and global competitiveness. Yet the status quo is not working to bring new reactor concepts to the market. One challenge is that the NRC's licensing mechanism for alternative reactor concepts is not yet fully developed. This is not necessarily a fault of the NRC, as it must first oversee the safety of its licensees, which fund 90 percent of the Commission's budget.

The NRC's strict mission focus has helped the U.S. nuclear industry attain one of the safest working environments in the world.

The Committee's responsibility, however, is to look beyond today. We must search for opportunities where our nation's R&D can help make our future brighter.

The DOE national laboratories provide vital capabilities for the private sector to invest in innovative energy technologies. This includes its open-access user facilities, which are one-of-a-kind machines that allow researchers to investigate fundamental scientific questions. These facilities enable a wide array of researchers from academia, defense, and the private sector to develop new technologies without favoring one type of design. This represents a better approach than simply picking winners and losers through energy subsidies.

DOE's labs also provide the fundamental research capabilities that lead to scientific publications or proprietary research. For nuclear energy R&D, this research is especially challenging because of the inherent regulatory burden that comes with using nuclear material. For this reason, the DOE and NRC should cooperate where appropriate to ensure that the R&D investments we make today will reach the market for the benefit of all Americans tomorrow.

Thank you, Mr. Chairman, and I yield back.

[The prepared statement of Chairman Smith follows:]

PREPARED STATEMENT OF FULL COMMITTEE CHAIRMAN LAMAR S. SMITH

Today's hearing will examine opportunities for advances in nuclear fission and fusion energy technologies.

We will hear from the Chairman of the U.S. Nuclear Regulatory Commission, Stephen Burns, who will provide the regulatory perspective on matters of policy for the next generation of nuclear energy technology.

The Nuclear Regulatory Commission (NRC) is an independent regulatory agency that licenses and regulates America's civilian nuclear material and technology. The NRC was established in 1974 when Congress separated the supportive nuclear research and development (R&D) aspects of the Atomic Energy Commission from its regulatory side. Currently, the Department of Energy (DOE) supports nuclear R&D to advance nuclear science while the NRC licenses new technologies as the private sector brings them to the market.

Today, we will get a better understanding of how DOE can more effectively advance innovation in nuclear energy and align its R&D priorities to fill gaps where the NRC is not permitted to do so. Nuclear energy provides reliable, zero-emission power. This technology represents a great opportunity for innovation to increase our Nation's economic prosperity and global competitiveness.

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These facilities enable a wide array of researchers from academia, defense, and the private sector to develop new technologies without favoring one type of design. This represents a better approach than simply picking winners and losers through energy subsidies.

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For this reason, the DOE and NRC should cooperate where appropriate to ensure that the R&D investments we make today will reach the market for the benefit of all Americans tomorrow.

Thank you Mr. Chairman and I yield back.

Chairman WEBER. Thank you, Chairman.

Our witness today is the Honorable Stephen Burns, Chairman of the U.S. Nuclear Regulatory Commission. Mr. Burns served as General Counsel of the NRC from May 2009 until April 2012 after having served as the NRC's Deputy General Counsel from 1998. Mr. Burns received his bachelor's degree in German magna cum laude from Colgate University and his J.D. from George Washington University. Mr. Burns, you are now recognized for five minutes.

TESTIMONY OF HON. STEPHEN BURNS, CHAIRMAN, U.S. NUCLEAR REGULATORY COMMISSION

Mr. BURNS. I appreciate the opportunity to appear before you today to discuss the NRC's licensing policies as they might apply to current and prospective Department of Energy nuclear energy research and development programs.

In January, the NRC marked its 40th anniversary as the independent agency in the United States responsible for licensing and regulating civilian uses of radioactive materials and nuclear facilities to ensure the production—protection—excuse me—of public health and safety, the common defense and security and the environment.

The NRC's regulatory program has been substantially strengthened over the years based in part on what we have learned from both domestic as well as international operating experience. Staff has made significant progress in preparing to review design certification applications for small modular reactors, one of which is expected to be submitted in late 2016.

And finally, the NRC is taking initial steps to prepare for the review and licensing of non-light-water reactor designs, which are the subject and focus of today's hearing.

Our cooperation with the Department of Energy on topics of mutual interest dates back to the Energy Reorganization Act of 1974 when the old Atomic Energy Commission was split into two separate organizations, the Energy Research and Development Administration, which later became part of the Department of Energy, and the NRC.

The skills and experience base of NRC and DOE are highly complementary. The mandate to correct—or to conduct R&D programs including civilian nuclear energy research, development and demonstration ensures that the Department of Energy has a deep technical capacity in a wide range of nuclear technologies. The NRC as an independent body focuses on licensing and oversight of commercial nuclear power operations to ensure public health and safety.

The mutually beneficial relationship across the nuclear plant lifecycle pays dividends to both agencies. DOE has been a key tech-

nical partner as the NRC moves toward gaining expertise in non-light-water technologies and looks to adapt its licensing framework.

The statutory authorities governing cooperation between NRC and DOE are well established. Our role in a project located at a DOE site is shaped by the purposes and function of the proposed project. Depending on the specific goal and purpose of the project, NRC could have licensing and regulatory authority over some types of facilities that are envisioned, for example, in H.R. 1158. For example, the Atomic Energy Act currently authorizes the NRC to issue licenses for production and utilization facilities for commercial purposes or licenses for research and development purposes.

The NRC has substantial experience in reactor licensing processes that are well established and which have been applied to an array of reactor technologies. We've determined that our current reactor design or licensing regulations are adequate for conducting reviews of advanced reactor applications. However, we recognize the potential gaps in understanding of acceptance criteria for both the NRC staff and applicants.

To better understand the opportunities for most efficiently adapting the current regulatory framework for non-light-water reactors, the agency has reviewed our licensing processes and infrastructure. We had a report in 2012 to Congress on advanced reactor licensing, and it included such recommendations as the need for additional research in areas such as materials and structural analysis, the need for appropriate computational tools for use in application reviews, and ensuring that appropriately trained and experienced staff are able to perform the reviews. We'll continue to develop our capability to evaluate non-light-water designs that may proceed to commercial maturity at a pace consistent with appropriated resources and Congressional direction.

We don't favor one particular technology over another, but through open communication with the non-light-water community and developers, and with the DOE, we're able to better optimize our planning and resources to conduct licensing reviews when a complete and technically sufficient application is presented for our consideration. We'll continue to work closely with DOE within our respective legal mandates to look for additional joint opportunities to make overall reactor development and licensing processes as transparent and as navigable as possible to reactor designs and potential applicants. In fact, we plan to hold a series of public workshops with the DOE starting this September to engage further with the designers, applicants, industry groups and the public.

In closing, I'll note that the NRC remains a technically adept and widely respected independent regulator domestically and internationally. Drawing on our experience and licensing processes to protect public health and safety, we have taken a number of steps to prepare ourselves for the future while we also recognize the important and complementary role the DOE plays.

Thank you for the opportunity to appear before the subcommittee today, and I look forward to your questions. Thank you.

[The prepared statement of Mr. Burns follows:]

WRITTEN STATEMENT
BY STEPHEN G. BURNS, CHAIRMAN
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY
July 29, 2015

Good morning, Chairman Weber, Ranking Member Grayson, and distinguished Members of the Subcommittee. I appreciate the opportunity to appear before you today to discuss the Nuclear Regulatory Commission's (NRC) licensing policies as they apply to current and prospective Department of Energy (DOE) nuclear energy research and development programs.

I will begin with a brief overview of NRC responsibilities. NRC conducts licensing and oversight activities for commercial nuclear power reactors, research and test reactors, decommissioning and waste management activities, uranium recovery facilities, fuel facilities, and radioactive materials users, including those overseen directly by the 37 states, known as "Agreement States," that have agreements with the NRC to assume regulatory responsibility for the use of certain radioactive materials.

In January, the NRC marked its 40th anniversary as the independent agency responsible for licensing and regulating the nation's civilian use of radioactive materials to ensure protection of public health and safety, common defense and security, and the environment. The NRC's regulatory program has been substantially strengthened, based in part on what we have learned from domestic and international operating experience. Our role begins during pre-application discussions with prospective applicants, and continues through the entire plant life-cycle, from plant design certification, combined license, manufacturing license, or operating license, construction, operations, through decommissioning, and, finally, radioactive waste storage and disposal.

The NRC has been involved in many significant activities regarding commercial nuclear power generation. To date, the NRC has renewed operating licenses for 74 of the 99 currently operating nuclear power reactors, extending the licensed life for each of these units. The NRC has granted 156 power uprates, which translates to 7,326 additional megawatts of electrical capacity for the nation.

In the area of new reactors, the NRC has issued six design certifications and is currently reviewing one design certification application. The agency also has issued combined licenses for five new nuclear reactor units, four of which are currently under construction. The NRC is poised to hold hearings for three additional combined license applications and one early site permit in 2015 and in 2016. In addition, the NRC is reviewing an application to operate Watts Bar Unit 2, for which construction had been suspended in 1985 after a substantial portion of the plant had been built.

With respect to advanced reactors, the NRC staff has made significant progress in preparing to review design certification applications for small modular reactors, one of which is expected to be submitted in late 2016. The NRC is also taking initial steps to prepare for the review and licensing of non-light water reactor (non-LWR) designs.

License Extension Beyond 60 Years:

The NRC's license renewal process provides reasonable assurance of safe plant operation for extended plant life for 20 additional years beyond the initial 40-year operating license term. In addition to the NRC's regulatory requirements, the staff issued a "Standard Review Plan," or SRP, for reviewing license renewal applications and a "Generic Aging Lessons Learned Report," which is commonly referred to as the GALL Report. These documents describe

methods acceptable to the staff for implementing the license renewal rule and evaluating license renewal applications to ensure quality and uniformity in NRC reviews.

The Commission has affirmed that the current license renewal regulatory framework is sufficient to support the review of subsequent license renewal for operation from 60 to 80 years. The NRC staff is nearing completion of an updated GALL Report and an SRP to address aging issues that nuclear power plants may experience for operation up to 80 years. The staff plans to issue these documents for public comment by the end of this year and expects to finalize the guidance documents needed to review these applications prior to the first subsequent license renewal application expected to be filed in late 2018 or early 2019.

The NRC staff continues to monitor the industry, DOE, and Electric Power Research Institute's progress on resolving the major technical issues for subsequent license renewal. These issues include reactor pressure vessel neutron embrittlement, irradiation assisted stress corrosion cracking of reactor internals and primary system components, concrete and containment degradation, and electrical cable qualification and condition assessment.

DOE is currently undertaking activities focused on evaluating damage to components and materials that have been collected from decommissioned nuclear power plants. I understand that these research activities can provide direct information on the performance and age-related degradation of safety-significant components. Findings from these activities may inform both the NRC's ongoing development of license renewal guidance document, and the NRC's evaluation of initial license applications for subsequent license renewal. The NRC staff is engaged in collaborative discussions and meetings to harness relevant data, information, and knowledge gained through the Light Water Reactor Sustainability program's research activities to better inform the Commission's subsequent license renewal process.

The NRC staff also is monitoring the activities of the Consortium for Advanced Simulation of Light Water Reactors initiative, primarily in the broad area of nuclear reactor thermal hydraulic analysis. The NRC is not currently aware of any DOE codes developed through the Consortium that have been used to support license renewal or subsequent license renewal at this time. However, we will continue to monitor should there be any new developments in this area.

Regulatory Authorities and Technical Assistance to DOE for Non-Light Water Reactors

The statutory authorities governing co-operation between the NRC and DOE are well established. NRC's role in a project located at a DOE site is shaped by the purpose and function of the proposed project. This includes the projects contemplated in Congressman Hultgren's legislation titled, "Department of Energy Laboratory Modernization and Technology Transfer Act of 2015" (H.R. 1158).

Depending on the specific goal and purpose of the project, the NRC could have licensing and regulatory authority over some of the types of facilities envisioned in H.R. 1158. For example, the Atomic Energy Act of 1954, as amended (AEA), authorizes the NRC to issue licenses for production and utilization facilities for commercial purposes or licenses for research development purposes.

The NRC regulates to ensure "adequate protection to the health and safety of the public" and "in accord with the common defense and security", which the AEA requires as a minimum safety standard. Congress gave the Commission the discretion, in exercising its licensing authority, to determine what constitutes "adequate protection" on a case-by-case basis, based on expert

engineering and scientific judgment, and in light of all relevant information, including improvements in nuclear technology over time.

The NRC would have licensing and regulatory authority over reactors located on DOE-owned facilities that fit the NRC's definition of a "prototype reactor" or for "research and development" that are operated as part of the power generation facilities of an electric utility system, or that are operated in any other manner for the purpose of demonstrating the suitability for commercial application of such a reactor. Under Section 202 of the Energy Reorganization Act, the NRC also has licensing authority for demonstration liquid metal fast breeder reactors and other demonstration nuclear reactors. In contrast, the NRC would not have regulatory authority over reactors located on DOE-owned facilities that are used for the purpose of collecting data for research, testing of materials, or testing of fuels, as is proposed for the fast-reactor user facility. I would note if the data collected in such a facility are intended to be used to make a safety case in a future license application, an NRC quality assurance program under Appendix B to 10 CFR Part 50 or an equivalent NRC-approved program would need to be followed in collecting the data.

Under the NRC's rules, an application for a design certification, combined license, manufacturing license, or operating license that proposes a nuclear reactor design that differs significantly from light-water reactor designs licensed prior to 1997 or uses simplified, inherent, passive, or other innovative means to accomplish its safety function, must meet certain requirements. The regulations provide that such designs will only be approved if the performance of each safety feature of the design, the interdependence of the safety features, and operation of the design over a range of operating conditions have been demonstrated through either analysis, appropriate test programs, experience, sufficient data, some

combination of these methods, or acceptable testing of a prototype plant over a range of operating conditions.

A prototype plant is similar to a first-of-a-kind or standard plant design in all features and size, but may include additional safety features to protect the public and the plant staff from the possible consequences of accidents during the testing period. If a prototype plant developed by DOE and subject to NRC licensing is used to comply with the testing requirements for a first-of-a-kind reactor design that differs significantly from existing light-water reactor technology, then the NRC may impose additional requirements on siting, safety features, or operational conditions for the prototype plant to provide this additional protection.

The Subcommittee also expressed an interest in a privately funded facility to be constructed and operated at a DOE site. As I understand it, the purposes of such a proposed facility would be to resolve technical uncertainty, prove concepts by reducing theory to reality, generally conduct research and development activities to improve nascent technologies, build upon existing theories, generate verifiable data, and improve reactor technologies. However, if such a facility would likely be used ultimately as a basis for commercial power reactor technologies, or ownership of the facility would be held by private parties, such a facility would fall within the NRC's regulatory purview and an NRC license would be required, even though the facility would be located on a DOE site.

In the alternative, if a proposed DOE facility is outside of the NRC's regulatory authority, the NRC could provide technical assistance to the DOE if resources are available. Examples of this assistance could include support in areas such as construction inspection and radiation safety for plant personnel. To maintain our regulatory independence, if a DOE facility requires an NRC license, the agency would be precluded from providing developmental technical assistance to

the DOE. However, the same regulatory and safety guidance provided to any potential NRC license applicant would be available to the DOE. The specific mechanisms used to provide the requested technical assistance would be determined concurrent with development of the required budget authorities needed to provide the requested assistance.

There are many examples of NRC and DOE cooperation on non-LWR projects. In 1982, the NRC reviewed the Clinch River Breeder Reactor Preliminary Safety Analysis Report submitted as part of a construction permit application developed in part by DOE's predecessor agency, the Energy Research and Development Administration. The NRC issued a Final Safety Evaluation Report for the Clinch River facility in 1983. In addition, beginning in 1986, the NRC staff conducted a pre-application review of the DOE-sponsored Modular High Temperature Gas Reactor (mHTGR) design. The review objectives were to identify key safety, research, and licensing issues and to provide feedback to the DOE on the licensability of the design. In 1989, the NRC issued a draft Pre-Application Safety Analysis Report for the mHTGR design.

In 1987, the NRC staff conducted a pre-application review of the GE-Hitachi PRISM Preliminary Safety Information Document prepared by the DOE. The NRC staff issued a Pre-application Safety Evaluation Report for the PRISM design, which identified no obvious impediments to licensing the PRISM design. Also beginning in 1986, the NRC performed a similar review of the DOE's Pre-application Safety Information Document for the Sodium Fast Reactor Design.

Most recently, in 2008, the NRC and DOE jointly issued the "Next Generation Nuclear Plant Licensing Strategy, A Report to Congress."[1] This report outlined the licensing strategy for a

[1] The NGNP project was formally established by the Energy Policy Act of 2005 (EPAct 2005), designated as Public Law 109-58, 42 USC 16021, to demonstrate the generation of electricity and/or hydrogen with a high-temperature nuclear energy source. The project is being executed in collaboration with industry, DOE national laboratories, and

very high-temperature gas-cooled reactor (HTGR) to be built on a DOE-owned site. In 2010, the DOE taught a HTGR technology course for NRC staff. In 2012, the DOE submitted a series of technical and policy issue white papers that were reviewed by the NRC. The NRC issued a comprehensive technical assessment of the key licensing issues in July 2014. In each case, the NRC and DOE provided valuable input while staying within their congressionally mandated roles and responsibilities.

Adapting the Current Regulatory Regime for Non-Light-Water Technology

The NRC has substantial experience in reactor licensing, with licensing processes that are well established and which have been applied to an array of reactor technologies and designs. The NRC has taken a number of proactive steps to consider how it might apply these processes efficiently and effectively to the review of new advanced reactor designs.

In 1986, the Commission issued a Policy Statement on the Regulation of Advanced Reactors, later updated in 2008. The policy statement expresses the intent of the Commission to develop the capability for timely assessment and response to innovative and advanced reactor designs that might be presented for NRC review. It also encourages the earliest possible interaction between the NRC and applicants, vendors, and other government agencies to provide for early identification of regulatory requirements for advanced reactors and to provide all interested parties, including the public, with a timely and independent assessment of the safety and security characteristics of advanced reactor designs.

U.S. universities. The U.S. Nuclear Regulatory Commission is responsible for licensing and regulatory oversight of the demonstration nuclear reactor.

The NRC has determined that its current reactor licensing regulations are adequate for conducting reviews of advanced reactor applications. However, because the NRC's current reactor licensing regulations and guidance documents were developed based on light-water reactor technologies, the NRC recognizes the potential knowledge gaps for both the staff and prospective applicants in understanding the acceptance criteria for non-light water reactor designs.

To better understand the opportunities for most efficiently adapting the current regulatory framework for non-LWRs, the agency has reviewed, and continues to review, our licensing processes and infrastructure for both light water and non-LWR technologies. These reviews identified process strengths, opportunities for improvement, incorporated lessons learned, and will aid agency planning to make the most effective use of our technical resources.

Some of the challenges associated with licensing non-LWR designs identified in the agency's "Report to Congress: Advanced Reactor Licensing," dated August 2012, and the NRC staff's recent recommendations to the Commission, "Status of the Office of New Reactors Readiness to Review Small Modular Reactor Applications" (SECY-14-0095) include:

- the need for additional non-LWR research, in areas such as materials and structural analysis, so that the analytical methods and experimental data can support the requisite independent safety findings by the NRC staff on non-LWR applications;
- the need for appropriate computational tools for use in non-LWR application reviews;
- the need to ensure that appropriately trained and experienced staff are available to perform non-LWR application reviews.

The NRC has also recognized the importance of appropriate timing in the development of the capability to review non-LWR applications, as described in the Advanced Reactor Policy

Statement. As demonstrated over the last 10 years, industry and financial market turbulence have had a significant impact on the agency's ability to plan for the submission of new reactor applications. The agency uses a wide variety of resources to gain the best available insights on market factors that could impact the timing of potential applications. For example, the Energy Information Agency's recent annual report, "Annual Energy Outlook – 2015," estimates a near-flat growth rate in domestic electricity demand and continued uncertainty in non-nuclear fuel prices through the year 2040.

Recognizing these challenges, the agency intends to continue to develop its capability to execute its mission for non-LWR designs that may proceed to commercial maturity, at a pace consistent with its appropriated resources and Congressional direction.

As emphasized in the Commission's policy statement, maintaining open communications with a wide variety of industry, government, and public stakeholders will provide the agency with information it can use to address approaching challenges. Strong communications assist non-LWR designers and potential applicants in understanding the NRC's roles and responsibilities in the reactor development lifecycle. They also provide the NRC with an early indication of non-LWR design trends, potentially unique design features, and the potential for reaching design maturity. The DOE's role in the research and development process provides the NRC with additional important insights.

Consistent with our mission, the NRC does not favor one particular nuclear technology over another. But, informed by our open communications with the non-LWR developer community and with the DOE, the NRC will be able to optimize its planning processes and resource expenditures to conduct licensing reviews when a complete and technically sufficient non-LWR application is presented for consideration.

The NRC engages its stakeholders using a variety of communications methods and channels. Examples include the annual Regulatory Information Conference, the use of Regulatory Information Summaries to obtain the voluntary submittal of information that will assist the NRC in the performance of its functions, a comprehensive website and social media presence, the use of open public meetings on a wide range of topics, and direct engagement with host communities to nuclear power plants. The NRC also takes advantage of DOE-sponsored industry forums as opportunities to assist non-LWR developers and stakeholders in better understanding the NRC's statutory roles and responsibilities. For example, in March 2015, DOE-sponsored meetings at six universities across the United States. The meetings solicited a wide range of inputs on nuclear power innovation from a broad cross-section of participants. We understand inputs from the workshops are being consolidated to provide a report summarizing all of the regionally focused technical discussions with specific recommendations to the Department of Energy's Office of Nuclear Energy for enhancements or additions to Research Development and Demonstration programs. The NRC participated in four of these workshops as observers. The workshops provided an opportunity for the NRC to collect direct feedback from participants and for the NRC to explain its roles and responsibilities in the technology development lifecycle to workshop attendees.

The NRC, consistent with its mission as an independent safety and security regulator, will continue to look for additional opportunities to work with DOE and make the NRC's licensing processes transparent and navigable to reactor designers/potential applicants, the financing community, and other stakeholders. In this vein, the NRC plans to hold a series of public workshops with the DOE starting this September to engage further with non-LWR designers, potential applicants, industry groups, and the public.

In closing, I will note that the NRC remains a technically adept, independent regulator. Drawing on our regulatory experience and licensing processes that protect public health and safety, we have taken a number of steps to prepare ourselves for the review and regulation of non-LWR technologies in a changing environment. We also recognize the important and complementary role that DOE plays in those preparations. We are prepared to perform additional tasks if funding is provided. Thank you for the opportunity to appear before the Subcommittee today, and I look forward to your questions.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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Stephen G. Burns

The Honorable Stephen G. Burns was sworn in as a Commissioner of the U.S. Nuclear Regulatory Commission (NRC) Nov. 5, 2014, to a term ending June 30, 2019. President Obama designated Mr. Burns as Chairman of the NRC effective Jan. 1, 2015.

Mr. Burns has a distinguished career as an attorney both within the NRC and internationally. Before returning to the NRC, he was the Head of Legal Affairs of the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development in Paris. In that position, which he held since April 2012, Mr. Burns provided legal advice and support to NEA management, carried out the legal education and publications program of the NEA, and provided advice and secretariat services to the Nuclear Law Committee and to the Contracting Parties to the Paris Convention on Third Party Liability in the Field of Nuclear Energy.

Mr. Burns joined the NRC as an attorney in 1978. Prior to assuming his post at the NEA, Mr. Burns served as General Counsel of the NRC from May 2009 until April 2012 after having served as the NRC's Deputy General Counsel from 1998. He also served as Executive Assistant to former NRC Chairman Kenneth M. Carr.

Mr. Burns received a bachelor's degree, magna cum laude, in 1975 from Colgate University in Hamilton, New York. He received his law degree with honors in 1978 from the George Washington University in Washington, D.C., where he was an editor on the George Washington Law Review.

Mr. Burns received the NRC's Distinguished Service Award in 2001 and the Presidential Meritorious Executive Rank Award in 1998 and 2008.

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Chairman WEBER. Thank you, Chairman Burns.

You said the NRC was 40 years old in 1975?

Mr. BURNS. Yes. We came into existence at the beginning of 1975.

Chairman WEBER. January 1975?

Mr. BURNS. We have a 40th birthday this year.

Chairman WEBER. Well, you don't look that old. I just want to—interestingly enough, on this day in history, in 1957, the IAEA was formed, so it's a very apropopriate date for us to have this testimony.

Chairman Burns—I'm going to recognize myself for five minutes for questions.

Chairman Burns, I believe you said that the NRC would not have jurisdiction over a DOE-owned and -operated user facility such as a proposed fast-reactor-based neutron source under consideration in this Committee. That said, if the DOE is to build this prospective facility under its own authority, my notes are saying it may require technical review from the NRC, and of course, we believe that it would, and can you elaborate on the extent to which the NRC would be able to provide that technical assistance to the DOE for such a project as this?

Mr. BURNS. Certainly. As you say, with the assumption that it's a DOE facility or created and constructed on behalf of the Department of Energy, we're still able to provide technical assistance and support to the Department. It's similar—it would be similar to what we do in the naval reactors area. We provide naval reactors reviews of new submarine reactor designs, and not only submarines, I think more recently an aircraft carrier design. So under basically reimbursable agreements, we will look at those technologies and can provide that kind of assistance. It also in some respects can benefit us to the extent that in the future, we may have similar type technology come before us in our own licensing role. We can gain experience that way.

Chairman WEBER. Well, you would be on the cutting edge or the leading edge, as it were, of watching that kind of technology develop.

You pointed out that if data collected from this facility is used to make the safety case in a future license application, the NRC would need to ensure that its Quality Assurance Program is followed. It makes sense to me that you would need to independently verify data if it's used to prove the safety for a product once it's commercial. So my question is this: Could this potential facility be helpful to the Commission for that very purpose, for verifying that physical data?

Mr. BURNS. I think it could be, and again, I think the point I was trying to make in the testimony was that when you do the evaluations and the testing—and the Department would be doing it at a high-quality level. I don't mean to cast any aspersion. But again, if you're looking for transferability from the Department's context and then ultimately to, say, a commercial context, the more you have conformity or harmony between the two organizations, the more useful I think in the long term the outcomes or the information you glean will be.

Chairman WEBER. In layman's terms, if you actually watch that process unfold, understand the steps it took to get there and the verifiability of that data, then that would actually help the NRC in its role, wouldn't it?

Mr. BURNS. Yes. It's not—and it's not only the being able to observe or see the results but it's also the processes through which the results are obtained.

Chairman WEBER. Sure. You explained in your opening testimony, Chairman Burns, that the NRC's role in the project at a DOE site would rest on the purpose and function of the proposed project. So if I understand your testimony correctly, DOE may enable private developers to construct and operate research-oriented reactors for purposes such as proving concepts by reducing theory to reality, provided two things are true: number one, DOE would in fact have to own that experimental reactor, and number two, that experimental reactor may not be used as a basis for commercial power technologies. Can you explain how you arrived at the conclusion that if the experimental reactor itself cannot be privately owned, even if its purpose is solely to improve new technology and increase practical knowledge at a DOE site?

Mr. BURNS. I think—again, I hope I can make this clear. Again, if it's—if the project is on or—on behalf of or for the benefit of the Department of Energy within its authorities, it's not licensed by the NRC. To the extent if you had—I think maybe an example might help. If you had a private company essentially creating on a DOE site a commercial venture, that would be licensable by the NRC. That's what I'm intending to say.

Chairman WEBER. Sure. I got you.

Okay. Well, I'm out of time here so I'm going to yield to the gentleman from Florida.

Mr. GRAYSON. Thank you.

At two recent hearings held by this Subcommittee, witnesses testified that the NRC's standard process for licensing a new commercial-scale nuclear reactor would be too costly and time-consuming for early-stage pre-commercial demonstrations of advanced reactor concepts to move forward. So let's start with the threshold question, which is whether those processes actually would apply in that situation.

Mr. BURNS. Well, we have a licensing process that has been, in some forms has actually been in place since the earliest days of nuclear—implementation of nuclear technology, even under the Atomic Energy Act. The NRC moved to what we call a one-step licensing, which is being used by some of the newer plants that are under construction today about 25 years ago, which also provided for design certification. So we have the basic processes. I think the processes that can get through would apply and would work in these circumstances. I think where we're looking forward and talking with DOE as well is the areas in terms of where you're moving from light-water technology to the advanced technologies, and we need to understand how do our acceptance criteria fit that? Do you need exemptions from that? Are there other considerations? So that's the primary area where we've been focused, and I think trying to look forward we need to focus.

Mr. GRAYSON. Well, the criticism specifically was that the process would be too costly and time-consuming for these advanced reactor concepts even to move forward. Do you regard that as a criticism that's well taken or far-fetched?

Mr. BURNS. I think probably I'm somewhere in the middle, probably more on the notion—again, the notion is, I think we know how to license nuclear power plants in this country. Where we—I think where we stand ready and able is to engage with potential developers who are interested in the new technologies to understand the issues they have, to understand—and so they also understand what they need to do in order to meet the safety requirements that the agency sets, and again, I think how that can happen is early engagement with the agency in terms of understanding what some of those issues are.

So again, when I've looked at—you know, my understanding in terms of an application, the application costs in terms of what it costs to go to the NRC is somewhere on the order of $45–70 million. That's the application fee. Now, that's a small part of their development costs. What we can do again, I think, is engage and assure that they're not off track or that they're on track in terms of the safety requirements that we require them to meet.

Mr. GRAYSON. All right. So you addressed the cost element. Let's talk about the time element. These are capital-intensive projects. The money is borrowed in advance before any electricity or power is generated. There are interest payments in the meantime. What kind of time commitment are people looking at when they go ahead and seek a license like this?

Mr. BURNS. Again, depending again whether a license or the certifying the design itself, which then can be referenced in other licenses. In both circumstances, I think based on my consultation with my staff, we think we could that on the order of five years. That's probably a little longer than our objective on current light-water technologies. It was more like about 3–1/2 years. But given that they're new, I think it's probably safe to say on the order of the five years.

Mr. GRAYSON. Do you see any possibility of dramatically reducing either the cost or the time involved?

Mr. BURNS. Well, again, I think as experience is gained, I think the timing could be reduced, but there are in addition to meeting or showing that you demonstrate conformance to the safety standards also requirments to go through the National Environmental Policy Act processes, again, I think for new—the current technology for new reactors, we set, I think about a 3–1/2-year goal.

Mr. GRAYSON. Thank you, Mr. Chairman. I yield.

Chairman WEBER. I thank the gentleman.

The Chair now recognizes the gentleman from California, Mr. Rohrabacher.

Mr. ROHRABACHER. Thank you very much, Mr. Chairman, and can I ask you, how many employees does your agency have?

Mr. BURNS. It's a little under 3,700 currently.

Mr. ROHRABACHER. Okay, 3,700. And these are highly skilled and educated people, I imagine?

Mr. BURNS. Yes, we have, primarily, you know, our technical and yes, it's very, very highly skilled in a number of engineering as well as scientific disciplines.

Mr. ROHRABACHER. Okay, and what's your budget for—annual budget?

Mr. BURNS. The current budget is about $1 billion. Actually over the next few years I expect that to be smaller, in part because the number of new reactors that we originally anticipated, say, ten years ago are not—the volume is not going to be there, so that's the primary reason I'd say we're going down.

Mr. ROHRABACHER. Are your folks being paid enough to attract the type of high-quality people you need?

Mr. BURNS. Yes, I think so. We have—in terms of the civil service laws and provisions, we are able to pay well. We get good experts that have—sometimes will have industry experience but also academic experience, and I'm very proud of our staff.

Mr. ROHRABACHER. You know, there's a lot of, especially on our side of the aisle where we complain about bureaucracy, and let me just note that, I mean, I use that joke myself: Bureaucracy is the most effective method known to man of turning pure energy into solid waste, all right?

But I think that's really unfair of us because quite often it's not the bureaucracy, it's not the people, it's the system that is set up and the criteria that they have to work from, and I think it's very clear to all of us that we've got a problem in this country with the development of the next generation of nuclear energy. We are now approving or we're involved with approving and putting into place nuclear reactors that are based on 65-year-old technology. Light-water reactors are 65 years old, and they're dangerous. The environmental movement years ago when we first proposed nuclear reactors were right in the sense that with this type of reactor, we have to deal with the waste problem and the potential of nuclear—of some radiation leaking from the system. Our newest systems, I guess, were sold to Japan, and look at the catastrophe that it caused there? People say oh, this could never happen with these new light-reactors. Well, it did because light-water reactors are inherently dangerous, and some of us are dismayed—I am dismayed by the fact that we have not gone on to even produce the prototypes of the next generation, and there's something wrong with our system. There's something wrong with what we have done to set up the methodology of bringing that new technology in.

Your agency is playing a part in that, and I don't know—we have to change the system in a way that we can be the leaders in progress on this very important technology for mankind. Nuclear energy had so much promise, and now we know its dangers as well, but we know that there's possibilities of—let me—I'm sorry, Mr. Chairman. I could go on for a while. I've got some specific questions on this.

The—right now, do you believe that—I'm looking at thorium reactors, pebble-based reactors, high-temperature gas-cooled reactors, and even there's—Lockheed even has a fusion, a small fusion reactor. We have so many options but yet none of them are moving forward into the market and being put to use, and instead, we're still

improving light-water reactors. Something is terribly wrong with the system.

Chairman WEBER. Will the gentleman yield?

Mr. ROHRABACHER. I certainly will.

Chairman WEBER. That's why we're having this hearing today.

Mr. ROHRABACHER. That's right.

Chairman WEBER. I yield back.

Mr. ROHRABACHER. Well, let me just note, I would hope that we can try to restructure, that we have some positive things that we can come up with today and working with you, not just today but in the days ahead to restructure this system so that people—so that the business community can commercialize and at least we can come up with—and the development community can come up with the prototypes that will give us a chance for a future use of nuclear energy that's safe for our people, and thank you very much for holding this hearing, Mr. Chairman.

Chairman WEBER. I thank the gentleman.

The Chair now recognizes the gentleman from Colorado, Mr. Perlmutter.

Mr. PERLMUTTER. Thanks, Mr. Chair, and thanks to Mr. Rohrabacher. Honestly, this is an area where I'm new to this subject and new to this Committee, so I'm going to have some very basic questions for you.

My district includes Rocky Flats, you know, where we produced a lot of plutonium triggers over the years. North of us, we have a mothballed long time ago plant called Fort St. Vrain.

Mr. BURNS. That's correct.

Mr. PERLMUTTER. And so I'm coming at it from that point of view, so I'm going to ask just sort of basic questions. How many nuclear plants do we have in the United States today?

Mr. BURNS. Right now, we have 99 operating nuclear power plants in the United States. I'd expect by the end of the year, early next year, a 100th will come online. That's the TVA's Watts Bar 2. And there are, just to expand a little bit for your benefit——

Mr. PERLMUTTER. Yes.

Mr. BURNS. There are four other plants under construction in South Carolina and—two in South Carolina and in Georgia currently.

Mr. PERLMUTTER. And how many license applications do you have pending?

Mr. BURNS. I might have to give you that for the record. I think we have on the order of about seven, but I might be off by one or two there. We have—for example, we recently authorized a license for DTE Electric near Detroit. We expect to have a hearing late this year on South Texas 3 and 4 in Texas, and there are a couple others as well.

Mr. PERLMUTTER. How long would you say the average license application runs today? I mean, I know it has varied. Sometimes it's taken forever and sometimes it's been quicker. What are they running today?

Mr. BURNS. Well, again, I think our objective is for the license, for the combined license for the new plants is that we run about 3–1/2 years, so about 42 months. We have a required hearing——

Mr. PERLMUTTER. I just want the—I'm not condemning that. I remember——

Mr. BURNS. No, no, no.

Mr. PERLMUTTER. I had Rocky Flats, okay? I have legacy.

Mr. BURNS. Oh, yes.

Mr. PERLMUTTER. I understand the public safety nature of the Commission, so I'm not——

Mr. BURNS. Right.

Mr. PERLMUTTER. —condemning that. I want you to do the right thing and do a good job.

Mr. BURNS. But that's why I'm saying, it's about a 42-month or 3–1/2-year objective to complete the licensing for a combined license that we issue now. That would assume that you have a certified design. So you take the design, say, a Westinghouse design. You reference it in the combined license. So it takes about that. Some of those, as you say, are longer.

Mr. PERLMUTTER. Construction of a plant, how long does that usually run?

Mr. BURNS. I'm trying to think. The current experience I think with the Vogtle plant, it's been about—they've been under—it'll be about six to eight years.

Mr. PERLMUTTER. I mean, these are major——

Mr. BURNS. Yes, it's a major——

Mr. PERLMUTTER. —construction.

Mr. BURNS. And they've had some construction difficulties on the way so they were responsible about addressing those, so that's provided some delay.

Mr. PERLMUTTER. All right. Now to get towards Mr. Rohrabacher's questions. So can you tell me—and I know—I'm a lawyer, you're a lawyer, and you know, maybe you would want an engineer but my guess is, you know this. So can you explain to me the difference between heavy water, light water, and some of the new technologies that he was just going through—thorium and gas plants and whatever.

Mr. BURNS. All right. I'm going to be a little challenged on that, but basically the newer technologies, say, thorium is another, would be used instead of uranium, for example, as a fuel. They may be cooled by different means. You have the molten salt reactor, you have the high-temperature gas reactor. The technologies do different things. You know what? I would be pleased to have the technical staff, give you maybe a brief rundown or something, maybe a sort of shortened form.

Mr. PERLMUTTER. But light water would——

Mr. ROHRABACHER. I will see you after work for a drink and——

Mr. PERLMUTTER. Okay. I'll see you in the gym.

Light water versus heavy water, and then I'll yield back.

Mr. BURNS. Yes, and the heavy water, for example, Canadians, the CANDU reactor uses heavy water. It's—again, it's the chemical characteristic of the water itself that's used. As I say, I'm starting to get a little bit out of my comfort zone.

Mr. PERLMUTTER. I'm happy to meet with you and anybody else.

Mr. BURNS. Yes.

Mr. PERLMUTTER. That would be great.

And I yield back to the Chair. Thank you very much.

Chairman WEBER. Boy, how would you like to be a fly on the wall in that meeting?

The gentleman from Illinois, Mr. Hultgren, is now recognized for five minutes.

Mr. HULTGREN. Thank you, Chairman.

Thank you, Chairman Burns, for being here today. Nuclear energy is very important for my home state in Illinois, and with increasing burdensome regulatory regime being proposed by EPA, nuclear energy is still the only viable zero-emission-based-load power source with arbitrary cups that our states are being forced to implement. Just maintaining our current fleet is vital to be able to hit these mandates. But there's more we could be doing to put America in a place to lead the world and the next generation of advanced reactors. Where are our reactors go, our regulatory structure goes with them. We need to be aware of this and we need to get a foothold in our nations if we'll be able to export these technologies in the future. For this to happen, we need a regulatory structure that seamlessly allows for the informed licensing of these facilities down the road.

Chairman Burns, I appreciate your commentary on my legislation, and I do have some questions about where the line is drawn between the DOE and the NRC authority to regulate a facility. You said in your written testimony, and I quote, that "NRC would not have regulatory authority over reactors located in DOE-owned facilities that are used for the purpose of collecting data for research, testing of materials, or testing of fuels."

At the same time, you say you would have authority over a facility that is operated in a manner for the purpose of demonstrating the suitability for commercial application of a power generation facility. I wondered, where is the line drawn if we are researching new materials? Does it become NRC jurisdiction if they are just trying to proof-of-concept work for something down the road? At the early stage we are certainly trying to establish the properties of new material and fuel but when does NRC consider this research to be for commercial application?

Mr. BURNS. Thank you for the question. Again, we're probably at some of those sort of gray areas where the line is, and probably in looking—you know, if we're getting to that point, I think that would benefit us and I think also the Department's understanding what the purposes of the project are.

Again, the bright line, as you say, would have to be if it's basically a contractor to DOE for the benefit of DOE. I'm phrasing it that way because that's clearly on the DOE side.

Again, where it—what I don't want to leave I think is the impression that any possibility that it may have an ultimately translated into a commercial benefit down the line means necessarily that it's—you know, it's NRC's jurisdiction. That's where I think we have to look carefully what it is.

Again, the easier—perhaps the easier example is if the demonstration plant is—DOE is providing the land for the demonstration plant, it is being hooked to the grid and that type of aspect, that I believe would be our jurisdiction.

I think what it is, this may be one of these things where we have to look at it carefully in order to give a complete answer, I think.

Mr. HULTGREN. Okay. Well, if we could maybe follow up on that some more?

Mr. BURNS. Sure.

Mr. HULTGREN. There is concern there, and we want to make sure——

Mr. BURNS. Yes, and I——

Mr. HULTGREN. —we do that well.

Let me move on. My time's going by fast. Does NRC consider things like the time value of money or opportunity costs of lost development in the United States when forming regulation?

Mr. BURNS. Our regulatory scheme is based primarily on the Atomic Energy Act, which says we need to establish as a baseline adequate protection of public health and safety and common defense and security, and at that point you have to reach that threshold. Above that threshold we do in effect include cost-benefit analysis in terms of assessing whether above the minimum required for safety, is there a benefit, is there a substantial additional safety benefit for additional things. So in that respect, beyond the base requirements, we would consider in fact costs and benefits of additional regulation.

Mr. HULTGREN. Let me wrap up one last question. How does the NRC anticipate changes in technologies so that the regulatory process can be responsive to innovation, and tied to that, does the NRC funding structure limit the Commission's ability to accommodate innovation?

Mr. BURNS. The way we anticipate potential new designs is by staying in communication with Department of Energy—we have a good, cooperative relationship with the Department of Energy—but also hearing from potential designers and potential applicants. We encourage them to come and meet with us to lay out what their plans are, and hearing from the industry what their expectations are, and the second part of your—I'm sorry. I forgot the second part of your question.

Mr. HULTGREN. Well, it's—my time's expired, so we can follow up maybe with other things.

Mr. BURNS. I'm sorry.

Mr. HULTGREN. No, that's fine. I just was wondering about the NRC funding structure, does it limit the Commission's ability to accommodate innovation. So it's 90 percent funded by licensees. I wondered if that limit the Commission's ability to accommodate innovation. We may follow up with written questions if that's all right.

Mr. BURNS. Okay.

Mr. HULTGREN. With that, my time's expired, Mr. Chairman. I yield back. Thank you.

Chairman WEBER. You actually have some time, Mr. Hultgren, if you'd like to follow up on the second part of that question. I think we're going to go for a second round of questioning here, if that's all right with—you don't have any questions? You're good? Okay. Well, you're out of time. But no, you have time if you want to follow up on that second question. Go ahead, take your time.

Mr. HULTGREN. Why don't we just communicate with your office, if that's all right?

Mr. BURNS. That would be fine.

Mr. HULTGREN. We'll get some questions to you if you don't mind responding to those. We just want to get some clarification there and make sure again we're recognizing how innovation is so important but also how regulation can either encourage innovation or hinder it, and we want to make sure that while we're doing everything to keep things safe, we're also doing everything to see potential advancement and taking a leadership role in the world.

So thanks, Chairman. I'll yield back, but we will follow up with some written questions. Thank you.

Chairman WEBER. I thank the gentleman, and I do have another question that I wanted to get answered if I could, Mr. Burns, and that would be, reading through the different—you know, the different hours, if you will, the NRC has charged. Decommissioning was one of them. How many decommissioned plants do we have in the United States?

Mr. BURNS. Well, we've completed decommissioning or oversight of decommissioning of a number of very early generation plants, and I think currently there's something like five—I think five are decommissioning. There may be a few more than that currently.

Chairman WEBER. Okay. And do you get involved with the Navy's decommissioning of their different vessels?

Mr. BURNS. No, I don't believe so.

Chairman WEBER. No? Okay. Recently we had an older ship come to Galveston, where I represent, where they were dismantling it and there was a lot of talk about that, so—okay. Well, just for the record, I appreciate you all. I think that the idea of the NRC working with the DOE will give you all a leg up on watching this new technology kind of unfold, as it were, and so that when you're involved in that process, it'll actually help.

And with that, I'm going to recognize the gentleman from California—I'm sorry. The gentleman from—are you good? Okay. You don't want to violate the witness's rights anymore? Okay. Good. The gentleman from California, Mr. Rohrabacher.

Mr. ROHRABACHER. Thank you very much. Well, first let me ask you, how long does a—when you approve a nuclear power plant like you've been taking about, how long is that actually functioning? Ten years, 20 years, 30 years, 40 years?

Mr. BURNS. Well, under the Atomic Energy Act, for a nuclear reactor, a license may be issued for an initial term of 40 years, and it can be renewed. We have about 75 of the current plants of the current fleet that have—their licenses have been renewed. So the——

Mr. ROHRABACHER. Once they build a plant, how long is it in operation?

Mr. BURNS. Well, it can be—much of the fleet has been or is approaching 40 years, and a number—some of the plants have gone into the license renewal——

Mr. ROHRABACHER. Let me note, Mr. Chairman, that I think it's outrageous then that we are approving any new light-water reactors. That means we're stuck with them for 40 years, and quite frankly, it's old technology that's dangerous, and for us to be putting Americans, 40 year future generations of Americans in that danger is absolutely ridiculous, and especially when we have a number of companies, people with good reputations who tell us we

can build a safe reactor and we haven't been able to get through the system in order to build our prototypes that are a safe alternative. And I just wanted to be on record saying that.

Let me ask you this, and we've been told this. This is not about necessarily a policy but maybe a mindset when these new reactor people are coming forward. They're saying that basically we're sort of in a vicious circle in dealing with this regulatory process in that it's holding back significant improvements because—and this is what they perceive, not necessarily a policy but a mindset that the NRC won't review an application without committed customers in the loop. So if they don't have someone already there saying we're going to finance this, then they—people don't take them seriously, the NRC, and the—if they are not taken seriously because they don't have—that just means the NRC is waiting for the customers but the customers are waiting for the NRC because they can't—they won't—the people in the money world won't put the money up for something that hasn't been at least looked at and given initial approval by your organization. So we're sort of in I guess what you would call a catch-22. I remember Joseph Heller's book about this World War II pilot and all of the things he went through. Every time there was something to get done, there was a reason why you couldn't do this but there was a reason you had to do it.

So aren't we—does that mindset exist? If it does, are we going to change that?

Mr. BURNS. Well, Mr. Rohrabacher, what—the obligation we have now is, we're required to recover 90 percent of our appropriation through fees, and so basically somebody can come in, and I think that some of their difficulty, is coming in, paying the fee for the design review before they may have a customer or before they have sort of secure financing. You know, I acknowledge on the other side that that can be an issue for them, and I think that's part of what this Committee is trying to explore.

The other piece of it is, it's really a question on priority of design review because, again, as we have an appropriation, we don't have unlimited resources so that if there isn't a customer for a particular design, that means it may not have a priority. But, for example, currently we have accepted the design—we do have a design certification under review for which there isn't a current customer in the United States. That's because we can—again, they're willing to put up the fees and we can accommodate within the current resources.

So there may be ways to address that that sort of go perhaps beyond what the NRC's role——

Mr. ROHRABACHER. There's obviously a block somewhere when for two decades now I have been told by people in industry that we can create a safe alternative to the current type of nuclear reactor, and for two decades now been seeing these people come to my office with really very brilliant people, people who have been involved in the nuclear industry, saying we can build these modular reactors in this way or that way or this way, and these are not fly-by-night people. These are very solid engineers. And yet they've made no progress towards even making a prototype. There's a fly in the ointment here. There's a roadblock there somewhere. I think what we just discussed is part of it. Perhaps we need also to make sure that we are committed not just in the NRC but the Department of

Energy as well, that we need to be committed as a country to getting this job done, to making sure after a certain number of years, we've going to have a number of prototypes to choose from, and especially let's not keep our people for 40 years in the future dependent on a dangerous source of electricity that could be replaced by something that's less dangerous.

Thank you very much.

Chairman WEBER. All right. I thank the gentleman.

I want to thank Chairman Burns for your valuable testimony and the Members for their questions. The record will remain open for two weeks for additional comments and written questions from Members. The hearing is adjourned.

[Whereupon, at 9:56 a.m., the Subcommittee was adjourned.]

Appendix I

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by The Hon. Stephen Burns

QUESTIONS FOR THE RECORD
SUBCOMMITTEE ON ENERGY
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

Hearing on *A Review of the Nuclear Regulatory Commission's Licensing Process*
Wednesday, July 29th, 2015

The Honorable Randy Weber

Question 1. **Does the NRC's current funding structure (requiring 90 percent recovery from licensees) limit the Commission's ability to accommodate innovation?**

a) Please explain the Commission's current process for budget allocation among its classes of licensees.

b) Has the Commission considered alternative management or day-to-day operational practices to reduce the overall fees assessed to licensees? Please explain.

c) How does the Commission set the hourly rate for assessment of new reactor applications and has the Commission considered whether the cost is prohibitive, especially for novel technologies?

Answer.

The NRC is required by the Omnibus Budget Reconciliation Act, as amended, to recover through fees approximately 90% of its annual budgetary resources to support its mission. Regardless of funding structure, the NRC works to ensure that its regulatory framework imposes the appropriate level of requirements consistent with protecting the public health and safety and the common defense and security for proven technologies as well as novel ones. Therefore, the NRC's funding structure does not limit its ability to accommodate novel technologies.

a) The Commission established the initial methodology for calculating fees through notice and comment rulemaking in the FY 1999 fee rule (64 Fed. Reg. 31448; June 10, 1999), determining that fees will be re-established triennially, or more frequently if there is a substantial change in the total NRC appropriation or in the magnitude of the budget allocated to a specific class of licenses. The Commission's current process for budget allocation among the classes of licensees involves analyzing the specific activities that support each fee class. Our most recent revision of fee schedules, the fee recovery schedule for Fiscal Year 2015, was published June 30, 2015 (80 Fed. Reg. 37432).

b) It is incumbent on the Commission to ensure that the NRC's budget and organizational structure are appropriately sized so that the agency has sufficient resources to perform its mission and be an effective regulator while being prudent in its expenditure of resources.

To adjust to a declining workload and dynamic regulatory environment, the NRC initiated an effort called Project Aim 2020. The purpose of the project is to identify ways to enhance the NRC's ability to plan and execute the agency's mission more efficiently and to adapt to changes in a timely and effective manner. The Commission has directed the NRC staff to implement a number of recommendations from the Project Aim 2020 report to improve the efficiency of the NRC's internal processes. The Chief Financial Officer is also working to make the fee billing and collection process more transparent.

c) Consistent with the Omnibus Budget Reconciliation Act and OMB circular A-25, "User Charges," the NRC determines its hourly rate by adding the recoverable budgeted resources for: (1) mission-direct program salaries and benefits, (2) mission-indirect program support, and (3) agency overhead or indirect costs — which includes the Inspector General — and dividing by mission-direct full-time equivalent hours. The only budgeted resources

excluded from the hourly rate are those for contract activities related to mission-direct and fee-relief activities. As a safety regulator, the NRC has not specifically considered whether the hourly rate is prohibitive for novel technologies, but as noted above, the NRC strives to ensure that its regulatory requirements are commensurate with the risk posed by licensed activities.

Question 2. **How well does the Department of Energy communicate with the NRC to ensure the Commission is well informed of DOE's R&D efforts?**

a) Will a review and decision by the Commissioners be necessary for a generic determination for the NRC to provide technical assistance to DOE for a research oriented non-power reactor at a DOE site (either operated by a private entity or operated by a DOE contractor for the account of the DOE)?

b) Will a review and decision by the Commissioners be necessary for each specific instance of providing technical assistance for these types of facilities?

c) Are there specific policy issues involving the provision of NRC technical assistance that would trigger a review and decision by the Commissioners?

Answer.

Communication between NRC and DOE is frequent and occurs at varying levels of both agencies. Senior managers in the Department of Energy's (DOE) Office of Nuclear Energy

meet quarterly with the Directors of NRC's Offices of New Reactors, Nuclear Regulatory Research, and Nuclear Materials Safety and Safeguards to discuss topics of mutual interest, which include relevant research and development activities for both DOE and NRC. One topic that is periodically discussed at these meetings is the NRC-DOE Interagency Agreement on Fuel Cycle Research and Development, which has led to increased coordination and information sharing regarding advanced fuels. The acting Assistant Secretary for Nuclear Energy and the Chairman of the NRC have also established quarterly meetings to discuss topics of mutual interest. Additionally, under a memorandum of understanding between the DOE and the NRC, managers and staff in the NRC's Office of Nuclear Regulatory Research meet with their DOE counterparts periodically to discuss ongoing activities related to DOE computational analysis efforts and other bilateral or multilateral efforts. These meetings are beneficial because they ensure that each agency has an understanding of each other's work, and that our work is complementary and not duplicative. For example, these regular meetings and interactions have resulted in the identification of needed research that not only would address and resolve regulatory safety concerns, but would also contribute to the DOE Light Water Reactor Sustainability Program. These meetings also led to a cooperatively funded experimental program between NRC and DOE.

Generally, DOE or a private party under agreement with and oversight by DOE, e.g., a DOE contractor, may construct and operate a research-oriented, non-power reactor at a U.S. government-owned facility without obtaining an NRC license. However, an NRC license is required where the DOE reactor is operated by a private party on private property free from DOE oversight and control, as part of the power generation facilities of an electric utility system, or to demonstrate its suitability or practical value for industrial or commercial application. If an NRC license is not required, the NRC can provide DOE and its contractors with technical assistance to ensure the safety of the construction and operation of the DOE research and

development facility. NRC's authority to provide technical assistance to DOE for a research-oriented, non-power reactor at a DOE site, either operated by DOE or by a DOE contractor for the account of the DOE, would depend on the facts of the particular reactor project. Therefore, it is unlikely that a "generic" NRC determination would be applicable.

As a general matter, prior to providing technical assistance to another federal agency, the NRC enters into a memorandum of understanding or agreement with that agency. These types of agreements generally do not involve a review and decision by the Commissioners, and the agency is unaware at this time of any specific policy issues that would prompt Commission review. However, the Commission may choose to exercise its inherent supervisory authority over the staff and provide direction in such matters. Even if there is no formal Commission decision, the NRC staff would keep the Commission informed regarding any such technical assistance request or agreement from DOE or another federal agency.

Any reactor operated by a private party that is not a DOE contractor would require an NRC license regardless of whether the reactor is for research or other purposes. Regardless of the intended purpose of a nuclear reactor, the Atomic Energy Act makes it unlawful for any person to manufacture, produce, acquire, possess, or use a utilization facility (i.e., a nuclear reactor) without first obtaining an NRC license.

The Honorable Randy Hultgren

Question 1. The attached Congressional Research Services (CRS) memorandum titled "NRC Licensing of Proposed DOE Nuclear Facilities" generally concludes that research oriented reactors at DOE sites are exempt from NRC jurisdiction so long as the reactor project does not meet the conditions of specific statutory provisions.

a) Does the Commission object to this conclusion or any other conclusions in the attached memorandum?

b) Chairman Burns, on page 6 of your prepared testimony you assert that a research oriented reactor at a DOE site would necessarily fall within the jurisdiction of the NRC "if ownership of the facility would be held by private parties." Please explain the statutory basis for this conclusion that private ownership is a deciding factor for whether a purely research oriented reactor at a DOE site would require an NRC license.

c) Chairman Burns, on page 6 of your prepared testimony you also assert that a privately-funded research oriented reactor at a DOE site that "would likely be used ultimately as a basis for commercial power reactor technologies" would require an NRC license. Please explain the Commission's interpretation of this condition.

Answer.

a) The NRC agrees with the underlying principles and conclusions in the referenced CRS report, which is consistent with what the agency has previously stated regarding its licensing and regulation of proposed DOE nuclear facilities.

b) Any reactor operated by an entirely private party that is not a DOE contractor, would require an NRC license regardless of whether the reactor is for research or other purposes. Without regard to the intended purpose of a nuclear reactor, section 101 of the Atomic Energy Act, as amended, makes it unlawful for any person to manufacture, produce, acquire, possess, use, import, or export a utilization or production facility without first obtaining an NRC license.

DOE has statutory authority to self-regulate its construction and operation of reactors on DOE property for the purpose of developing or testing new reactor technologies or concepts, or the safety and workability of systems or components individually or as part of the overall reactor system. Generally, DOE or a private party under agreement with and oversight by DOE may construct and operate a research-oriented, non-power reactor at a U.S. government-owned facility without obtaining an NRC license. An NRC license is required, however, if the DOE reactor is operated by a private party on private property, free from DOE oversight and control as part of the power generation capacity of an electric utility system or to demonstrate its suitability or practical value for industrial or commercial application.

c) Under the Atomic Energy Act (AEA), the NRC licenses the construction and operation of various types of nuclear facilities, as well as the use and possession of different forms of nuclear material and nuclear waste. Nuclear reactors are defined as "utilization facilities" under the Atomic Energy Act and are licensed by the NRC when constructed and operated for commercial purposes or as a facility "useful in the conduct of research and development."

Regardless of the intended purpose of a nuclear reactor, section 101 of the AEA makes it unlawful for any person to manufacture, produce, acquire, possess, use, import, or export a utilization or production facility without first obtaining an NRC license.

Question 2. **Does the Commission have authority to consider the time value of money and possible lost opportunity from domestic technology companies moving operations overseas when it considers applications to license and certify new technologies?**

a) How does the NRC avoid the inclination to only accept familiar risks? Does the preference to only accept familiar risk deny substantial new safety benefits because innovations require change and unfamiliar risks?

b) Does the NRC require organizational changes to enable responsiveness to innovation?

c) Has the Commission considered adjusting its licensing protocols to enable technical staff to memorialize agreed upon technical specifications for first-of-a-kind designs so that designers can track tangible benchmarks during the pre-application and application process?

Answer.

The NRC regulates the civilian uses of nuclear materials in the United States to protect public health and safety, and the common defense and security. The agency does not have a role in promoting particular technologies; rather, that role was vested in DOE by the Energy Reorganization Act of 1974. Thus the agency does not directly consider the time value of money or lost business opportunities as part of its licensing process. However, the NRC works to

ensure that the regulatory burden is consistent with protecting the public health and safety, and common defense and security whether for existing or new technologies. The NRC staff also works with designers and potential applicants for licenses and design certifications prior to the submission of their applications to identify potential issues and establish the means to resolve them.

a) The NRC evaluates each new application and new technology on its technical merits. For example, the NRC is currently making substantive progress on the construction permit review for a facility that will use a new technology for producing medical isotopes. The agency's performance-based regulatory framework allows for NRC approval of different approaches used by applicants to achieve or exceed NRC's safety goals. On September 1-2, 2015, the NRC and the DOE co-hosted the Advanced Non-Light Water Reactors Workshop to discuss the development and deployment of non-light water reactors (LWRs). Topics included an overview of roles and responsibilities of the NRC and DOE, previous experience licensing non-LWR designs, critical gaps and needs in research and development, and suggestions for improvements in the licensing of non-LWR designs.

NRC policy encourages early discussion (prior to submission of a license application) between agency staff and potential applicants (such as utilities and reactor designers). Such discussions enable the NRC staff to offer licensing guidance and identify and resolve potential licensing issues early in the licensing process. During this pre-application period for design certification, the NRC holds public and closed meetings with potential applicants to discuss advanced reactor designs and identify (1) major safety issues that could require Commission policy guidance to the staff, (2) major technical issues that the staff could resolve under existing NRC regulations and policy, and (3) research needed to resolve identified issues.

b) No, as a general matter, the NRC does not require organizational changes to enable responsiveness to innovation.

c) The current license application process allows for this memorialization. Where a potential applicant seeks a decision on a regulatory or technical issue during pre-application interactions so that an applicant may rely on that decision in the future, the applicant can submit topical reports and receive Safety Evaluation Reports, which can then be referenced in any future application. For new reactor application reviews, the NRC staff uses a design-centered review approach, which supports a "one issue, one decision" approach for similar designs.

Appendix II

Additional Material for the Record

DOCUMENT SUBMITTED BY SUBCOMMITTEE CHAIRMAN RANDY WEBER

Congressional Research Service
Informing the legislative debate since 1914

MEMORANDUM July 20, 2015

To: House Committee on Science, Space and Technology
Attention: Aaron Weston

From: Todd Garvey, Legislative Attorney

Subject: **NRC Licensing of Proposed DOE Nuclear Facilities**

This memorandum is provided in response to your request for a discussion of the Department of Energy's (DOE) authority to construct and operate nuclear facilities for research and development purposes without approval from the Nuclear Regulatory Commission (NRC). Specifically, you asked whether the construction and operation of two types of facilities would require an NRC license: (1) a research oriented, non-power reactor at a DOE site operated by a private entity pursuant to an agreement with DOE; and (2) a DOE, or DOE-contractor operated nuclear reactor user test facility for use by private parties to facilitate research and development. It would appear that neither of the proposed facilities would require an NRC license, so long as they are operated for research or experimental purposes (rather than commercial purposes), are constructed and operated at a DOE-owned or controlled site, and any participation by a private entity is pursuant to an adequate contractual arrangement with the DOE.

In the case that these facilities do not require an NRC license, you also asked whether the NRC would nonetheless be permitted to provide the DOE with technical assistance in ensuring their safe construction and operation. Both law and practice would appear to support NRC's ability to provide the DOE with such assistance.

Discussion of General Principles Governing NRC Licensing of DOE Nuclear Facilities

The Atomic Energy Act (AEA) established the Atomic Energy Commission (AEC) and assigned the agency the dual tasks of encouraging the growth and development of nuclear energy while ensuring the public's health and safety through regulation and licensing.[1] In 1974, the Energy Reorganization Act (ERA) abolished the AEC and divided the agency's authorities between two newly created agencies.[2] Developmental and promotional functions were assigned to the Energy Research and Development

[1] P.L. 83-703, 42 U.S.C. §§ 2011 et seq.
[2] P.L. 93-438, 42 U.S.C. §§ 5801 et seq.

Administration (which was incorporated, along with its authorities, into the DOE in 1977[3]) while licensing and regulatory functions were delegated to the Nuclear Regulatory Commission.[4]

Under the law, the DOE is charged with "encouraging and conducting research and development... related to the development and use of energy from . . . nuclear . . . sources."[5] The NRC, on the other hand, licenses the construction and operation of various types of nuclear facilities, as well as the use and possession of different forms of nuclear material and nuclear waste.[6] Nuclear reactors, for example, are defined as "utilization facilities" [7] under the AEA, and are licensed by the NRC either for commercial purposes or as a facility "useful in the conduct of research and development."[8] Regardless of the intended purposes, 42 U.S.C. § 2131 makes it unlawful for any person to manufacture, produce, acquire, possess, or use a utilization facility without first obtaining a license from the NRC.

However, consistent with Congress's intent to separate research and developmental from regulatory and licensing functions, most DOE nuclear facilities and programs are exempt from NRC licensing and regulation. Under 42 U.S.C. § 2140, no NRC license is required for "the construction or operation of facilities *under contract with and for the account of the [DOE].*"[9] In addition to this broad exemption for DOE facilities, contractors performing work for the DOE are also generally exempt from obtaining an NRC license for the use of various types of nuclear material.[10] The general rule, therefore, is that the DOE ensures the safety of its own developmental nuclear activities through self-regulation, rather than through NRC licensing.[11] As clarified in the legislative history of the ERA, Congress saw ERDA, and later DOE

[3] Department of Energy Organization Act, P.L. 95-91, 42 U.S.C. § 7151.

[4] 42 U.S.C. § 5801 ("The Congress finds that it is in the public interest that the licensing and related regulatory functions of the Atomic Energy Commission be separated from the performance of the other functions of the [NRC].")

[5] 42 U.S.C. § 5813(2).

[6] See, e.g., 42 U.S.C. § 5813; 42 U.S.C. § 5841; 10 C.F.R. Parts 31, 40, 50 and 70.

[7] 42 U.S.C. § 2014 ("The term 'utilization facility' means (1) any equipment or device, except an atomic weapon, determined by rule of the Commission to be capable of making use of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public, or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device as determined by the Commission. "); 10 C.F.R. Part 50.

[8] 42 U.S.C. § 2133; 42 U.S.C. § 2134. Utilization facilities may also be licensed for medical or industrial purposes.

[9] 42 U.S.C. § 2140(a):

> Nothing in this subchapter shall be deemed—
>
> (a) to require a license for (1) the processing, fabricating, or refining of special nuclear material, or the separation of special nuclear material, or the separation of special nuclear material from other substances, under contract with and for the account of the Commission; or (2) the construction or operation of facilities under contract with and for the account of the Commission.

"Subchapter" would appear to refer to Chapter 10 of the AEA, which provided the AEC, and now the NRC, with the authority to issue atomic energy licenses. Although the provision's use of "Commission" originally referred to the AEC, that language would appear to also apply to DOE. See, Waste Control Specialists, LLC v. United States Department of Energy, 1997 U.D. dist. LEXIS 19717 (N.D. Tx. 1997) ("The Atomic Energy Commission was abolished in 1974 and its functions were transferred to the NRC and the [ERDA]. In 1977, Congress terminated the Energy Research and Development Administration and transferred its functions to the newly-created DOE. As a result, the reference to "Commission" in Section 110a(2) of the AEA must be read to refer to the DOE.").

[10] 10 C.F.R. § 30.12 (byproduct material); 10 C.F.R. § 40.11 (source material); 10 C.F.R. § 70.11 (special nuclear material).

[11] The U.S. Court of Appeals for the District of Columbia Circuit has noted that there is a "general exemption of ERDA [now DOE] programs from NRC licensing authority." See, Natural Resources Defense Council, Inc. v. United States Nuclear Regulatory Commission, 606 F.2d 1261, 1266 (D.C. Cir. 1979) ("Congress gave ERDA [now DOE] responsibility for insuring that its programs are environmentally sound and not adverse to public health and safety."). 42 U.S.C. § 5843(c) ("Nothing in this section shall be construed to limit in any way the functions of the [DOE] relating to the safe operation of all facilities resulting (continued...)

self-regulation, as "especially imperative in the noncommercial nuclear R & D [research and development] area because the NRC will have no licensing jurisdiction over such [] nuclear activities."[12]

The NRC has further clarified this statutory framework through regulation.[13] 10 C.F.R. § 50.11, articulates two applicable scenarios in which the operation of a DOE utilization facility does not require a NRC license:

> (i) The construction or operation of a production or utilization facility for the Department at a United States government-owned or controlled site...Provided, that such activities are conducted by a prime contractor of the Department under a prime contract with the Department.
>
> (ii) The construction or operation of a production or utilization facility by a prime contractor or subcontractor of the Commission or the Department under his prime contract or subcontract when the Commission determines that the exemption of the prime contractor or subcontractor is authorized by law; and that, under the terms of the contract or subcontract, there is adequate assurance that the work thereunder can be accomplished without undue risk to the public health and safety.[14]

Although DOE "facilities"—including utilization facilities such as nuclear reactors— are generally exempt from NRC licensing, a number of statutory provisions nevertheless provide the NRC with authority to regulate and license *specific* DOE activities.[15] One potentially applicable provision is found in 42 U.S.C. § 5842.[16] It provides that notwithstanding the general exemption from NRC licensing for DOE facilities established in 42 U.S. C. § 2140, the NRC "shall... have licensing and related regulatory authority" over "*demonstration* nuclear reactors...when operated as part of the power generation facilities of an electric utility system, or when operated in any other manner for the purpose of demonstrating the suitability for commercial application of such a reactor."[17] The conference report associated with the ERA

(...continued)

from all activities within the jurisdiction of the [DOE] pursuant to this chapter.") Congress has also given the Defense Nuclear Facilities Safety Board limited safety authority over DOE defense nuclear facilities.

[12] S. Rep. No. 93-980 at 30.

[13] The NRC's interpretation of 42 U.S.C. §§ 5842 and 2140 would likely be accorded deference by a reviewing court. See, Waste Control Specialists, LLC v. United States Department of Energy, 141 F.3d 564, 568 n. 20 ("To the extent that the statute is ambiguous on the licensing requirements, these regulations are entitled to deference under [Chevron v. NRDC, 467 U.S. 837 (1984)].") (reviewing 10 C.F.R. § 30.12).

[14] 10 C.F.R. § 50.11. In addition, 10 C.F.R. § 50.12 provides that the NRC may "upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations of this part, which are—(1) Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security..." Such an exemption requires certain "special circumstances" to be present.

[15] Many of these exceptions relate to the storage of nuclear waste. See e.g., 42 U.S.C. § 10134 (requiring an NRC construction authorization for the DOE's permanent repository for the storage of nuclear waste). See also, U.S. Gov't Accountability Office, GAO-09-61, Nuclear Safety: Department of Energy Needs to Strengthen Its Independent Oversight of Nuclear Facilities and Operations 66-68 (2008).

[16] 10 C.F.R.§ 50.11 notes, for example, that its exemption applies only so long as the facility is not covered by 42 U.S.C. § 5842, i.e. it is not a "demonstration nuclear reactor...operated as part of the power generation facilities of an electric utility system, or ... for the purpose of demonstrating the suitability for commercial application of such a reactor."

[17] 42 U.S.C. § 5842 (emphasis added):

> Notwithstanding the exclusions provided for in section 110a. [42 U.S.C. § 2140 (a)] or any other provisions of the Atomic Energy Act of 1954, as amended, the Nuclear Regulatory Commission shall, except as otherwise specifically provided by section 110b of the Atomic Energy Act of 1954, as amended, or other law, have licensing and related regulatory authority pursuant to chapters 6, 7, 8, and 10 of the Atomic Energy Act of 1954, as amended, as to the following facilities of the Administration:
>
> (2) Other demonstration nuclear reactors—except those in existence on the effective date of this chapter—when operated as part of the power generation facilities of an electric utility system, or when operated in any

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provides insight into what types of DOE reactors Congress intended the NRC to license. The conference report suggests that the grant of authority to the NRC under 42 U.S.C. § 5842:

> does not apply to facilities preceding the demonstration phase. Only demonstration reactors would be licensed under [42 U.S.C. § 5842]...They represent the last stage in development of given reactors and are intended to demonstrate practical value for industrial or commercial applications...Reactors under development prior to the demonstration stage would not be subject to licensing such research and development reactors usually are characterized as experimental, research, and test reactors. These reactors are distinguishable from demonstration reactors because their purpose is to develop or test reactor concepts, or the safety and workability of systems or components individually or as part of the overall reactor system.[18]

In light of this language, it does not appear that either the proposed research reactor or proposed user test facility would be considered a demonstration reactor under this provision. You have described each of these envisioned facilities as purely research oriented, constructed for the purpose of developing new reactor technologies rather than to demonstrate immediate commercial applications. The proposed facilities may, therefore, be more aptly categorized as a pre-demonstration phase. However, it should be noted that were the proposed facilities intended to "demonstrate practical value for industrial or commercial applications," or be used "in any other manner for the purpose of demonstrating the suitability for commercial application...," then NRC licensing jurisdiction could be triggered.

To summarize, the discussed statutory and regulatory provisions would appear to suggest that a private entity is authorized to operate a research or experimental reactor under an agreement with the DOE without first obtaining a license from the NRC. This authority, however, is subject to two important limitations. First, pursuant to NRC regulations, the entity operating the reactor must be a "prime contractor of the [DOE] under a prime contract with the [DOE]."[19] "Prime contractor" is not defined under the AEA or the ERA. Second, the operation of the reactor must either be at a government-owned or controlled site, or be determined by the NRC to be "authorized by law" under contractual terms that provide "adequate assurance" that the reactor can be operated "without undue risk to the public health and safety."[20] A private entity operating a facility on private property and free from DOE oversight and control would not appear to fall within the NRC licensing exemption.

Application of General Principles

You have asked whether a private party, under agreement with DOE, may construct and operate a research oriented, non-power reactor at a DOE facility without obtaining an NRC license. Because the proposed reactor would be operated at a DOE facility—and assuming the reactor is not a "demonstration reactor"—such a proposed arrangement would appear to be exempt from NRC licensing so long as the entity that operates the reactor does so pursuant to a "prime contract" with the DOE.[21] You have previously suggested that the agreement between the DOE and the private entity may be in the form of a Cooperative

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> other manner for the purpose of demonstrating the suitability for commercial application of such a reactor.

NRC's authority to license utilization facilities is found in Chapter 10 of the AEA. The four other specifically identified facilities in 42 U.S.C. § 5842 do not appear to be applicable to the immediate analysis.

[18] S. Rep. No. 93-1252 at 33-34.

[19] 10 C.F.R. § 50.11. The exemption under subsection (ii) also applies to subcontractors.

[20] 10 C.F.R. § 50.11(b)(2).

[21] 10 C.F.R. § 50.11(b)(2).

Research and Development Agreement (CRADA). Whether this type of agreement satisfies the standard established in 10 C.F.R. §50.11 may depend upon how the term "prime contract" is construed for purposes of this provision. This term is not defined in DOE regulations, nor does its meaning appear to be addressed in informal agency interpretations or guidance. Absent such interpretative guidance, an argument could be made that the term "prime contract" is to be construed in light of its plain meaning—that is, as a legally binding agreement between the DOE and a contractor (i.e., the prime contractor).[22] Under this interpretation, a CRADA could potentially be seen to constitute a "prime contract" insofar as it is a legally binding agreement between DOE and a contractor.[23] On the other hand, a CRADA might not be seen to suffice if the term prime contract were to be construed as referring to a "procurement contract," or a contract by which an agency acquires supplies or services for its own direct use or benefit.[24] The Federal Grant and Cooperative Agreement Act ("Grant Act," P.L. 95-224) expressly distinguished between procurement contracts and cooperative agreements by specifying that the former is to be used when the principal purpose of an agreement is to "acquire property or services for the direct benefit or use of the United States Government," while the latter is to be used when the principal purpose is to "transfer a thing of value to the State, local government, or other recipient to carry out a public purpose of support or stimulation authorized by a law of the United States."[25]

In addition, you noted that the operation of the proposed reactor by the private entity may include the use or testing of certain nuclear materials. DOE prime contractors are generally exempt from the requirement to obtain an NRC license for the use of source and special nuclear material.[26] So long as the use of the material is conducted pursuant to a "prime contract...for the performance of work for the Department at a United States Government-owned or controlled site," and is not at a facility covered by 42 U.S.C. § 5842, then it would appear that no NRC license is required for that type of activity.

You also asked whether a NRC license would be necessary for DOE to operate a nuclear reactor user testing facility for use by private parties to facilitate research and development. The same basic principles of DOE self-regulation would likely apply to this type of proposed facility. So long as the facility is constructed and operated "under contract with and for the account of the [DOE]," it would not appear to require an NRC license.[27] The articulated non-commercial, non-power, research and development

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[22] Ralph C. Nash, Jr., Steve L. Schooner, Karen R. O'Brien-DeBakey, and Vernon J. Edwards, The Government Contracts Reference Book: A Comprehensive Guide to the Language of Procurement (3d ed. 2007), at pg. 446 (defining a prime contract as a "contract entered into directly between the government and contractor ... 'Prime' is used to distinguish that contract from any subcontract entered into between the prime contractor and a supplier or vendor called a subcontractor, or between such a subcontractor and another, lower-level subcontractor. ... There is privaty of contract [i.e., a direct contractual relationship] between the government and prime contractors, but not between the government and subcontractors."); BLACK'S LAW DICTIONARY 365 (9th ed. 2009) (defining "contract" as "[a]n agreement between two or more parties creating obligations that are enforceable or otherwise recognizable at law"); Restatement (Second) of Contracts §1 cmt. a (1979) ("'[C]ontract' [is] ... sometimes used as a synonym for 'agreement'"); *Id.* §3 cmt. a ("[A]greement has in some respects a wider meaning than contract, bargain, or promise. ... The word 'agreement' contains no implication that legal consequences are or are not produced.").

[23] For an agreement to be legally binding, there generally must have been an offer, an acceptance, and "consideration," or a "performance or return promise that is the inducement to a contract because it is sought by the promisor in exchange for his promise and is given by the promisee in exchange for that promise." Government Contracts Reference Book at 122.

[24] Subsection 8701(4) of Title 41 of the United States Code does define a "prime contract" as a "contract or contractual action entered into by the Federal Government to obtain supplies, materials, equipment, or services of any kind." However, this definition is expressly said to apply to the particular chapter of Title 41 in which it appears. This chapter addresses kickbacks, and it is unclear to what extent this definition should be applied in other contracts.

[25] 31 U.S.C. §6303 (using procurement contracts); 31 U.S.C. §6305 (using cooperative agreements).

[26] 10 C.F.R. § 40.11 (source material); 10 C.F.R. § 70.11 (special nuclear material).

[27] 42 U.S.C. § 2140.

application of the facility would further suggest that such a facility would remain under DOE's regulatory authority. It does not appear that there are any specific statutory provisions that would override the general presumption of DOE self-regulation and bring such a facility back within NRC jurisdiction.[28] The proposed facility would seem to be similar to the current DOE-operated and regulated Nuclear Science User Facility, which provides private entities with access to technological facilities at the Idaho National Laboratory.[29] The research and development activities at that site are not licensed by the NRC.

Informal Cooperation and Technical Assistance

You have also asked whether the NRC, though not licensing the proposed facilities, would be able to provide the DOE and participating contractors with technical assistance to ensure the safety of the construction and operation of the facilities. Past and current practice shows that the NRC and DOE often provide each other with informal technical assistance. For example, the Naval Reactors Division of the DOE voluntarily provides NRC with safety analysis reports of reactor and spent fuel storage designs for its informal review.[30] Although the NRC issues no license, it nonetheless acts as an "independent safety advisor."[31] The DOE and NRC also entered into a Memorandum of Understanding (MOU) outlining the NRC's role in providing "cooperation and support" during the DOE Hanford Tank Waste Remediation System Privatization program.[32] Under the MOU, the NRC would "provide detailed briefings, guidance documents, and support [to the DOE] in developing important administrative and technical program elements of a regulatory program."[33] More generally, the MOU "gave NRC the opportunity to acquire an understanding of the wastes and potential treatment processes, and allowed DOE to see how NRC would perform reviews and develop an effective regulatory program for the potential transition to its regulatory oversight."[34] In December 2014, the NRC and DOE entered into an agreement establishing "a framework for the two agencies to exchange information related to safety issues associated with non-reactor nuclear facilities that would be beneficial to both agencies."[35] Finally, the DOE also regularly provides the NRC with technical assistance in non-routine licensing reviews.[36]

There would appear to be an adequate statutory basis for the NRC to provide the DOE with technical assistance in the construction and operation of the proposed facilities. 42 U.S.C. § 5845 provides that the DOE shall "consult and cooperate with the [NRC] on research and development matters of mutual interest and provide such information and physical access to its facilities as will assist the [NRC] in acquiring the

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[28] See, e.g., NRC Report: *Review of the U.S. Department of Energy's Regulatory Processes for the Hanford Waste Treatment Plant*, at 9 ("Unless expressly authorized by statute, NRC does not have authority to license or otherwise regulate DOE facilities.") Available at: http://pbadupws.nrc.gov/docs/ML0811/ML081150883.pdf.

[29] For more information on the Nuclear Science User Facilities see https://atrnsuf.inl.gov/default.aspx?Page=About%20Us&id=1.

[30] External regulation of Department of Energy Nuclear Facilities: A Pilot Program, NUREG-1708 at 19.

[31] *Id.*

[32] Memorandum of Understanding Between the Nuclear Regulatory Commission and the Department of Energy for Cooperation and Support of the Department of Energy Hanford Tank Waste Remediation System Privatization Activities, January 2, 1997 available at: http://pbadupws.nrc.gov/docs/ML9929/ML992920012.pdf.

[33] *Id.*

[34] U.S. Gov't Accountability Office, GAO-09-61, Nuclear Safety: Department of Energy Needs to Strengthen Its Independent Oversight of Nuclear Facilities and Operations 68 (2008).

[35] Agreement for Nuclear Safety Information Exchanges Between the U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards and the U.S. Department of Energy, Office of Environment, Health, Safety and Security, available at: http://energy.gov/sites/prod/files/2014/12/f19/DOE-NRC-Nuclear-Safety-Info-Sharing-Agreement.pdf.

[36] See, Research and Test Reactors, available at http://www.nrc.gov/reactors/non-power.html ("The NRC often uses technical assistance from DOE's National Laboratories to supplement NRC staff efforts in conducting the high number of complex reviews...").

expertise necessary to perform its licensing and related regulatory functions." [37] Similarly, 42 U.S.C. § 5814 provides that the DOE "shall utilize...the technical and management capabilities of other executive agencies having facilities, personnel, or other resources which can assist or advantageously be expanded to assist in carrying out" its responsibilities.[38] Finally, the Economy Act, which was cited as partial authority for the Hanford MOU, may also permit technical cooperation between the NRC and DOE. That statute provides agencies with the authority to place orders with another agency for "goods or services" so long as certain conditions are met.[39]

[37] 42 U.S.C. § 5845(e).

[38] 42 U.S.C. § 5814(i).

[39] 31 U.S.C. § 1535.