

COMMITTEE ON ENERGY AND COMMERCE
DOE Modernization: Legislation Addressing Development, Regulation,
and Competitiveness of Advanced Nuclear Energy Technologies

Tuesday, May 22, 2018

QUESTIONS FROM CHAIRMAN UPTON

Halden Reactor

Q1. The Halden Reactor in Norway provides critical research capabilities that are utilized by the U.S. commercial nuclear industry. Are DOE and the Nuclear Regulatory Commission aware of the potential loss of the reactor?

Q1a. Is DOE examining what specific steps the U.S. government can undertake to assure this reactor is maintained for use by the international research community?

A1a. The Department of Energy (DOE) understands that the Institute for Energy Technology (IFE) in Norway has decided to permanently shut down the Halden Reactor. DOE is moving quickly to develop a mitigation plan to ensure that the capabilities of the reactor are identical or re-established at other facilities and laboratories in the United States and abroad. We have initiated discussions, and are receiving information from the U.S. Nuclear Regulatory Commission (NRC), Nuclear Energy Institute, Electric Power Research Institute, and the Organisation for Economic Co-operation and Development/Nuclear Energy Agency.

Representatives from all of these organizations met at the Idaho National Laboratory (INL) in July to seek consensus on these capabilities and begin to develop credible pathways to re-establish these capabilities. Of immediate need is to ensure that capabilities that are unique to Halden and that are critical for accident tolerant fuel development and qualification are addressed in order to meet the schedules that the nuclear industry requires.

Q1b. Has DOE discussed the potential loss of this facility with the NRC and is there as mutual recognition of the Halden Reactor's capabilities?

A1b. Yes, DOE has initiated discussion. Both DOE and NRC have a history of collaborations at the Halden Reactor, and are well aware of the capabilities of the reactor and the technical experts associated with the reactor project. The NRC has provided the

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Department with Halden capabilities that are important to them, and NRC participated in the July meeting at INL.

Atomic Energy Act and International Nuclear Markets

- Q2. The purpose of the Atomic Energy Act is to provide “a program of international cooperation to promote the common defense and security and to make available to cooperating nations the benefits of peaceful applications of atomic energy as widely as expanding technology and considerations of the common defense and security will permit.” However, the statute was enacted when the United States was one of only a small handful of countries that had access to atomic energy.
- Q2a. Would you agree that the purpose of the Atomic Energy Act to provide for international peaceful use of atomic energy remains important for the nation, even while the global nuclear landscape has changed?
- A2a. Yes, the Atomic Energy Act has long served as the legal basis by which the United States achieves its objective of fostering the development, use, and control of atomic energy in such a way as to maximize the common defense and security.
- Q2b. Would you consider it beneficial for Congress to modernize the Atomic Energy Act to reflect the current reality, to ensure continued U.S. participation in the global nuclear power development and use?
- A2b. If Congress proposes to amend the Atomic Energy Act, the Administration would review such legislation for consistency with the President’s program.

Nuclear Fuel Cycle Competition

- Q3. During the hearing, Congressman Shimkus asked about the Office of Nuclear Energy’s plans relating to developing an enrichment facility to serve commercial markets. Mr. McGinnis noted his support for competition and pointed to fuel fabrication facilities. However, there exists a lack of demand for enriched uranium and additional nuclear reactors ceasing operation in the next 7 years.
- Q3a. What are the market risks of subsidizing commercial competition in enrichment facilities that result over supply of enriched uranium?

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- A3a. The nuclear industry has identified the critical need for high-assay low-enriched uranium (HALEU) for development of advanced reactors. There is only one commercial enrichment facility operating in the United States and it does not have HALEU capability. This capability needs to be developed due to limited supplies of highly enriched uranium that can be processed or recovered.
- Q3b. Has the Department requested any funding for the Office of Nuclear Energy to develop or build an enrichment facility for commercial HALEU production?
- A3b. DOE did not request funding in FY 2019 to develop or build an enrichment facility for commercial HALEU production.
- Q3c. Will you commit to notifying the Committee prior to providing any such financial assistance?
- A3c. Any funding request for enrichment or other options for HALEU would be made through the annual budget process.

Russian Uranium Imports

- Q4. What steps is the Department taking to review the pending expiration of the limitation on uranium imports from Russia that will expire in 2020?
- Q4a. The U.S is now importing 93% of our nation's need for uranium. What is DOE doing to revive the U.S. domestic uranium production industry? For example, has anyone from the Department discussed revised regulation of U.S. mining facilities by the Environmental Protection Agency?
- A4a. The Department of Commerce (DOC) is responsible for the Agreement Suspending the Antidumping Investigation on Uranium from the Russian Federation (Russian Suspension Agreement). DOC initiated an Administrative Review of the Russian Suspension Agreement in December 2017; we understand that the Administrative Review is ongoing. In addition, on July 18, 2018, the Secretary of Commerce initiated an

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investigation under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. 1862) to determine the effects on the national security of imports of uranium.

DOE recognizes the vital role that nuclear energy plays in support of our economic and environmental goals, as well as our national security missions. We are aware that the U.S. Energy Information Administration reported recently that 93% of the uranium purchased by owners and operators of U.S civilian nuclear power reactors, and 87% of the uranium in fuel assemblies loaded into our reactors in 2017, was foreign-origin uranium. A White House-led review of U.S. nuclear energy policy is underway. We are confident that the outcomes of that review will inform our approach to revitalization of the U.S. nuclear energy sector.

Recycling Navy Spent Fuel

- Q5. Has the Department conducted a cost estimate to reprocess spent nuclear fuel from the U.S. Navy for high-assay LEU?
- Q5. Prior to conducting any demonstration or large scale project to reprocess Navy spent nuclear fuel, will the Department commit to conducting such a cost estimate?
- A5. DOE has assembled a ¼ scale pilot plant, using unirradiated materials (cold tests), at the Idaho National Laboratory to conduct research on the feasibility of reprocessing Navy spent fuel for HALEU production. As part of this R&D effort, the Department is currently conducting a cost estimate for a potential full scale facility as one option for consideration. Results of the current research, potential costs and other policy considerations would inform any decision whether or not to move forward beyond the current feasibility tests, to be evaluated through future budget requests.

Need for Underlying Benchmark Data

- Q6. Criticality benchmark data are key to develop the underlying information for the regulatory framework to help provide advanced nuclear fuels. Please describe the nature of this information, why it is necessary and what government or non-government

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facilities are available to gather the data.

- A6. Criticality benchmark data are obtained from criticality experiments that are designed to have configurations with nuclear and geometric similarities representative of, for example, nuclear materials in fuel manufacturing facilities or of nuclear fuels used in reactors or being stored and transported. The data are used by criticality safety organizations worldwide, including DOE laboratories, along with the NRC and its licensees, to assess criticality safety margins associated with the uses and disposition of nuclear materials. The data is often used to assess the validity of (or benchmark) nuclear safety computer code models.

Consortium and Cost Recovery for HA-LEU

- Q7. The Advanced Nuclear Fuel Availability Act would establish a public-private consortium to provide material for advanced nuclear fuels and sets up a structure by which consortium members would have access to the material, provided the private entities covered the cost of the nuclear material.
- Q7a. If DOE sets up this cost recovery structure, could such a program be carried out with limited budgetary impacts on DOE's overall mission needs?
- A7a. If such a structure were established, the Department would evaluate how to implement it most efficiently, and apply its resources in a way that minimizes any potential effects on other priority missions.
- Q7b. DOE currently provides some high-assay LEU for research needs. How is the cost structure set up for those recipients of HALEU?
- A7b. The DOE Office of Nuclear Energy (NE) manages the Research Reactor Infrastructure (RRI) program that provides HALEU fuel at no cost to 23 university research reactors for use at their on-campus reactor facilities. The title of the fuel remains with the U.S. Government, and when these universities no longer require the fuel, the RRI program is responsible for managing the return and disposition of the used nuclear fuel. Typically, other research uses of HALEU, such as fuels development, involve small quantities of

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HALEU, and the research is conducted at DOE's Idaho National Laboratory. In this case, the HALEU is never transferred to an external entity and there is no cost recovered for the material itself.

National Nuclear Waste Transportation Program Funding

- Q8. On April 16, 2018, the Nuclear Waste Strategy Coalition wrote the Department expressing concern about the decrease in the Department's support for State Regional Groups and Tribal Radioactive Materials Transportation Committee.
- Q8a. Does DOE remain committed to continuing to provide the same level of funding and engagement for these programs?
- A8a. DOE is committed to ensuring that spent nuclear fuel and high-level radioactive waste are transported and disposed of safely and in a manner that protects both human health and the environment. Part of that commitment is to work cooperatively with state and tribal governments that are likely to be impacted. Our level of engagement and funding is commensurate with both Congressional direction for nuclear waste program activities and Congressional appropriations.
- Q8b. Please describe why the Department curtailed the activities identified by the letter.
- A8b. DOE is focusing appropriations and available staff resources on activities that serve both disposal and long-term fuel storage. These activities include generic transportation analyses and planning, and supporting state and tribal engagement with the Department. The DOE Office of Nuclear Energy (NE) continues to fund the four State Regional Groups mentioned in the Nuclear Waste Strategy Coalition letter and the Tribal Radioactive Materials Transportation Committee to support the operation of their regional meetings and projects. In addition, NE staff continue to participate in DOE's National Transportation Stakeholders Forum (NTSF, led by DOE's Office of Environmental Management), including attending the NTSF Annual Meeting in June 2018.

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Q8c. Please provide list of meetings conducted with those organizations beginning in fiscal year 2015 through now.

A8c. Below is a list of in-person meetings DOE's NE staff conducted with State Regional Groups, the Tribal Radioactive Materials Transportation Committee (formerly the Tribal Caucus) and the National Transportation Stakeholders Forum and its Working Groups from FY 2015 to the present. Staff from other DOE radioactive materials transportation programs participated in some of these meetings, in addition to others specific to their own shipping programs.

Council of State Governments Eastern Regional Conference - Northeast High-Level Radioactive Materials Transportation Task Force

- November 2014, Port Jefferson, NY
- October 2015, Portsmouth, NH
- November 2016, Atlantic City, NJ
- November 2017, Portland, ME

Council of State Governments Midwest - Midwestern Radioactive Materials Transportation Committee

- November 2014, Traverse City, MI
- November 2015, Des Moines, IA
- November 2016, St. Louis, MO

Western Interstate Energy Board – High-Level Radioactive Waste Committee

- October 2014, Lake Tahoe, CA
- November 2015, Spokane, WA
- December 2016, Phoenix, AZ
- October 2017, San Diego, CA

Southern States Energy Board - Radioactive Materials Transportation Committee

- December 2014, Charlotte, NC

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- December 2015, New Orleans, LA
- December 2016, Myrtle Beach, SC

Tribal Radioactive Materials Transportation Committee

- January 2015, San Diego, CA
- January 2016, Palm Springs, CA
- January 2017, Charlotte, NC

DOE NTSF Annual Meeting

- May 2015, Albuquerque, NM
- June 2016, Orlando, FL
- June 2017, Pittsburgh, PA
- June 2018, Omaha, NE

NTSF Spent Nuclear Fuel Rail/Routing Ad Hoc Working Group Meeting

- May 2015, Albuquerque, NM
- November 2015, Des Moines, IA
- April 2016, Fort Worth, TX
- June 2016, Orlando, FL
- November 2016, St. Louis, MO
- June 2017, Pittsburgh, PA
- August 2017, Colorado Springs, CO

NTSF Section 180(c) Ad Hoc Working Group Meeting

- October 2014, Atlanta, GA
- May 2015, Albuquerque, NM
- August 2015, Boston, MA
- March 2016, Washington, DC
- June 2016, Orlando, FL
- June 2017, Pittsburgh, PA

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DOE-NE Transportation Core Group Meeting

- March 2015, Washington, DC
- August 2015, Boston, MA
- March 2016, Washington, DC
- August 2016, Chicago, IL
- March 2017, Washington, DC
- August 2017, Colorado Springs, CO

Q8d. Please provide a breakdown of funding provided under this program beginning in fiscal year 2015 through now.

A8d. From FY 2015 to now, NE has provided \$2.9 million in total funding through cooperative agreements with four State Regional Groups, and \$815,000 in total funding to the National Conference of State Legislatures to support the Tribal Radioactive Materials Transportation Committee.

USEC Restrictions on Enrichment Services

Q9. How does the Department of Energy reconcile its statements noting interest to develop uranium enrichment capability for high-assay low enriched uranium against the prohibition to provide enrichment services under Section 3112 of the USEC Privatization Act (42 USC 2297h-10)?

A9. DOE is considering a number of options to ensure the availability of high-assay low-enriched uranium for advanced reactor development. Any option pursued would be done in a manner consistent with Section 3112 of the USEC Privatization Act.

Isotope Consortium and HA-LEU Applicability

Q10. The Department created the National Isotope Development Center to interface with the user community and manage the coordination of isotope production across the Department's facilities and business operations involved in the sale and distribution of isotopes. Would a similar organization or DOE-led consortium within the Department

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provide the stability and guidance to the commercial HA-LEU production and user community?

- A10. The DOE Isotope Program, managed by the Office of Nuclear Physics within the Office of Science, established the National Isotope Development Center (NIDC) to primarily interface with the stakeholder community and implement the business aspects of the sales and distributions of isotopes. The Department could certainly explore whether the NIDC model and mission would be applicable to coordination across entities engaged in the commercial production of HALEU.

Report on Price Anderson

- Q11. The NRC has previously reported that advanced nuclear technologies would likely have differing requirements under what is known as “Price Anderson Act.” The Price Anderson insurance requirements are based on the risk and generation output of the existing fleet of commercial nuclear power plants. Has DOE had any discussions yet on how the liability requirements under the existing Price Anderson framework would be applied to safer and smaller advanced nuclear designs?
- A11. DOE agrees with NRC that advanced nuclear reactors may require different treatment under the Price-Anderson Act (PAA) than existing commercial nuclear power plants but has not begun any detailed consideration of this issue.

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QUESTION FROM REPRESENTATIVE BILL FLORES

Q1. Will you outline for us the number of different regulatory approvals, facility updates, transportation issues, and other milestones that will have to be accomplished to have the advanced fuels available in time for the first movers?

A1. While long-term supply of high-assay low-enriched uranium (HALEU) for advanced reactors will involve industry-driven solutions, industry has identified specific challenges for which government support is needed to enable the deployment of advanced reactors in the United States by the early 2030s.

DOE is exploring options for making HALEU available for early start-up fuel including from existing stocks of enriched uranium.

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QUESTION FROM REPRESENTATIVE JOHN SHIMKUS

Q1. Are you aware of a recent GAO report that found DOE's cost estimate to develop new enrichment options lacked credibility because it was not well documented or accurate?

A1. The National Nuclear Security Administration's (NNSA) response to the GAO report notes that the preliminary cost estimate does not include the full lifecycle cost of constructing a uranium enrichment facility that could meet the range of enriched uranium needs. The rough order of magnitude estimates prepared by NNSA were for the purpose of determining Critical Decision (CD) authority under DOE Order 413.3B. NNSA determined that it is not required or cost beneficial to include the life-cycle costs of a potential facility at this early stage. NNSA will produce higher fidelity estimates of the final alternatives including appropriate life cycle cost estimates of potential facilities as it continues through the process leading to selection of an alternative. DOE's Office of Program Management Oversight and Analysis conducted an Independent Cost Review of the preliminary estimates and deemed them appropriate for the intended purpose.