Raymond L. Orbach

Director's Message

These are extraordinary times for science.

We are learning to manipulate matter at the molecular scale. The sequencing of the human genome, a landmark achievement, is providing a foundation from which to explore the most basic mechanisms of life. Computation has become a true third pillar of scientific discovery, complementing theory and experiment and providing insights into systems of otherwise impenetrable complexity. And we are probing the very structure of matter and the beginning of time.

The Office of Science is at the center of these and many other research frontiers, working in concert with other Federal agencies and U.S. universities to deliver the breakthroughs that will transform our future. This Strategic Plan, crafted in close consultation with the U.S. research community, is designed to deliver the scientific advances and support for our mission that will position our Nation for scientific and economic strength and leadership in the years to come.

When I joined the Office of Science after a career as a university scientist and administrator, I came with an appreciation for the four key roles that the Office plays in the U.S. research effort: *We provide solutions to our Nation's energy challenges*, contributing essential scientific foundations to the national, energy, and economic security missions of the U.S. Department of Energy (DOE). *We are the Nation's leading supporter of the physical sciences*, investing in research at over 280 universities, 15 national laboratories, and many international research institutions. *We deliver the premier tools of science to our Nation's science enterprise*, building and operating major research facilities for open access by the science community. *We keep the U.S. at the forefront of intellectual leadership*, supporting the core capabilities, theories, experiments, and simulations at the extreme limits of science.

This is an organization that takes scientific risks with high payoffs. We make long-term investments in people and research programs, while responding with agility to rapid changes at the frontiers of science. We work in partnership with other Federal agencies and the international scientific community. We build and maintain remarkable tools of discovery, such as the Spallation Neutron Source now under construction, and we take great pride in constructing and operating them on time and budget. We balance our signature support for big science and interdisciplinary teams with a broad portfolio of projects conducted by leading university and laboratory investigators.

Underpinning these efforts is an uncompromising commitment to scientific excellence and integrity, a commitment embodied by the cadre of dedicated and highly professional managers who guide our programs. All of our research is competitively selected and peer reviewed.

The Office of Science and its predecessors have proven over the past 50 years that we deliver results. Our legacy includes 79 Nobel laureates associated with DOE and its predecessor agencies since 1934. We have spawned entire

new industries, including nuclear medicine technologies that save thousands of lives each year, and the nuclear power industry that now contributes 20% of the power to our Nation's electricity grid. We have been the first to take on new research challenges for the Nation, such as launching the Human Genome Project in 1986, and we were the first Federal agency to investigate the causes of global climate change. We are now working on the challenges that face our Nation in the 21st Century.

At the outset of this strategic planning process, I emphasized the need to identify a set of our highest science priorities, and through our deliberations, we have identified seven items that top our list for the foreseeable future (see sidebar).

Within this list, *Facilities for the Future of Science* crosscuts and supports all of the other priorities while at the same time underpinning research spanning almost all disciplines of science. I am increasingly mindful that the health and vitality of U.S. science and technology depends upon the availability of the most advanced research facilities—the powerful tools of discovery. The DOE Office of Science leads the world in the conception, design, construction, and operation of these large-scale devices. These machines have enabled U.S. researchers to make some of the most important scientific discoveries of the past 70 years, with spin-off technological advances leading to entirely new industries. More than 18,000 researchers and their students from universities, other government agencies (including the National Science Foundation and the National Institutes of Health), private industry, and those from abroad use our facilities each year. These users are both growing in number and diversity.

Because of their critical role in science, in the Fall of 2002, I initiated a process to identify and prioritize future major facilities. The results of this complementary planning effort, complete with detailed descriptions of the facilities, their roles, and the priority-setting process, are contained in the companion document, *Facilities for the Future of Science: A Twenty-Year Outlook*. The list of 28 large-scale facilities (see page 15) represents our view of the projects that will help maintain U.S. scientific leadership for decades to come. These facilities are an integral part of this Strategic Plan.

The following pages outline an ambitious agenda for science, one that will lead us to a more secure energy future, a cleaner environment, a healthier citizenry, and great advances in our imagination and knowledge. I trust that the goals of this Plan will fire your imagination as they have ours, and that you will join with us in this exciting quest for scientific discovery and leadership.

Raymond L. Orbach
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U.S. Department of Energy
Office of Science Strategic Plan 2004

Highest Priorities for the Office of Science

- *ITER for Fusion Energy:* Provide the enduring solution to our Nation's energy challenge, conducting the burning plasma experiment that will bring fusion energy within reach as a commercial source of clean, abundant energy.
- *Scientific Discovery through Advanced Scientific Computing:* Expand the broad frontiers of scientific discovery through the power of advanced computation.
- *Nanoscale Science for New Materials and Processes:* Master the ability to construct revolutionary new materials and processes…atom-by-atom and build upon Nature's self-assembling techniques.
- *Taming the Microbial World—the Next Revolution in Genomics:* Harness microbial genomes and the molecular machines of life for energy, the environment, and human health.
- *Dark Energy and the Search for the Genesis:* Illuminate the basic forces of creation and the origins of matter, energy, space, and time.
- *Nuclear Matter at the Extremes:* Explore new forms of nuclear matter at high-energy densities and at the extreme limits of stability.
- *Facilities for the Future of Science:* Deliver the high-priority facilities over the next 20 years that support DOE's and the Nation's research.