

**STATEMENT OF JOHN WILLIAMS, SOUTHERN NUCLEAR OPERATING COMPANY
BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE**

**ADVANCED NUCLEAR TECHNOLOGY: SAFETY AND ASSOCIATED BENEFITS OF LICENSING ACCIDENT
TOLERANT FUEL FOR COMMERCIAL NUCLEAR REACTORS**

September 13, 2018

INTRODUCTION

I am John Williams, Nuclear Fuel and Analysis Director at Southern Nuclear Operating Company. I am responsible for nuclear fuel, safety analysis, and risk-informed engineering for the Southern Nuclear fleet of generating plants, and am the Corporate Functional Area Manager for the Fuel & Reactor Engineering functional area. I am also a member of the Nuclear Energy Institute's Accident Tolerant Fuel Working Group, which is charged with guiding industry policy and action and is led by Mr. Danny Bost, Executive Vice President and Chief Nuclear Officer of Southern Nuclear.

SOUTHERN COMPANY

Southern Company is a natural gas and electric utility holding company headquartered in Atlanta, Georgia, with executive offices also located in Birmingham, Alabama. The nation's premier energy company, Southern Company provides clean, safe, reliable, affordable energy to 9 million gas and electric utility customers in 11 states. Southern Company is developing the full portfolio of energy resources, including carbon-free nuclear, advanced carbon capture technologies, natural gas, renewables, energy efficiency and storage technology, and creating new products and services for the benefit of customers.

Innovation is a central part of our strategy. We foster a culture that seeks to make transformational changes and understand that innovation and technology are engines of American greatness. We actively collaborate with the U.S. government, other utilities, universities and technology developers and remain at the forefront of technology development for the production, delivery and end-use of energy.

Southern Nuclear

Southern Nuclear, a subsidiary of Southern Company, currently operates six nuclear reactors: Units 1 and 2 at Plant Farley near Dothan, Alabama; Units 1 and 2 at Plant Hatch near Baxley, Georgia; and Units 1 and 2 at Plant Vogtle near Augusta, Georgia.¹ Together, Plants Farley, Hatch and Vogtle provide approximately 20% of the electricity used in Alabama and Georgia. This is made possible by our talented and committed workforce of more than 4,000 men and women working at our fleet of nuclear power plants and corporate

¹ Plant Farley is owned by Alabama Power Company. Plants Hatch and Vogtle are co-owned by Georgia Power Company, Oglethorpe Power Corporation, the Municipal Electric Authority of Georgia, and Dalton Utilities.

offices, all of whom are also part of the larger Southern Company team of over 32,000 employees who are building the future of energy for the customers they serve. Southern Nuclear, as a subsidiary of the Southern Company, embodies the company's commitment to creating America's energy future and developing new products and services for the benefit of consumers through technological innovation. As such, we are proud to be taking a leadership role in the development and testing of Accident Tolerant Fuel (ATF).

It is an honor to appear before this Committee to share my views on the benefits of accident tolerant fuels and how we can overcome the development and licensing challenges before us. I thank Chairman Barrasso, Ranking Member Carper, and the Committee Members for taking the time today to discuss this pivotal technology that has the potential to make our Nation's nuclear fleet more reliable and efficient, as well as enhance its safety.

NEED FOR NUCLEAR INNOVATION, HOW ATF WILL ADVANCE NUCLEAR SAFETY (AND EFFICIENCY OF EVERYDAY OPERATIONS)

America's nuclear power plants run 24 hours a day, seven days a week, providing 20 percent of the nation's electricity and nearly 60 percent of its clean, emissions-free power. The nuclear fleet is a vital part of America's critical infrastructure, and an essential linchpin of a reliable, resilient national grid.

However, the sustainability of the US nuclear fleet will depend, in large part, on industry's ability to innovate at a pace which will allow the plants to remain economically competitive with other rapidly advancing energy technologies. I am proud to be leading a significant effort, currently, well underway, on one such innovation – Accident Tolerant Fuels – which has significant potential in this regard. The US Nuclear industry, in partnership with the Department of Energy (DOE), is developing highly advanced new fuels which offer improved performance under both accident and normal operating conditions. They have the potential to provide significant additional safety margin to protect the public and environment. The effort to develop ATF designs is accelerating as the value that these technologies bring becomes more apparent.

Early research and analysis work on advanced fuels has shown potential for the enhanced robustness and other properties of accident-tolerant fuels to (1) increase safety under [rare] accident conditions and (2) increase fuel and system efficiency, performance and therefore profitability under normal operating conditions.

The industry sees enough potential in the ATF program that we are pushing for an accelerated timeline for testing, analysis and licensing, with a goal for final deployment of ATF across the existing reactor fleet by the early- to mid-2020s.

The industry's rationale for an accelerated timeline is that utilities will be making second license renewal decisions by the early 2020s. Those decisions will be informed by whatever enhanced safety and economic benefits are evident from the results of the development program.

THE PATH FORWARD

Time is of the essence, and we are focused on accelerating the program by coordinating our activities across the fields of R&D, testing, modeling and simulation, licensing preparation, and safety and economic benefit analysis. Historically, development of new nuclear fuels can take upward of 20 years. Development on that timeline is not practical. The industry is working closely with the U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC) to innovate on licensing and development, while maintaining the highest levels of safety. ATF presents an opportunity to showcase a transformative, risk-informed and streamlined regulatory and licensing framework.

FIRST LTAs LOADED AT HATCH

The industry is making investments and moving forward. We loaded two kinds of ATF cladding in Southern's Hatch plant in February—the first of many in-reactor tests to come across the nuclear industry. We will also be loading new fuel and cladding concepts at our Vogtle plant in early 2019. While the results from the Hatch test won't be available until the next refueling outage, we did learn from the experience about the regulatory framework that needs to be in place to ensure that future tests can take place in a timely manner.

FUTURE LTAs

Between now and 2022, the three major fuel vendors in the ATF program (General Electric/GNF; Westinghouse/General Atomics; and Framatome) will be inserting lead test assemblies comprising several concepts of advanced accident-tolerant fuel and cladding in U.S. commercial reactors operated by Southern and Exelon. The results of this testing (and of other tests being conducted in DOE research reactors and labs) will provide fuel performance data from commercial reactor environments and inform NRC licensing activities.

Some of these activities will be conducted in parallel, which will help to accelerate the deployment timeline toward the desired goal of beginning batch loads of ATF fuel in commercial reactors by 2023, and full deployment by 2026.

ATF FUNDING 2018-2019

We are grateful for the strong support demonstrated by both the Senate and House of Representatives for this program. The levels of funding are adequate to continue the development of the technologies in partnership with the DOE. We are grateful for the close attention and support that Congress has provided to ATF, and for its recognition that this program represents the cutting edge of innovation that will help preserve America's technological and strategic leadership.

NRC ATF LICENSING PLAN

The industry also is appreciative of the NRC's plans to license fuel in an innovative way which can accelerate the deployment of ATF in the marketplace. The NRC staff and Commission have been extremely diligent in coordinating their efforts with those of DOE and the industry to develop a

comprehensive and risk-informed licensing plan. The NRC's Transformation Initiative is also partly geared toward streamlining the regulatory framework for the timely and efficient licensing of innovative technologies such as ATF.

DOE ATF ACTIVITIES IN SUPPORT OF INDUSTRY

Our collaborative relationship and partnership with the DOE and National Labs cannot be understated. The National Lab testing, modeling and simulation, and coordination with the NRC on code development for licensing reviews, are essential aspects of the fuel development. We greatly benefit from the Labs' vast expertise and world class testing capabilities.

As an example of U.S. leadership, it is expected later this month that Idaho National Laboratory's unique TREAT facility will perform its first pulse test in more than 20 years, in an experiment to gather baseline data for ATF testing. The TREAT reactor is a national asset that was specifically designed to test and qualify nuclear fuels and determine their safety margins. It first opened in 1959 and was restarted last year after being shut down in 1994.

SAFETY AND ECONOMIC BENEFITS REPORT

Ultimately, the widespread use of these innovative technologies will depend upon the safety and economic benefits. The industry is keenly focused on understanding the range of potential benefits and is also evaluating how ATF can be an enabler to additional benefits from increased enrichment and fuel burnup. It is our intent to document the benefits in a report to be issued in the next several months. These efforts are closely coordinated with the Electric Power Research Institute, who is leading several of the analyses to ensure an independent perspective on the results.

CONCLUSION

The phrase "win/win" has become a bit of a cliché, but the successful development of accident tolerant fuels has the potential to provide a win for everyone – safety, the environment, consumers, and plant operators – by making light water reactors even safer, as well as more efficient and reliable. If in the process, we develop a model for the transformation and modernization of the regulatory framework for nuclear plants, even better. However, for all of this to have meaning, we all – industry, regulators, Department of Energy and Congress, must continue to work together without delay.