

Office of the President

TO MEMBERS OF THE COMMITTEE ON OVERSIGHT OF THE DEPARTMENT OF ENERGY LABORATORIES:

DISCUSSION ITEM

For Meeting March 20, 2014

UPDATE ON THE DEPARTMENT OF ENERGY LABORATORIES

This discussion will review recent administrative activities at the three University of California-affiliated Department of Energy (DOE) National Laboratories:

- Lawrence Berkeley National Laboratory (LBNL or Berkeley Lab)
- Lawrence Livermore National Laboratory (LLNL)
- Los Alamos National Laboratory (LANL)

Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise

As part of the National Defense Authorization Act for fiscal year 2013, Congress established a twelve-member Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise to examine potential options and make recommendations for revising the governance structure, mission, and management of the nuclear security enterprise (NSE). The panel has committed to submitting a preliminary report, including findings, conclusions, and recommendations, in March to the President of the United States, the Secretary of Defense, the Secretary of Energy, the Senate Committees on Armed Services, and Energy and Natural Resources, and the House of Representatives Committees on Armed Services, and Energy and Commerce, with a final report due at the end of summer. The report is to include:

1. An assessment of each option considered by the panel for revising the governance structure, mission, and management of the NSE, including the advantages, disadvantages, costs, risks, and benefits of each option.
2. The recommendation of the panel with respect to the most appropriate governance structure, mission, and management of the NSE.
3. Recommendations of the panel regarding but not limited to:
 - the appropriate missions of the NSE, including how complementary missions should be managed while ensuring focus on core missions;
 - the organization and structure of the NSE and the federal agency responsible for such enterprise;

- the roles, responsibilities, and authorities of federal agencies, federal officials, the national security laboratories and nuclear weapons production facilities, and the Directors of such laboratories and facilities, including mechanisms for holding such officials and directors accountable;
 - the appropriate means for managing and overseeing the NSE, including the role of federally funded research and development centers, the role and impact of various contracting and fee structures, the appropriate role of contract competition and nonprofit and for-profit contractors, and the use of performance-based and transactional oversight;
 - the appropriate means for ensuring the health of the intellectual capital of the nuclear security enterprise, including recruitment and retention of personnel and enhancement of a robust professional culture of excellence; and
 - contracting, budget planning, program management, and regulatory changes to reduce the cost of programs and administration without eroding mission effectiveness or requirements, and ensuring robust protection of the health and safety of workers and the public.
4. An assessment of if and how the recommendations of the panel will lead to greater mission focus, and more effective and efficient program management for the NSE.

The LANL and LLNL Directors, as well as Vice President – Laboratory Management Mara, have met with the panel, and panel members have visited both Laboratories to in order to hear directly from various individuals and collect information relevant to the panel’s work.

Los Alamos National Laboratory and Lawrence Livermore National Laboratory Corrective Actions to Improve DOE Performance Ratings

As a follow up to the January 2014 Regents Item O1, the performance improvement and corrective actions being implemented by the Laboratories are described below.

Los Alamos National Laboratory

The Laboratory Director initiated a “pause” in nuclear materials handling operations to complete a comprehensive review of materials handling procedures and criticality safety. LANL is completing this extensive review effort and has been bringing individual operations back on line, with the necessary modifications to procedures per standards and requirements.

Lawrence Livermore National Laboratory

In coordination with the Lawrence Livermore National Security (LLNS), LLC Board of Governors, LLNL has completed significant actions, including management structure changes, to address the lack of transparency in operations and program management decisions, and lack of

coordination and communications in dealing with external stakeholders noted by the National Nuclear Security Administration (NNSA). LLNL has also engaged in significantly enhanced outreach to NNSA headquarters and other stakeholders. Regular updates from DOE/NNSA indicate there has been substantial improvement in addressing NNSA's identified issues.

Department of Energy Funding of UC Pension

The DOE/NNSA has continued to make progress towards making full payment of its 2013 required contribution. Since January 2014, DOE/NNSA has successfully paid all but approximately \$10 million of the \$80 million past due amount. DOE/NNSA is communicating bi-weekly with Congress to work on reprogramming the remaining ~\$10 million.

With respect to the 2014 required contribution, DOE/NNSA has already paid ~\$60 million of the \$373 million due in advance of the due date. The Department expects to pay the full balance of the 2014 contribution (~\$313 million) in March 2014.

Lawrence Livermore National Laboratory Director Search

The search for and selection of the next Director of LLNL is being conducted in accordance with Regents' policy under the leadership of Regent Pattiz, Chairman of the LLNS Board of Governors and the Regents' Committee on Oversight of the DOE Laboratories. Pursuant to the LLC Agreement between UC and its LLNS corporate partners, the University's choice of Laboratory Director, selected by Regent Pattiz with the concurrence of Chairman Varner and President Napolitano, is subject to the approval of the LLNS Board of Governor's Executive Committee and requires the concurrence of the Energy Secretary and the NNSA Administrator. The Laboratory Director is also the President of the LLC.

Candidate interviews, conducted by the UC-led Search Committee, are scheduled for March 10 and 11. Every effort has been made to ensure a broad and diverse candidate pool. It is expected that the final candidate selected by Regent Pattiz will be submitted to the LLNS Executive Committee for approval and the DOE/NNSA for concurrence by the end of March. LLC Chairman Regent Pattiz would announce the new LLNL Director thereafter.

Vice President for Laboratory Management Search

The search for and selection of the Vice President for Laboratory Management to replace retiring Vice President Mara continues under the leadership of Provost Dorr. The Search Advisory Committee has carried out an extensive review of candidates and will complete interviews in early March. A professional search firm is supporting the Committee. Subject to Regents' approval, the appointment of the new Vice President for Laboratory Management is anticipated at the May Regents' meeting.

PROGRAM HIGHLIGHTS

Lawrence Berkeley National Laboratory

Former LBNL Director Andrew Sessler receives prestigious Fermi Award

Andrew Sessler, award-winning theoretical physicist, acclaimed humanitarian, and former LBNL Director (1973-1980), who founded both the Earth Sciences Division and what is now the Environmental Energy Technologies Division, was named a recipient of the Enrico Fermi Award by President Obama. One of the federal government's oldest and most prestigious prizes for scientific achievement, the Fermi Award is administered on behalf of the White House by the DOE. Sessler was selected for his "outstanding contributions to the establishment of the beam-physics knowledge basis that has underpinned the development of current-generation particle accelerators and storage rings deployed at leading research institutions throughout the world." He was honored by President Obama at a White House event on February 3, 2014.

Berkeley Lab's ScanDrop technology identifies drinking water contaminants

Researchers from Berkeley Lab and collaborators have developed a portable, network-enabled system for testing drinking water contamination. The system, called ScanDrop, uses microfluidics technology and cloud-based networking to scan water samples for pathogens and transmit the data remotely. Testing drinking water samples for disease-causing pathogens requires several days in a laboratory. The LBNL study serves as a proof-of-concept for a method of water testing that is faster than current options and cheap enough that it could be deployed in many poor countries. The system could also potentially be set up to test for several pathogens at once or to test for other kinds of contaminants, including environmental sampling for bacteria that impact the global carbon cycle or are used for bioremediation. The work was highlighted in a January issue of the journal, *PLOS ONE*.

Alivisatos elected Chairman of the National Laboratory Directors Council

Berkeley Laboratory Director Paul Alivisatos was recently elected by his peers to serve as Chairman of the National Laboratory Directors Council (NLDC). The 17 DOE Laboratory Directors provide strategic programmatic and operational advice to the Secretary of Energy through the NLDC on matters related to the DOE's energy, environment, science, and national security missions. As NLDC Chairman, Alivisatos will work closely with his colleagues to strengthen the partnership between the DOE, National Laboratories, and management and operating contractors to provide strategic advice to the Secretary of Energy in the broad scientific and technological expertise of the National Laboratories and to strengthen and raise the profile of the DOE National Laboratory system as a whole.

Lawrence Livermore National Laboratory

National Ignition Facility (NIF) experiments show initial gain in fusion fuel

Ignition, the process of releasing fusion energy equal to or greater than the amount of energy used to confine the fuel, has long been considered the “holy grail” of inertial confinement fusion science. A key step along the path to ignition is to achieve “fuel gains” greater than unity, where the energy generated through fusion reactions exceeds the amount of energy deposited into the fusion fuel. Though ignition remains the ultimate goal, the recent achievement of significant alpha heating (self-heating heat generated by alpha particles generated during the compression of the NIF capsule) has been reached for the first time ever on any facility. In a paper published in the February 12, 2014 online issue of the journal *Nature*, scientists at LLNL detail a series of NIF experiments, which show an order of magnitude improvement in yield performance over past experiments. Lead author of the report Omar Hurricane noted that “There is more work to do and physics problems that need to be addressed before we get to the end, but our team is working to address all the challenges, and that’s what a scientific team thrives on.”

LLNL-developed planet imager used on Chile’s Gemini telescope

LLNL scientists and engineers designed and built the Gemini Planet Imager (GPI) that was installed on the 8-meter Gemini telescope in Chile. GPI, the world’s first fully optimized planet imager, recently saw first light, generating stunning images of far-away planets. These early first-light images are almost a factor of ten better than previously achieved, collecting images in one minute that previously took an hour, and detecting planets a million times fainter than their parent stars. In addition to leading the overall project, LLNL was responsible for the GPI’s adaptive optics system, which is the most advanced in the world. The Laboratory pioneered the use of adaptive optics for astronomy, which provides sharper images than otherwise possible for Earth-bound telescopes. Adaptive optics systems provide real-time compensation for the turbulence in the Earth’s atmosphere by dynamically deforming telescope mirrors to correct for the atmospheric turbulence and significantly improve the images. The use of adaptive optics for astronomy was developed at LLNL with early support from the institutional Laboratory Directed Research and Development (LDRD) program.

President Napolitano to visit LLNL

University President Napolitano will visit LLNL on March 25 as the featured speaker in the LLNL Director’s Distinguished Lecture Series (DDLS). The DDLS was initiated in 1977 to enable and encourage interactions between Laboratory employees and prominent individuals in academia, industry, and government. This visit is co-sponsored by LLNL’s Women’s Association.

Los Alamos National Laboratory

Technology Alliance leverages LANL technology to solve critical needs for oil and gas industry

In February, Chevron Energy Technology Company and GE Oil & Gas announced the creation of the Chevron GE Technology Alliance to develop and commercialize valuable technologies to solve critical needs for the oil and gas industry. The Alliance provides a mechanism for commercializing early stage technologies from Chevron, GE, or other technology partnerships, including LANL. As an example, GE flow meter products will be developed incorporating the Swept Frequency Acoustic Interferometry metering technology incubated in an alliance between Chevron and LANL.

According to Duncan McBranch, LANL's chief technology officer: "Los Alamos develops unique technologies and these can have powerful applications for U.S. industry. Strategic partnerships with industry allow us to accelerate breakthrough innovation in these areas. As the alliance demonstrates, national laboratories can serve an important role in connecting different industry partners to strengthen the U.S. innovation landscape."

Record power-conversion efficiency at LANL from quantum dot sensitized photovoltaics

Solar cells made with low-cost, nontoxic copper-based quantum dots can achieve unprecedented longevity and efficiency, according to a study by LANL and Sharp Corporation. The reported solar cells are based on a new generation of nontoxic quantum dots (not containing either lead or cadmium as do most quantum dots used in solar cells). These dots are composed of copper indium selenide sulfide and are rigorously optimized to reduce charge-carrier losses from surface defects and to provide the most complete coverage of the solar spectrum. The researchers used low-toxicity materials and low-cost solution fabrication methods to produce the solar cells, which exhibit both high performance and high stability. The efficiency approaches the highest reported values for any type of quantum dot solar cells, yet the devices do not degrade for months even if stored in air. This stability is orders of magnitude longer than in any previous report on quantum dot photovoltaics.

"For the first time, we have certified the performance of a quantum dot sensitized solar cell at greater than 5 percent, which is among the highest reported for any quantum dot solar cell," said Hunter McDaniel, a Los Alamos postdoctoral researcher and the lead author on a paper appearing in *Nature Communications*. "The robust nature of these devices opens up the possibility for commercialization of this emerging low-cost and low-toxicity photovoltaic technology," he noted.

"The new solar cells were certified by the National Renewable Energy Laboratory and demonstrated a record power-conversion efficiency for this type of devices," according to LANL's Victor Klimov, Director of the Center for Advanced Solar Photophysics (CASP), a DOE Energy Frontier Research Centers (EFRC). In addition to CASP-EFRC, this research has been also supported under a cooperative research agreement with Sharp Corporation.

Regents to visit LANL

Regents Feingold and Schultz, and Regents-designate Engelhorn and Leong Clancy are scheduled to visit LANL on April 7 to tour the Laboratory's unique research facilities and receive program briefings from LANL Director McMillan and other senior leaders.

President of the United States Honors Five Berkeley Lab Researchers

Five researchers from the UC-affiliated National Laboratories (four from LBNL and one from LLNL) were among the 102 recipients of the Presidential Early Career Awards for Scientists and Engineers (PECASE) for 2014 with recent recognition by President Obama. PECASE, established by President Clinton in 1996, is the highest honor bestowed by the U.S. Government on science and engineering professionals in the early stages of their independent research careers. The recipients are employed or funded by various federal agencies, including the DOE, which join together annually to nominate the most meritorious scientists and engineers whose early accomplishments show the greatest promise for ensuring America's preeminence in science and engineering and contributing to the awarding agencies' missions.

Receiving recognition from the DOE were LBNL researchers Daniel Kasen, with the Nuclear Science Division, and Adam Weber from the Environmental Energy Technologies Division. The National Science Foundation recognized two UC Berkeley faculty, Junqiao Wu and Ahmet Yildiz; these faculty members are also associated with Berkeley Lab, in the Materials Sciences Division and the Physical Biosciences Division, respectively. DOE recognized LLNL computational materials physicist Miguel Morales-Silva for his research on fundamental descriptions of materials at high pressure and temperature using a technique called density functional. For a complete list of 2014 PECASE recipients, including many from UC campuses, see: <http://www.whitehouse.gov/the-press-office/2013/12/23/president-obama-honors-outstanding-early-career-scientists>.