Summary Minutes of the

U.S. Department of Energy (DOE)
Commission to Review the Effectiveness of the National Energy Laboratories
Public Meeting

Commission Members in Attendance:	TJ Glauthier, Co-Chair; Jared Cohon, Co-Chair; Cherry Murray; Richard Meserve; Norm Augustine
Date and Time:	9:00 AM – 2:00 PM, Friday, May 22, 2015
Location:	SLAC National Accelerator Laboratory, Kavli Auditorium, Bldg. 51 (Kavli Building), 2575 Sand Hill Road
Purpose:	Meeting of the Commission to Review the Effectiveness of the DOE National Energy Laboratories
Presenters:	Speakers **Laboratory Directors** Chi-Chang Kao, SLAC National Accelerator Laboratory Paul Alivisatos, Lawrence Berkeley National Laboratory William Goldstein, Lawrence Livermore National Laboratory **Site Office Consolidation** Paul Golan, Site Office Manager, SLAC/LBNL **Technology Transfer Coordinators** Mark Hartney, Director of the Office of Strategic Planning, SLAC Bob Hwang, Director, Transportation Energy Center, Combustion Research Facility, Sandia National Laboratories Elsie Quaite-Randall, Chief Technology Transfer Officer, Innovation and Partnerships Office, LBNL Richard A. Rankin, Director, Industrial Partnerships Office and Economic Development Office (Interim), LLNL **Bay Area Industrial Partners** Michael Bauer, President, Chief Product Officer and Founder, Sentient Energy Lloyd Hackel, Vice President for Advanced Technologies, Metal Improvement Corporation Charlie Hotz, Vice President of Research and Development, Nanosys, Inc.
DOE Staff:	Karen Gibson, Designated Federal Officer
IDA and STPI Staff:	Mark Taylor, Susannah Howieson, Libby Turpen, Martha Merrill, Kathleen Peroff, Ryan Whelan, Vanessa Pena, Julian Zhu

Meeting Summary

The Commission to Review the Effectiveness of the National Energy Laboratories (Commission) was convened for its ninth meeting at 9:00 AM on May 22, 2015. Commission Co-Chair Jared Cohon led the meeting. The meeting included discussion with lab directors; technology transfer coordinators; Bay area industrial partners; and site office management. The discussion was followed by an opportunity for public comment.

Opening of Public Meeting

Co-Chair Jared Cohen opened the meeting and welcomed the commissioners, speakers, and observers.

Laboratory Directors

Chi-Chang Kao, Director, SLAC National Accelerator Laboratory provided an overview of SLAC. He began with two key points; the lab has reinvented itself as a multidisciplinary lab over the last decade to better address DOE's mission and scientific challenges; the lab benefits from a unique partnership with its contractor which allows for more efficient and effective implementation of its strategy. Partnerships with Stanford include the Kavli Institute for Particle Astrophysics and Cosmology, the Stanford Institute for Materials and Energy Sciences, the Stanford PULSE Institute, and the Center for Interface Science and Catalysis. SLAC has an immense user base resulting in six Nobel Prizes awarded for research performed at SLAC. The lab has maintained and advanced core competencies in accelerators and detectors, and developed them in lasers. The LCLS has been an essential tool to see atoms and electrons moving, make movies of chemistry in action, unlock the secrets of photosynthesis, discover and develop better drugs, see 3D images of biological molecules, and better understand cell function. LCLS II is expected to increase capability and capacity.

Paul Alivisatos, Director, Lawrence Berkeley National Laboratory provided an overview of LBNL. Core competencies include energy sciences, biology and environment, computing, physical sciences, and energy technologies. LBNL also has an immense user base and facilities including, the Joint Genome Institute, NERSC, Energy Sciences Network, the Advanced Light Source, and the Molecular Foundry and NCEM. LBNL's contribution to Labs as Network is perhaps most felt in the energy sciences and technologies including its robust role in the shale gas revolution; energy efficiency work on CFLs, Energy Star standards, cool-roofing materials, Aeroseal duct sealer; and renewable energy technologies such as PV and Wind materials and renewable energy policy analyses. Dr. Alivisatos also offered some observations from serving as chair of the NLDC for 1 ½ years. He focused on the network of labs that cover DOE's mission areas in different ways and help DOE with solving important problems: core networks around big investments like light sources, dynamic networks that take time to build programs around such as storing solar energy, and rapid response networks such as the network used during the Iran negotiations. He noted the importance of a strong relationship between the Department and the labs and the need to perpetuate structure the Secretary has put in place such as the Lab Policy Council and the Lab Operations Board.

William Goldstein, Director, Lawrence Livermore National Laboratory (LLNL) Bill Goldstein – discussed the importance of LLNL as one of three NNSA labs responsible for certifying, developing, and

maintaining nuclear systems past their service life. The three nuclear security labs are a good example of how the labs function as a network. The core network of these three labs work together in a managed balance of competition; draw regularly on other science labs; and provide critically different capabilities. The stockpile stewardship and management program has been tremendously successful. It has maintained confidence in the system without testing and is a huge tribute to the lab FFRDC model's ability to adapt in face of huge paradigm changes. The labs apply frontier science to national security.

The two nuclear design labs at LLNL and LANL engage in stockpile stewardship made possible by the mutual peer review process that the 2 labs enable. Plutonium is an example of peer review and competition that led to consequential results. Current priorities include a look at the stockpile modernization plan, including lifetime extension programs, annual stockpile stewardship assessments, improving tools, and High Performance Computing, in partnership with Argonne National Lab, for national security and fundamental science.

Challenges arise as the demographics shift -- workers who have tested nuclear devices retire and are replaced with those who have only simulated. Fundamental to the lab system's success is clarity of mission, spectrum of interesting work, modern infrastructure, FFRDC model, and LDRD. Goldstein also remarked on the gap between where labs leave off and the private sector takes up – the 'valley of death'. Labs tend to work on precompetitive basic science and only go so far in developing technologies and manufacturing for private sector use. This gap makes it difficult to measure the impact of labs on economic well-being since successes are often much further down the development process, e.g. the human genome project.

A Q&A session followed.

Site Office Consolidation

Paul Golan, Site Office Manager, SLAC/LBNL presented on the role of the DOE Site Office. Paul began by broadly discussing the roles of the Lab, Contractor, and Site Office. He characterized the role of the Lab as doing the work; the Contractor as overseeing and assuring the work as promised, and the Site Office as protector of the government's assets and interests, ensuring the work is done in accordance with the contract. More specifically the Site Office seeks to hold the contractor responsible without second guessing the contractor; enable the mission without managing the contractor; perform research instead of relying on assumptions that the lab is performing well; be understanding as opposed to overreacting; create a trust based partnership; focus on performance, not methods; make risk informed decisions; provide real-time feedback; and use approvals judiciously. He noted the importance of personal context and relationships in terms of working well between the sites, headquarters and the labs.

Golan addressed questions on making risk informed decisions, constraints due to an abundance of guidance and orders, and keeping an eye on mission. He noted the complexity of managing risk, but suggested it might be possible to rely on existing standards in nonnuclear areas, while maintaining a set of orders for high hazard facilities.

A Q&A session followed.

Technology Transfer Coordinators

Mark Hartney, Director of the Office of Strategic Planning, SLAC discussed how SLAC works with the biomedical community. Pharmaceutical companies come in and work with synchrotrons. Many users can submit to a robotic interface and do not have to come in person. SLAC is beginning to transition from a physics lab to a materials based lab. They are using CAT scans to observe how batteries operate. SLAC is continually looking for novel ways to accelerate and engage with industry on the timescale that is relevant to them.

Bob Hwang, Director, Transportation Energy Center, Combustion Research Facility (CRF), Sandia National Laboratories (SNL) presented on the impact of the CRF, a DOE collaborative research facility created in response to the gasoline crises of the 1970s. The CRF was built to utilize NNSA's existing optical diagnostics, High Performance Computing, and experimental facilities. It was jointly funded by DOE Office of Science and EERE. He noted that the principles for industry impact focus on industry needs, emerging challenges, and delivery of precompetitive results; include regular calls with industry partners; and involve many post docs and students who are hired by industry partners. Hwang discussed the Advanced Engine Combustion MOU that involves many partners and about 100 participants who meet every 6 months to share results and discuss collaborations. Building upon this model, Sandia has created an open forum collaboration – the Engine Combustion Network, providing for collaboration among experimental and computational researchers. Industry has identified spray physics as an area for advancement and a Spray Combustion Consortium is being launched. Hwang also talked about the importance of LDRD for enabling new capabilities.

Elsie Quaite-Randall, Chief Technology Transfer Officer, Innovation and Partnerships Office, LBNL has partnered with industry to provide access to Berkeley Lab's unique user facilities and expertise, license LBNL developed technology to qualified companies, create startup companies to further develop LBNL technology, and co-develop technology for commercial applications. In FY14 LBNL served over 10,000 users and launched 88 projects with the private sector and 50 projects with small businesses. LBNL licenses technology in the areas of energy and environment, biotech, and advanced materials and supported over 40 start-ups, and created research partnerships in excess of $53 million. She noted that some national user facilities are close to capacity. LBNL is going through a reorganization, combining non-federal WFO group with their Tech Transfer and IP management group to form the integrated Innovation and Partnership Office (IPO). The new IPO will proactively drive industry interest in Berkeley Lab technologies expand industry contacts, and create an industry advisory group. It will also improve the customer experience with dedicated cross-functional teams, clear communication, and improved collaboration.

Richard A. Rankin, Director, Industrial Partnerships Office and Economic Development Office (Interim), LLNL notes their capabilities naturally intersect with the private sector in the areas of high-performance computing, computational science and engineering, information systems and data science, advanced materials and manufacturing, biosecurity science and engineering. Rankin discussed public/private partnerships which advance innovation, competitiveness and capabilities including HPCIC, HPC4manufacturing, HAPLS, CES-21, HPC4energy, and CNMI. LBNL is building a regional ecosystem to

enhance laboratory impact by expanding their entrepreneur network, developing and strengthening partnerships, and developing training programs. Technological impacts include the digital globe, chromosome painting, Mood Ring, nanolaminate technology, and micro impulse radar. The technology has been effectively transferred into the economy resulting in $400 million in annual sales of products based on LLNL technology, annual savings of $14 billion by reducing the number of auto crash tests, and the formation of 4 companies started by LLNL scientists with a market value of $12 billion. He noted further that industrial partnerships help with recruiting and retention of staff.

A Q&A session followed.

Bay Area Industrial Partners

Michael Bauer, President, Chief Product Officer and Founder, Sentient Energy offered observations regarding working with ORNL on technology transfer. Bauer was a representative of a venture capital firm, Foundation Capital, which had won a DOE grant as a pilot project to work with one of the labs to explore such collaboration as a means of identifying technology transfer options. He described the process and criteria of identifying lab programs at ORNL that would be a good fit. They narrowed the number and applied filters, such as maturity, market size, investment required, strong IP, platform nature, customer benefits, to the disclosures filed at ORNL. He noted that ORNL has strong IP in specialized technologies, but most could not serve as foundation for a new start-up. Ultimately they opted to start a new company, but noted that the ORNL commercialization department was well organized, easy to work with, and motivated to license technology. He found the ORNL scientists easy to work with, safety oriented, and better at communicating with DOE than entrepreneurs. He also noted that beyond entrepreneurial leave there wasn't a strong entrepreneurial culture/ecosystem.

Lloyd Hackel, Vice President for Advanced Technologies, Metal Improvement Corporation presented on the impact of laser peening. Laser peening was developed by LLNL and transferred into an industrial process in 2002. It is well established as a design, manufacturing, and overhaul tool for enhancing fatigue life and fatigue strength of components. The technology was of interest to both DOE and industry. This technology is expected to save millions of dollars in unexpected jet engine replacement costs.

Charlie Hotz, Vice President of Research and Development. Nanosys, Inc. presented on the impact of quantum dots. Quantum dots pioneered by LBNL and successfully transferred and commercialized by Nanosys double the image color quality while consuming less energy. Control of the intellectual property was a critical success factor. Sales of quantum dot components are projected to reach $10.6 billion by 2025. He noted that control of intellectual property is a critical success factor for emerging technology companies. He also stated that Nanosys could not have succeeded without support of the Berkeley lab community and tools.

A Q&A session followed.

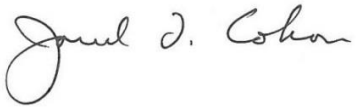
Public Comment
No members of the public requested the opportunity to comment.

Meeting adjourned at 2:00 PM.

Respectfully Submitted:
Karen Gibson, Designated Federal Officer

I hereby certify that these minutes of the May 22, 2015 Lab Commission meeting are true and correct to the best of my knowledge.

TJ Glauthier
Co-Chair



Jared Cohon
Co-Chair