Hearing Charter

COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

"***Advancing Technology for Nuclear Fuel Recycling: What Should Our Research, Development and Demonstration Strategy Be?"***

Wednesday, June 17, 2009
10 a.m. – 12 p.m.
2318 Rayburn House Office Building

Purpose

On Wednesday, June 17, 2009 the House Committee on Science & Technology will hold a hearing entitled: "***Advancing Technology for Nuclear Fuel Recycling: What Should Our Research, Development and Demonstration Strategy Be?"***

The Committee's hearing will explore the benefits and risks associated with nuclear waste recycling and the research development and demonstration needed to address the technical challenges and policy objectives of a nuclear waste management strategy that could include recycling spent nuclear fuel. If nuclear power is going to expand in this country the government needs to have a strategy to manage the growing volumes of spent nuclear fuel. The Committee will hear from expert witnesses who will discuss the issues relevant to deployment of advanced technologies for nuclear waste recycling.

Witnesses

- **Dr. Mark Peters is the Deputy Associate Laboratory Director at Argonne National Laboratory.** Dr. Peters will testify on the current research, development and demonstration programs at the Department of Energy to advance technologies for recycling spent nuclear fuel. He will also discuss future RD&D needs.

- **Dr. Alan S. Hanson, Executive Vice President for Technology and Used Fuel Management at Areva, Inc.** Areva has worldwide operations that encompass the entire nuclear power cycle, including uranium exploration and mining, fuel fabrication, design and construction of nuclear reactors, and treatment and recycling of spent fuel. Dr. Hanson will provide information regarding Areva's technology for reprocessing nuclear waste and the company's technology development underway.

- **Ms. Lisa Price is the Senior Vice President, GE-Hitachi Nuclear Energy and Chief Executive Office of Global Nuclear Fuel**. GE-Hitachi develops advanced light water nuclear reactors and provides products and services for improving output and efficiency of existing nuclear power plants. Ms. Price will testify

about General Electric's technology development for recycling spent nuclear fuel and GE's work with the federal government in this area.

- **Dr. Charles D. Ferguson is a Philip D. Reed Senior Fellow for Science and Technology at the Council on Foreign Relations.** The Council on Foreign Relations is an independent, non-partisan organization established in 1921 to explore foreign policy issues and promote an understanding of the U.S. role in the world. Dr. Ferguson will provide testimony about the various technology options available for management of spent nuclear fuel and the benefits and risks associated with those technologies.

Background

According to the Nuclear Regulatory Commission (NRC), as of August 2008 there are 104 commercial nuclear power reactors licensed to operate in thirty-one states providing approximately 20 percent of our nation's electricity supply. The approximate 58,000 metric tons of spent nuclear fuel already existing at these reactor sites continues to accumulate at a rate of 2,000 metric tons per year. In 1987, Congress designated Yucca Mountain in Nevada as the nation's sole candidate site for a permanent high-level nuclear waste repository. The Department of Energy submitted a license application to the NRC for the proposed Yucca Mountain site in June 2008. The Nuclear Waste Policy Act of 1982 targeted 1998 as the year to start loading waste into the repository. That date has been pushed back repeatedly.

The Obama Administration is taking a very different approach to Yucca Mountain and nuclear waste management. President Obama is proposing to cut funding for the Yucca Mountain project by approximately $100 million and to convene a blue ribbon panel to look for alternative solutions for managing the nation's nuclear waste. The President's 2010 budget request appears to continue the Yucca Mountain licensing process, but the significant funding cut certainly would delay the planned 2020 opening of the repository.

Alternatives to Yucca Mountain

Current law provides no alternative repository site to Yucca Mountain, and it does not authorize DOE to open temporary storage facilities without a permanent repository in operation. In the past, there have been discussions about the Department of Energy taking title of the commercial spent nuclear fuel and paying for the cost of storing the waste at the private utility sites. In the early 1980s the NRC determined that waste can be safely stored at these reactor sites for at least thirty years after a reactor shuts down. More recently, the NRC is proposing a further revision to its Waste Confidence Decision to find reasonable assurance that spent fuel can be stored safely for at least sixty years after a reactor's licensed operating life. In addition, under current law a private storage facility could be licensed by the NRC. Such a facility has been licensed in Utah, but its operation has been blocked because it cannot obtain a permit from the Department of Interior's Bureau of Land Management.

Recycling Spent Nuclear Fuel

With the Obama Administration poised to delay the Yucca Mountain project and initiate a major program review, recycling spent nuclear fuel is likely to be considered in part because there is another long-term concern that uranium supplies for nuclear fuel may become scarce if it can not be reused. Along with consideration of a recycling alternative for nuclear waste management, it is essential to examine the research, development and demonstration needed at the federal level to ensure that we understand the safety, environmental, security and economic issues associated with a decision to adopt a nuclear waste recycling program in this country.

Since the 1970s, U.S. nuclear waste policy has been based on the "once through" fuel cycle in which nuclear fuel is used once in a reactor and then permanently disposed of in long-term storage. The major alternative is the "closed" fuel cycle, in which spent nuclear fuel would be reprocessed into new fuel. The goal is to extract more energy from a given supply of uranium, reduce the amount of waste going to a permanent waste repository and do this in a manner that is proliferation-resistant.

Fuel for U.S. nuclear reactors currently consists of uranium in which the fissile isotope U-235 has been enriched to 3-5 percent -- the remainder being the non-fissile isotope U-238. During use in the reactor most of the U-235 splits, or fissions, releasing energy. Some of the U-238 is transmuted into fissile isotopes of plutonium, some of which also fissions. In reprocessing, the uranium and plutonium are chemically separated to be made into new fuel while the lighter elements resulting from the fission process are stored for disposal. There are a number of different fuel options for recycling nuclear waste. One process, used primarily in France, mixes plutonium with uranium to form fresh fuel known as MOX fuel which can be reused once in most existing light water reactors. For multiple recycling of spent fuel, advanced reactors would be necessary. These fast reactors could create new fuel from spent fuel repeatedly in a manner that would allow it to be fed back into the reactor until it is entirely fissioned. These fast reactors also would destroy the longest-lived radioactive components for the fuel, leaving only relatively short-lived radioactive isotopes which would decay to background levels within approximately 1,000 years. Ultimately, these short-lived isotopes would be sent to permanent storage.

Depending on the exact technologies chosen to close the nuclear fuel cycle, there are a number of issues to consider. The National Academy of Sciences, the General Accountability Office, and the Council on Foreign Relations have raised questions about using an approach such as the process used to form MOX fuel. This involves separating a pure stream of plutonium from the spent fuel, prompting concerns about proliferation of weapons-grade materials. Although still debated, spent fuel recycling could save space in an underground repository by reducing the near-term heat load, which is the primary limit on repository capacity. However, the closed fuel cycle is generally considered to be substantially more expensive than the once-through cycle and there is a broad scientific consensus that long-term isolation of nuclear waste from the environment will still be required. There is also widespread agreement that a more robust long-term research and development program is needed to address these outstanding issues.