





# Fueling Change Through Scientific Discovery

**B**attelle, Brookhaven National Laboratory, the National Renewable Energy Laboratory, Oak Ridge National Laboratory, and Pacific Northwest National Laboratory work at the confluence of scientific discovery initiatives whose impacts will fuel positive societal changes for decades to come.

These national science initiatives—in **Nanoscience**, **Genomes to Life**, and **High-Performance Computing**—offer the potential for numerous future breakthroughs and support the key DOE missions in energy, environment, and national security.

Battelle approaches these major initiatives with a strong emphasis on simultaneous excellence in science, laboratory operations, and service to the local communities where these initiatives are performed. Our integrated approach to the leadership of scientific discovery helps maximize DOE's and Battelle's scientific investments for the benefit of the nation and our future quality of life.

Battelle also is positioning itself to help the national laboratories translate this world-class scientific discovery into applications through the formation of Battelle Ventures, which will help take promising national lab technologies to the marketplace for societal benefit. Think of it as fundamental science leading to fundamental change.

⊖ Brookhaven National Laboratory and Oak Ridge National Laboratory are global leaders in Nanoscience. Tiny machines—known as “Nanoscience Monitors”—one day will monitor human bloodstream activity to help detect and treat diseases.



**B**rookhaven National Laboratory and Oak Ridge National Laboratory are linking world-class **Nanoscience** centers to develop breakthroughs in areas such as health care, manufacturing, new materials, and product development. In the health care area, “nanoscience monitors”—tiny machines that could continually monitor body chemistry and bloodstream activity for such things as orphan cancer cells—are an area of focus. These are much like a warning light on a car’s instrument panel. In addition, researchers are looking at carbon nanotubes as a means to help speed drug delivery in solving human health problems.

Exploration of nanomaterials (on a scale of billionths of a meter) at Brookhaven offers the promise of innovative technologies that could underpin new materials for electronic devices, transistors, fuel cells, and manufacturing. And at Oak Ridge, the completion of the \$1.4 billion Spallation Neutron Source—the nation’s largest science project—will provide future benefits in nanomaterials, plastics, and superconducting magnets.

**P**acific Northwest National Laboratory and Oak Ridge National Laboratory are co-leaders for DOE's **Genomes to Life** Initiative, a \$1 billion effort to develop leading-edge technologies for isolating and identifying groups of proteins within cells.

This world-class scientific research will provide vast knowledge regarding how cells function, the response of biological systems to environmental influences, and insights into analyzing a plethora of future human health issues. Pacific Northwest and Oak Ridge are leading this massive effort while collaborating with other national laboratories and universities such as the University of Utah and the University of North Carolina.

In 2003, Pacific Northwest National Laboratory also established a world-class proteomics facility at the Environmental Molecular Sciences Laboratory to learn more about cellular behavior.

⑤ The U.S. Department of Energy's Genomes to Life Initiative is a \$1 billion effort to develop leading-edge technologies for isolating and identifying groups of proteins within cells.

## Change in the Making: 1949



Throughout its history, Battelle has been a world leader in nuclear energy.

During the 1940s, Battelle scientists fabricated uranium fuel rods and developed zirconium for the first full-scale nuclear reactor at Oak Ridge, Tenn.

In 1949, Battelle researchers developed the prototypes of fuel elements for the novel, compact nuclear reactor in the first atomic submarine—the *Nautilus*.

Pacific Northwest National Laboratory and Oak Ridge National Laboratory also are co-leaders of the nation's **High-Performance Computing** Initiative, expanding the frontiers of science in high-performance computing to bring lightning-fast capabilities to bear on major national problems.

Oak Ridge is constructing the world's fastest supercomputer, an instrument that will be able to perform 1,000 trillion operations per second. This instrument represents a national investment of \$500 million. And Pacific Northwest recently installed a supercomputer that will operate 9,200 times faster than a personal computer and address future problems in such areas as environmental cleanup, new materials, and human health.

These developments are helping to significantly boost computing power in the United States through faster machines and greater data storage capacity.

# 1949

