DOE-Sponsored Light Water Reactor Sustainability Program

Issues:

- Since 2013, ten sites (11 reactors) have closed and another 5 sites (8 reactors) have announced plans to retire prior to their license expiration date with many utilities attributing these decisions to financial challenges.
- Thirteen units have announced intentions to apply for subsequent license renewals (SLR) to 60-80 years and ten units submitted applications to the Nuclear Regulatory Commission (NRC); four of those reactors (Turkey Point Units 3 and 4 and Peach Bottom Units 2 and 3) received SLR approvals from NRC.
- Understanding the mechanisms of materials aging for key structures, systems, and components (SSCs) helps determine how they will perform in their in-service environments during long term operation; Addressing other forms of aging and obsolescence of plant technologies and capabilities are vital to sustaining the long term operation and performance of the existing light water reactor fleet.
- Since 2011, the U.S. Department of Energy's (DOE's) Light Water Reactor Sustainability (LWRS) program, in coordination with the NRC and the Electric Power Research Institute (EPRI), has been coordinating and conducting collaborative projects to address key issues related to materials performance of SSCs for operating periods from 60 to 80 years.

LWRS Key Messages:

- The LWRS program is the DOE Office of Nuclear Energy's main programmatic activity that is being conducted to enhance the long term viability and competitiveness of the existing U.S. reactor fleet.
- The goals of the program are to (1) provide industry with science-based solutions to implement technology that can exceed the performance of the current business model; and (2) manage the aging and obselence of plant systems, structures, components and technologies so that nuclear power plants can continue to operate safely, efficiently, and economically.
- The LWRS program defines "sustainability" as the ability to maintain safe and economic operation of the existing fleet of nuclear power plants for as long as possible and practical. To enhance plant performance, reduce operating costs, and increase revenue opportunities, the program focuses on plant modernization, flexible plant operation and generation, risk-informed systems analysis, materials research, and physical security.

LWRS Status and Next Steps:

- Much of the research and development activities of the LWRS program are conducted through cost-shared, private-public partnerships with industry and other stakeholders to enable deployment of innovative approaches to improve economics and economic competitiveness of LWRs in the near-term and in future energy markets.
    - Pilot projects are conducted in many research activities to achieve needed progress in selected areas and to provide industry the information needed to move forward in deploying these potential solutions in the operating fleet.
    - Industry-led projects to date will digitalize a boiling water reactor safety system, automate remote and condition-based monitoring of plant systems and equipment, support the deployment of integrated energy systems at operating reactors to produce hydrogen for commercial use, advance aging management of physical systems, and enhance approaches to fire probabilistic risk assessment (PRA).

- Close coordination will be maintained with owner-operators, Owner's Groups, vendors and suppliers, the regulator, and other industry groups to assist in the development of a proactive long term plan for research that delivers near-term results to enhance and sustain the existing fleet and maintain U.S. national capabilities in nuclear energy systems.

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