The Regents of the University of California

COMMITTEE ON OVERSIGHT OF THE DEPARTMENT OF ENERGY LABORATORIES
May 15, 2013

The Committee on Oversight of the Department of Energy Laboratories met on the above date at the Sacramento Convention Center, 1400 J Street, Sacramento.

Members present: Regents Blum, De La Peña, Gould, Pattiz, Reiss, Rubenstein, Ruiz, and Varner; Ex officio members Lansing and Yudof; Advisory members Powell and Schultz

In attendance: Regents Island, Kieffer, Makarechian, Mendelson, Stein, and Zettel, Regents-designate Feingold and Flores, Faculty Representative Jacob, Secretary and Chief of Staff Kelman, Associate Secretary Shaw, General Counsel Robinson, Chief Investment Officer Berggren, Provost Dorr, Executive Vice President Brostrom, Senior Vice Presidents Dooley and Stobo, Vice Presidents Allen-Diaz, Beckwith, Duckett, Lenz, and Sakaki, Chancellors Birgeneau, Block, Blumenthal, Drake, Katehi, Khosla, Leland, and Yang, Acting Chancellor Conoley, and Recording Secretary McCarthy

The meeting convened at 9:50 a.m. with Committee Chair Pattiz presiding.

1. **APPROVAL OF MINUTES OF PREVIOUS MEETING**

Upon motion duly made and seconded, the minutes of the meeting of March 14, 2013 were approved.

2. **UPDATE ON THE DEPARTMENT OF ENERGY LABORATORIES**

[Background material was provided to Regents in advance of the meeting, and a copy is on file in the Office of the Secretary and Chief of Staff.]

Committee Chair Pattiz thanked his fellow Regents for their positive comments on prior presentations to the Committee about work being done at the National Laboratories. He said the current meeting would continue in that vein, with a presentation from Lawrence Berkeley National Laboratory (LBNL) scientists about research being conducted at LBNL, Lawrence Livermore National Laboratory (LLNL), and Los Alamos National Laboratory (LANL) regarding global climate change. He introduced LBNL Deputy Director Horst Simon, an internationally recognized expert in computer science and applied mathematics, with a joint appointment as an adjunct professor at UC Berkeley's College of Engineering. Mr. Simon is one of 233 Laboratory scientists and engineers with concurrent faculty appointments at UC campuses. Committee Chair Pattiz also introduced LBNL Senior Scientist, UC Berkeley Professor-in-Residence in Earth and

Planetary Science, and Chief Scientist of the Department of Energy (DOE) Climate and Earth System Modeling Program William Collins.

Mr. Simon said that LBNL had been founded in 1931 by UC Berkeley physics professor Ernest Orlando Lawrence, who developed the earliest particle accelerators and originated modern-day team science. Since its beginning, LBNL has drawn strength from UC faculty who, along with their students, have in turn greatly benefited from their association with the Laboratory. Using large accelerator-based facilities throughout the mid-twentieth century, LBNL scientists discovered 16 elements. In the 1970s LBNL scientists turned their attention to the nation's energy challenges, developing technologies that have saved consumers billions of dollars and put California at the forefront of work regarding energy efficiency and climate change. Twelve LBNL scientists and one LBNL team have been awarded Nobel Prizes.

Mr. Simon said that LBNL continues its mission of delivering transformational solutions to scientific challenges in complex areas such as clean energy, climate change, human health, and the environment. Current work conducted at LBNL, LLNL, and LANL on climate change would create a new type of climate model that would help integrate cutting-edge knowledge about climate science, energy, the environment, and economics. He said Mr. Collins' contributions in this field include participation in the United Nations Intergovernmental Panel on Climate Change (IPCC) in 2007, which was awarded the Nobel Peace Prize jointly with Vice President Al Gore. Mr. Collins continues his participation with the IPCC and will be the lead writer for Working Group One for the IPCC's Fifth Assessment Report, due out in September.

Mr. Collins stated that scientists at the three National Laboratories collaborate with scientists at many UC campuses to develop the world's most advanced climate models used for research and assessment of national, regional, and international climate change. At the National Laboratories, large interdisciplinary teams of top climate scientists, mathematicians, biogeochemists, and computer scientists use some of the world's most powerful computers to project the climate's future. The teams have focused on key questions such as the resilience of natural resources and food supplies in a warmer climate in order to safeguard these resources for future generations, the effects of rising seas on coastlines, and the reliability of climate models to make useful projections. Mr. Collins stated that the predictive capability of this work is improving. For the current IPCC report, LLNL delivered 85 percent of the data used by the global community to evaluate climate predictions. He said that increases in computing power have enabled simulation of increasingly specific regional details of climate change. Mr. Collins predicted that the upcoming ten years would bring more dramatic improvements in model resolution. Modeled data is compared with real data to establish the models' reliability.

Mr. Collins said that predicting extreme weather events is like trying to find a needle in a haystack, and requires analysis of enormous amounts of data by the Laboratories' extremely powerful computers. Simulations of several years' patterns are compared with real-world observations. He noted that prediction of single extreme weather events such as the recent Hurricane Sandy is still beyond the models' capabilities. However, the

Laboratories' models are becoming capable of predicting how entire hurricane seasons will change. He said that, when compared with real data, the models have been able to predict both the numbers and the strength of hurricanes over the past several decades. For the local region, Mr. Collins said the models could be used to predict periods of strong rains, which he expects to become more frequent.

Mr. Collins discussed the meaning of climate change for California, and the significant effect it will have on management of water and agricultural resources. He said he is virtually certain, within the technical meaning of that term, that increased temperatures will result in less precipitation falling as snow rather than as rain, having a large effect on the use of the Sierra snowpack as a time-release source of water. He showed models predicting how the snowpack would change by 2050, and by 2100. Mr. Collins also showed two different projections of the snowpack: one incorporating active worldwide carbon reductions like those California is adopting, and one without any effort to reduce emission of the greenhouse gases causing warming. The models show that, with no efforts to reduce greenhouse gas emissions, the Sierra snowpack would be reduced to two-thirds to three-quarters of its current normal level by 2050, and one-tenth to one-quarter of that by 2100.

Mr. Collins added that the DOE, represented by the three UC National Laboratories, is making the relationship between climate and water a top research priority; the Laboratories are prepared to maximize the utility of this research for the University and the state. Roadmaps have been developed for work with UC and with policymakers to help safeguard water supplies. Mr. Collins said that climate is changing and that, to the best of existing knowledge, that change is caused by people; global warming is caused by the use of fossil fuels enhancing the earth's greenhouse effect. He noted that it had been announced the prior week that the level of carbon dioxide in the atmosphere had crossed a major threshold, reaching 400 parts per million. In response to this challenge, Mr. Collins said the UC National Laboratories have developed leading climate models to inform policy decisions.

Regent Reiss said work regarding this serious challenge reflects one of the most important responsibilities of the University. She noted a recent report showing that the effects of climate change are occurring faster than had been anticipated. Regent Reiss commented on the importance of the Laboratories' work on modeling and UC's other environmental research to the scientific community. Mr. Collins said that this team effort goes beyond physical science, and reflects the breadth and depth of the UC system.

Regent Gould expressed his appreciation for the presentation and asked how the Laboratories' work regarding climate change is integrated with discussion of water storage transfer in California. Mr. Collins said that LBNL recognizes the importance of water issues and has launched a search with UC Davis to hire a climate hydrologist to work in this area. He reported the commitment of the DOE to work with stakeholders to address these challenges. LBNL is also in active discussion with Bay Area governments about ways to help local communities use the Laboratories' research to inform adaptation and mitigation measures.

Regent Ruiz asked what effect farming and agriculture have on climate change. Mr. Collins said the challenge of ensuring the food supply would be a significant ongoing concern and could be approached in several ways. Water could be used more strategically, possibly drawing on the experience of countries with more desert-like environments. Since a by-product of the use of nitrogen fertilizer is the formation of additional greenhouse gases, another effort would be the use of fertilizers in a more sustainable way. A recent workshop on predictive agriculture was sponsored by LBNL and UC Davis, reflecting the Laboratories' commitment to work with the UC campuses on these issues.

Committee Chair Pattiz said that, like the rest of UC, the National Laboratories are under enormous fiscal pressure because of federal budget constraints. He noted the importance of the Laboratories' national security work in the area of climate change. He urged the Regents to continue to advocate for the important research mission of the University.

The meeting adjourned at 10:20 a.m.

Attest:

Secretary and Chief of Staff