

**STATEMENT OF  
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**BEFORE THE  
HOUSE APPROPRIATIONS SUBCOMMITTEE FOR  
ENERGY AND WATER DEVELOPMENT**

**CONGRESSMAN DAVID HOBSON  
CHAIRMAN**

**March 15, 2006**

**Mr. Chairman, my name is** Jerry Draayer and I am President and CEO of the Southeastern Universities Research Association (SURA). SURA is a non-profit consortium of 62 universities that is the management and operating contractor for the Thomas Jefferson National Accelerator Facility (Jefferson Lab) in Newport News, Virginia. Last year, I added SURA's voice to the chorus of Americans in academia, government and industry who expressed concern that without increased investments in the physical sciences, our nation would be ill-prepared for the challenges of the global innovation economy. Many voices from this subcommittee were also part of that chorus. The purpose of my testimony today is to recognize the subcommittee's foresight in supporting the physical science programs funded by the Department of Energy's Office of Science, specifically Nuclear Physics and to ask that you fully fund the President's FY 2007 budget request for the DOE's Office of Science (\$4.1B, a \$505M increase over FY 2006 levels) and the Nuclear Physics program (\$454.1M, an \$87M increase over FY 2006 levels.)

Mr. Chairman, we recognize that the FY 2007 appropriations cycle will be challenging and the subcommittee's spending ceiling will most likely present difficult choices among the many important programs within the jurisdiction of the Subcommittee. We believe, however, that without these investments in the Office of Science, as recommended by the President and numerous panels including the most recent National Academy of Science's "Rising Above the Gathering Storm" report, our nation will lose ground against countries who are aggressively investing in science and technology, and creating an environment where those enterprises and the resulting high-paying jobs can flourish. The "Gathering Storm" report states that "as much as 85% of measured growth in US income per capita is due to technological change." This change is nurtured by research in the physical sciences that not only lead to breakthroughs in our understanding of the world around us; it results in new technologies and trains new generations of scientists and engineers to help us face the challenges of the future.

Within the Office of Science, this proposed increase in the Nuclear Physics budget will allow us to take advantage of the important scientific opportunities recommended in the Nuclear Science Advisory Committee (NSAC) Long Range Plan and reflected in the Office of Science 20-year plan - *Facilities for the Future of Science*. For Jefferson Lab, the President's Budget allows the Lab to increase operations (+10.8M) to conduct experiments for university users and provides \$7M for Project Engineering and Design for the Jefferson Lab 12 GeV Upgrade, designated a near-term priority in the 20-year *Facilities* plan. This increase assures that the US will continue to reap the benefits of its investment in this basic research facility - new insights into the structure of matter, young trained physicists and engineers equipped to meet future challenges, technologies that benefit our national and economic security, and outreach programs that improve the quality of math and science education and reach out to underrepresented children to open opportunities in math and science.

### **DOE-Supported Science is Essential to US Competitiveness**

Mr. Chairman, as you and the other members of the Committee know, the Department of Energy's Office of Science is the largest sponsor of research in the physical sciences, which provides the underpinning of many other scientific disciplines. It not only operates unique user facilities, it provides support for the university users in biological and life sciences, physics, chemistry, environmental sciences mathematics, computer science, and engineering. These

programs and facilities play an essential role in supporting individual investigator-driven research efforts of the National Institutes of Health (NIH) and the National Science Foundation (NSF). Each year more than 15,000 sponsored scientists and students conduct cutting edge experiments at DOE research facilities. In addition to funding research at our national labs, the DOE Office of Science provides critical support to scientists and students at our colleges and universities, with almost 15 percent of its budget allocated to university-based research.

Numerous studies and reports have highlighted the importance of the physical sciences for the national, homeland and economic security of our nation. Among them are the *Road Map for National Security: Imperative for Change* released in February 2001 and the 2004 *InnovateAmerica* report by the Council on Competitiveness, signed by CEOs of major companies, and university presidents. The National Academy of Sciences report, *Rising Above the Gathering Storm: Emerging and Energizing America for a Brighter Economic Future*, released in October 2005 has focused the attention of a wide national audience for investments in basic research to ensure both our national security and quality of life and generated support from both sides of the aisle.

The major finding of *Rising Above the Gathering Storm* is that the nation must prepare “*with great urgency to preserve its strategic and economic security...the United States must compete by optimizing its knowledge-based resources, particularly in science and technology, and by sustaining the most fertile environment for new and revitalized industries and the well-paying jobs they bring.*”

Mr. Chairman, thanks to the leadership and foresight of this Subcommittee, our nation has made significant investments in national user facilities, providing worldwide unique efforts and facilities in several scientific disciplines such as those at Jefferson Lab. We would be less than honest however if we did not note that the Jefferson Lab programs were negatively impacted by the FY 2006 funding level provided by the Conference Committee. Despite increased funding for Nuclear Physics in both the House and Senate marks, the FY 2006 conference agreement went below both the House and the Senate by approximately \$34 million. For the Jefferson Lab, operating with this reduced funding level requires significant reductions in operating time and workforce. We are greatly encouraged, however, by the Administration’s FY 2007 request and urge that it at least be maintained in the final bill.

It is our hope that through your continued leadership, in concert with the Administration’s American Competitiveness Initiative, the downward funding trend in the physical sciences that has occurred over the last several years will be reversed. Specifically, an increase in funding for Nuclear Physics in FY 2007 will allow us to maintain our world leadership position in this critical field and continue the much needed output of Ph.D.s that provides the next generation of scientists and engineers for our nation. This is particularly important since one-quarter of our current science and engineering workforce is older than age 50, while degrees granted in the U.S. in physical sciences and engineering have remained flat or declined since 1985.

**The Thomas Jefferson National Accelerator Facility (Jefferson Lab) Advances DOE Mission**

Mr. Chairman, the Jefferson Lab not only serves over 2,000 university researchers from the U.S. and abroad, it is the only facility of its kind in the world, uniquely equipped to understand nuclear matter in terms of the quarks and gluons from which it is composed. This challenge is analogous to efforts to understand the structure of the atom at the beginning of the 20<sup>th</sup> century that yielded many of the advances and technologies that are now part of our daily life. Jefferson Lab is a prime example of how a basic research facility can have far-reaching benefits for our nation – increasing our fundamental understanding of the world around us, providing a pipeline for young scientists and engineers, developing technologies that advance science in other fields and strengthen our defense, providing spin-offs that enhance our quality of life, and increasing math and science literacy among our young people.

Experiments at Jefferson Lab use an electron beam to probe the protons and neutrons of the nucleus to learn about its constituent parts – the quarks and gluons. Several new insights resulting from the Jefferson Lab experimental program include the shape of the proton and new understanding of how strange quarks contribute to the proton's electric and magnetic fields. Exceptional data with outstanding quality from the Jefferson Lab experimental program is also being used to help determine the existence of a five-quark particle, the pentaquark, which was heralded as one of the top ten science stories of 2003 by Discover Magazine. Jefferson Lab research combines theory, experiment and computer simulation to bring new insight to our understanding of the fundamental building blocks of the universe.

Nuclear physics also provides a critical foundation for other Department of Energy missions such as defense and energy, and trains the next generation of nuclear physicists to meet the challenges facing our nation. Jefferson Lab provides leadership in this area, producing one fourth of all Ph.D.s in nuclear science in the United States (224 Ph.D.s with another 199 Ph.D.s in progress).

Beyond of its unique and primary mission in nuclear physics research, Jefferson Lab is an international leader in accelerator physics and design. Its unique expertise and experience in superconducting technologies made Jefferson Lab instrumental in both the construction of the Spallation Neutron Source at Oak Ridge, and the eventual construction of the International Linear Collider. This technology has also enabled the world's most powerful Free Electron Laser (FEL) at Jefferson Lab, funded by the Navy with potential uses for missile defense, materials science, nanotechnology, and biophysics. Additionally, detector technology and expertise at Jefferson Lab has resulted in the development of new non-invasive medical imaging tools and techniques that have impacted areas such as detecting breast cancers with better accuracy and assisting in the development of a new gene therapy for cystic fibrosis. Dilon Technologies, the first spinoff company to develop from Jefferson Lab's technologies, is currently producing scintimammography cameras that will be used to more accurately detect breast cancers in clinical settings.

Jefferson Lab has also pioneered effective programs to enhance math and science education. Our Becoming Enthusiastic About Math and Science (BEAMS) program reaches middle school students in disadvantaged schools and exposes them to the research environment through hands-on activities and mentoring at Jefferson Lab. This program is a model for the DOE and has

made a positive impact on the Standards of Learning test scores of those who have participated. In addition, the DOE-sponsored Teacher Academy for Physical Sciences (TAPS) program enhances the classroom skills and techniques of science teachers by providing a challenging summer program at Jefferson Lab that couples learning with research experiences

### **The Future of Jefferson Lab: the 12 GeV Upgrade**

Mr. Chairman, the 12 GeV Upgrade to Jefferson Lab's main accelerator cost effectively doubles the energy of the existing machine, and provides the capability to study the structure of protons and neutrons in the atom with much greater precision than is currently possible. The Upgrade will also allow scientists to study quark confinement – this would answer the question: **“Why is one quark never found alone?”** – one of the top ten physics questions for the new millennium according to the *New York Times*. The Jefferson Lab 12 GeV Upgrade was designated as a near-term priority in the Office of Science *Facilities for the Future of Science* 20-year plan, and has received its first two critical milestones, CD-0, or Statement of Mission Need and CD-1, Approval of Preliminary Baseline Range.

Mr. Chairman, we greatly appreciate that the committee included report language last year to encourage the Department to move forward with the 12 GeV Upgrade and the Administration has requested funding (+\$7M) in FY 2007 for the 12 GeV Upgrade for the needed Project Engineering and Design work. We request that the subcommittee continue its support for this project by maintaining the funding in its final bill at a very crucial time for the 12 GeV Upgrade Project.

### **Conclusion**

Mr. Chairman, in conclusion we thank the subcommittee for its past support and ask that you continue investing in the physical sciences and Nuclear Physics by fully funding the President's FY 2007 budget request for the DOE's Office of Science for \$4.1 billion, or \$505 million (+14%) above FY 2006 levels. This is consistent with the recommendations of the National Academy's "Rising Above the Gathering Storm" report. Furthermore, within the Office of Science, we request that the Nuclear Physics budget be increased to \$454,060,000, or \$87 million (+23.7%) over FY 2006 appropriated levels to take advantage of important scientific opportunities that exist in this field.

Jefferson Lab is a prime example of the value of our nation's investments in basic research, and the importance of maintaining world leadership in the physical sciences. Jefferson Lab is delivering international leadership in hadronic and nuclear physics, providing a training ground for our next generation of scientists and engineers, and providing technologies that benefit not only Nuclear Physics but other fields of science dependent on accelerator technology. We are building on unique technologies that have application in defense, medical imaging, bioscience, nanotechnology and micromachining. We are reaching out to the students and teachers to improve the quality of math and science education and spark interest in science in young people while enhancing their performance in those subjects. The funding level proposed for Jefferson Lab will sustain these vital programs and allow our nation to continue to reap the benefits of this unique research facility.

Consistent with the Department of Energy's Facilities for the Future of Science, the President has further requested that Congress provide \$7 million for project engineering and design for the 12 GeV Upgrade at the Jefferson Lab and a \$10.8 million increase to restore operational research hours at the Jefferson Lab to FY 2005 levels. We fully support this increase and urge the Committee to grant the President's request.

Mr. Chairman, we appreciate the opportunity to submit this testimony.