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PNNL is the provider of choice in a multitude of technical areas, including:

- ▶ Environmental reviews
- ▶ Non-destructive evaluation
- ▶ Nuclear fuel design reviews
- ▶ Thermal-hydraulic analysis
- ▶ Emergency preparedness
- ▶ Cyber security
- ▶ Digital instrumentation and control
- ▶ Stress corrosion crack growth
- ▶ Tsunami effects (surface hydrology)
- ▶ Nuclear plant fire protection

Nuclear regulatory expertise for America's energy future

The U.S. Department of Energy (DOE) projects the United States will need 40 percent more electricity by 2030, and that worldwide population growth and corresponding rates of energy consumption will cause global energy demand to double in the next few decades. In order to minimize the impact on energy resources and global climate change from this energy growth, the world must significantly increase its use of nuclear power. Nuclear energy is a carbon-free, large-scale energy source that will continue to grow as demand for affordable, environmentally-responsible energy expansion persists.

The United States has fallen behind other parts of the world in terms of building nuclear generation capacity, and now construction of new nuclear plants should be expedited to meet growing domestic energy needs, as well as to bolster America's international leadership in the nuclear safety and regulatory assurance arenas. To address this complex challenge, DOE's Pacific Northwest National Laboratory (PNNL) is working with the U.S. Nuclear Regulatory Commission (NRC), to apply its distinguished environmental and safety analysis review capabilities to facilitate construction of new reactors and safely extend the operating licenses of currently operating nuclear plants.

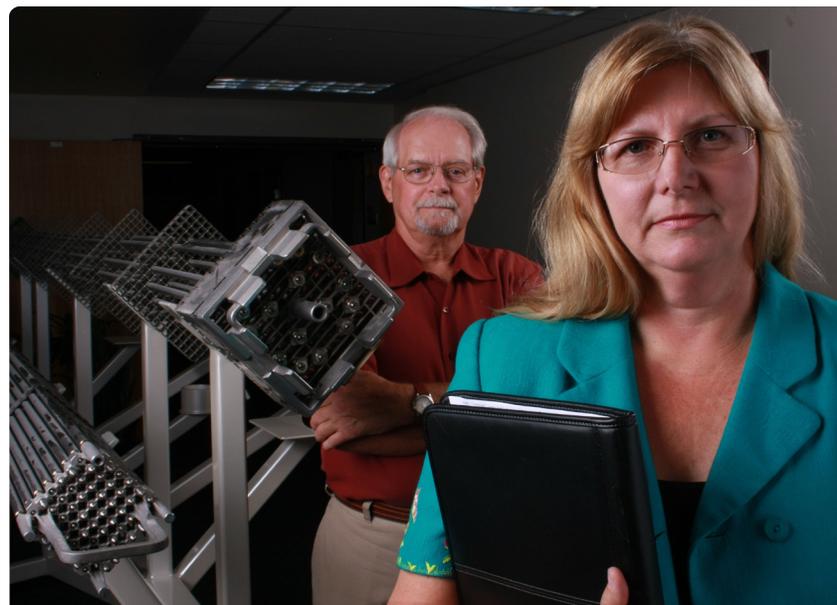
PNNL: A KEY RESOURCE FOR THE NRC

PNNL has supported the NRC's nuclear energy oversight activity for more than three decades. For the past 10 years, PNNL has been the NRC's provider of choice to support its environmental reviews for existing and new power reactor facilities. PNNL was selected by the NRC as the lead laboratory for environmental reviews for new nuclear plants.

In addition to plant specific environmental reviews, PNNL also provides NRC with extensive support on safety and emergency response reviews, and the development and update of regulatory guidance documents. PNNL was selected for this role because of the breadth and depth of its environmental and engineering expertise, and the confidence built upon years of reliable assistance. PNNL also participates in a multi-laboratory consortium, providing expert technical safety analysis support to NRC in assessing new reactor designs as part of NRC's overall design certification process.

The NRC was created to enable the nation to safely use radioactive materials for beneficial civilian purposes while ensuring that people and the environment are protected from radiation. NRC's continuing diligence and oversight has contributed to an excellent safety record; the nation's nuclear power plants are among the safest and most secure industrial facilities in the world. NRC views PNNL, and other national

PNNL expertise in environmental and safety analysis reviews is vital to the U.S. Nuclear Regulatory Commission's efforts to facilitate the construction of new reactors and safely extend the licenses of currently operating nuclear plants.



U.S. DEPARTMENT OF
ENERGY

laboratories, as important national science and technology resources for accomplishing the commission's critical missions.

BUILDING U.S. NUCLEAR ENERGY CAPACITY

Nuclear energy currently accounts for about 20 percent of America's energy mix. In order to maintain current production levels amidst significant growth in energy demand, it's estimated more than 180 new reactors must be operational in the U.S. by 2050. Applications for more than 30 new reactors have already been submitted to the NRC, but many more will be needed in order to meet projected electricity demand.

To facilitate the process of bringing new reactors on line, PNNL will continue to conduct environmental siting reviews to examine land use, environmental monitoring, hydrology, and other factors such as urban population distribution to help determine whether proposed new nuclear plant sites should be approved.

In addition, PNNL will assist the NRC with the design certification process to ensure proposed new plant designs adhere to established criteria, and that all systems, components, and processes included in the design will comply with the rigorous standards necessary for the safe construction and operation of nuclear power generation facilities. In tandem with these efforts, PNNL will contribute its capabilities to help the NRC improve permit and licensing processes to facilitate more rapid growth of our nation's nuclear power generation capability.

PROVIDING EXPERTISE IN CRITICAL AREAS

Environmental reviews require specialized expertise in a number of areas, including terrestrial and aquatic ecology, hydrology, meteorology, health physics, transportation, socioeconomics, environmental justice, land use, and cultural resources. Through interdisciplinary collaboration with other national laboratories, PNNL will apply its world-leading expertise in these areas to help the NRC address

the significant challenge of reviewing new nuclear plant siting permits and combined construction operating license applications, as well as design certification applications.

LEVERAGING EXISTING POWER GENERATION

Another key element of growing the nation's nuclear power capacity is the ability to continue using existing reactors for cost-effective generation. The nuclear reactors currently operating in the U.S. were built decades ago and, for license renewal, their compliance with regulatory criteria for component aging management programs and periodic inspections must be examined and verified. PNNL will provide expertise in these areas to assist in assuring that operating licenses can be safely extended for 20 years or more.

The partnership between PNNL and NRC on license renewal will save the industry billions of dollars in new construction costs and provide a jump start to domestic nuclear energy expansion.

A RELIABLE AND ECONOMIC DOMESTIC FUEL RECOVERY AND ENRICHMENT INDUSTRY

As the number of operating nuclear plants increases, so will the need for

additional nuclear fuel resources. Currently, the U.S. imports most of the uranium needed to fuel 104 operating reactors, and with the resurgence of domestic and international interest in and use of nuclear energy, fuel costs are increasing.

Rising uranium prices and growing demand have increased interest in domestic uranium production, which requires stringent safety and environmental oversight. PNNL stands ready to assist the NRC with exploration of our nation's capabilities in uranium recovery and enrichment to support efforts to maximize domestic nuclear fuel sources.

SAFELY EXPANDING NUCLEAR POWER

In the coming years, nuclear regulatory advances could make it possible to add 30 gigawatts of nuclear generating capacity to the national energy portfolio, taking the nation well along the path to meeting future energy demands, while maintaining strict standards of environmental responsibility.

PNNL, working in partnership with the NRC, is addressing some of the nation's most pressing energy challenges through world-leading nuclear regulatory expertise.

ABOUT PNNL

PNNL is located in Richland, Wash., employs approximately 4,200 staff, and conducted more than \$880 million in research in fiscal year 2008. In the quest for environmental solutions, PNNL marshals interdisciplinary research teams, collaborates with a range of partners, and leverages research funding to maximize results. Our staff, facilities, capabilities, and approach to inquiry and innovation have established PNNL as a premier science and technology enterprise.

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