

Report of December 14, 2009 ACSCOLI Meeting at Lawrence Livermore National Lab

The December 14, 2009 meeting of the Academic Council Special Committee on Laboratory Issues (ACSCOLI) took place at the Lawrence Livermore National Lab (LLNL). The purpose of the meeting was to orient to the Committee members to programs at the Laboratories and raise issues of interest to UC faculty. The agenda included 1) an overview on LLNL and the Los Alamos National Lab (LANL); 2) actinide research, plutonium processing and pit fabrication; 3) panel discussions on nuclear weapons, global security, and UC's role in the Labs; and 4) roundtable discussions on post-docs and graduate students at the Labs, the "Open Campus" proposal at LLNL/Sandia, recent developments at the Lawrence Berkeley National Lab (LBNL), an overview on laboratory governance issues, the National Academy of Sciences Review of the National Security Laboratories, and the results of the UC Lab Management Fee Research Program. ACSCOLI concluded its visit with a tour of the National Ignition Facility (NIF), which included a presentation on the National Ignition Campaign (NIC), and the Laser Inertial Confinement Fusion-Fission Energy (LIFE) concept. ACSCOLI thanks the LLNL protocol office, LLNL Director George H. Miller, and other high-ranking LANL and LLNL Lab officers. Information on the NIF can be found at <https://lasers.llnl.gov/>. The Committee especially thanks the LLNL and LANL personnel who made presentations to the Committee and who are listed in the appendix.

Overviews of the Lawrence Livermore National Lab and the Los Alamos National Lab

Over the past 15 years, the nature of LLNL has changed from weapons research and development to a more diverse portfolio of activities that includes research in fundamental biological sciences, laser science, advance computation, and environmental and climate science. This shift has also increased opportunities to collaborate with academia and private industry. LLNL comprises 7.4 million square feet, employs 6,000 people (1,200 PhDs and 800 engineers) and has a \$1.5 billion federal budget.¹ LLNL's science and engineering workforce is slanted towards engineers with slightly more than 800 in this category, following by physicists (approximately 700), and computer/mathematical scientists (about 640). Its major research and development facilities include the Forensic Science Center, the NIF, the Center for Accelerator Mass Spectrometry, the High-Explosives Application Facility, and the Terascale Simulation Facility. Since 1992, LLNL has participated in the nuclear weapons stockpile stewardship program, which monitors the stockpile to ensure design intent is maintained, produces components to replace defective or aging parts, certifies that changes due to aging or replacement of components maintains design intent, and adapts safety and security features to evolving requirements. LLNL has also been the site of a number of spin-offs in related areas,

¹LLNL's budget is split among the following activities: the NIF (\$330M), direct stockpile (\$245M), Department of Defense and Intelligence (\$215M), advanced simulation and computing (\$210M), safeguards and security (\$110M), facility operations (\$100M), homeland security (\$98M), nonproliferation (\$85M), applied and basic research (\$70M), energy (\$35M), and environmental restoration (\$25M).

which include advances in DNA research (e.g., the Human Genome Project, pathogen testing), advanced scientific tools like the NIF and high-level computing capabilities (the Dawn-BG/P at 501 teraflops, and the Sequoia super computer at 20 petaflops under development), non-proliferation and counter terrorism activities, and developments in the energy and environmental fields (climate modeling, nuclear energy, carbon sequestration, the National Atmospheric Release Advisory Center (NARAC), and hydrogen storage).

LANL's primary mission is research in support of stewardship of the nuclear stockpile, but the Lab also supports the missions of global security and energy security. In comparison to LLNL, its science, technology, and engineering workforce (2,500 PhDs total) favors physicists, followed by material scientists, and finally engineers. LANL's total budget is \$2.2 billion, with weapons comprising 50% of that budget. The Lab's nuclear weapons deterrence programs include weapons' simulations, secondary system aging and manufacturing, surveillance program, simulations of foreign state systems, and its participation in such non-proliferation programs as the IAEA nuclear safeguards program. LANL is also integral to the nation's energy security, and balances this work in this area on three central pillars: the impacts of energy demand growth, sustainable nuclear energy, and concepts and materials for clean energy.

Actinide Research, Plutonium Processing and Pit Fabrication at LANL

In his annual 2009 report to the Academic Assembly, President Yudof noted that LANL produced a total of four plutonium pits, all for the nuclear stockpile, in FY 2009. LANL is required to produce a total of 31 pits for the US Navy. To date, it has produced 22 pits. LLNL does not produce pits, and is reducing its plutonium inventory to sufficient levels to simply support plutonium R&D. Pit production is currently being consolidated at LANL. At the meeting, it was noted that actinide science and manufacturing have always had a positive and symbiotic relationship, which has only strengthened since the cessation of nuclear testing. The certification of new pit types demands an intensive and long-lasting science campaign (5-8 years). Actinide science capabilities are also critical for non-proliferation activities, nuclear forensics, and safeguards such as IAEA inspector training, safeguards training, nanotechnology, and single particle detection.

Panel Discussions

Nuclear Weapons: Since 1992, when the moratorium on nuclear testing was implemented, the US has relied more heavily on advanced computer simulation and modeling as well as on laboratory experiments. (e.g., science based stockpile stewardship). Many of the issues identified in the early 1990s are now being resolved (or resolvable) through these methods. In fact, many of the investments made during this time are now beginning to pay off exactly at the time when the budget for these activities is declining. Lab experts remarked that the Comprehensive Test Ban Treaty (CTBT) is indeed achievable through stockpile stewardship as long as the budget is maintained. More generally, the Obama Administration has recently

expressed support for 1) the non-proliferation regime; 2) reduced reliance on numbers of deployed nuclear weapons; and 3) maintaining a safe, secure and effective stockpile. There is also a need for bi-partisan support for a national security policy and re-engagement with the Labs, along with the acknowledgement that the current budget trends for the Labs are simply unsustainable going forward. There are also a number of Studies and analyses defining the future of the Nation's deterrent posture: these include the [Schlesinger Reports](#) (Sept/Dec 2008); the [Congressional Commission on the Strategic Posture of the United States](#) (May 2009); the National Academy of Sciences review of the Nuclear Security Labs (ongoing); the [Quadrennial Defense Review](#) (Feb 2010); and the Nuclear Posture Review (Feb 2010). Finally, the CTBT may be considered for ratification in 2010.

Global Security: The panel discussion on global security focused on developments at both Labs in this area. At LANL, non-nuclear weapons programs integral to its global security work include programs in the biological sciences and the space sciences (e.g., proliferation detection), participation in the IAEA international safeguards systems, field intelligence, and LANL's nuclear emergency support team. LANL has also restructured itself in this area by combining a number of disciplines to focus on experimental science, information science, and technology (e.g., large-scale predictive science, science of signatures). That said, funding for global security has been relatively flat over the past couple of years and this program is not contributing to the infrastructure at LANL. At LLNL, global security focuses on defense (directed energy, IEDs, ISR, and munitions), intelligence (cyber, space, and weapons of mass destruction analysis), energy and environmental security (carbon, nuclear energy, and renewable), domestic security (BioWatch, CBRN, explosives, and infrastructure), and nonproliferation (treaty support, advanced safeguards, materials management), with an emphasis on applying multidisciplinary science and technology to anticipate, innovate, and deliver responsive solutions to complex global security needs. More generally, a shared consensus on the proliferation threat amongst the United States' allies has recently emerged, but that is coupled with significant uncertainty in information about proliferation threats in such countries as Brazil, Russia, India, and China.

Role of UC in the National Labs: Participants also engaged in an extemporaneous panel discussion on the benefits that UC brings to the National Labs, and its special role in their management. In brief, members provided the following reasons as to retaining UC's special relationship and role in the management of the Labs: First, there is the obvious workforce connection between the University's graduate students and the Lab's scientific workforce—either as post-docs or permanent employees. Towards that end, LANL and LLNL are destinations for careers in the physical sciences, but this could be expanded into the biological sciences as well. Second, UC is a resource for high-level, albeit non-classified, work and problem solving in the computational and physical sciences. Third, the University is a champion for science, technology, and engineering, as well as physical infrastructure needed to support these endeavors. This should be juxtaposed to the DoD, which is a champion for the nuclear weapons stockpile. UC has developed the experience and expertise to successfully manage such

a high-risk enterprise as the Labs. The University's oversight also serves as a watchdog for the integrity of the public service provided by the Labs, and lends credibility to the Lab directors' efforts to advocate policy oriented towards public service. Fifth, the University serves as a center for collaborations between scientists at the Labs and those within UC, at other universities (internationally and domestically); UC also maintains a number of non-governmental channels for collaboration. Finally, it was suggested that the University do more to open up its various academic schools (and their related expertise) to the Labs; these would include schools of management, public policy, and engineering for example.

Roundtable Discussions

Employment, with Focus on Post-docs and Graduate Students: At LANL, and generally speaking, the numbers of post-docs employed have declined slightly from pre-2006 levels (when the LANL contract was rebid). In July 2009, there were 332 post-docs employed at LANL (the annual goal is 350); of these, 57% were foreign nationals and 37% were minorities. LANL also employs 200-300 graduate and undergraduate students to work on its campus as non-regular employees (out of programmatic funding), and it funds (\$65M) an internship and diversity program for this purpose. 29% of current LANL staff members were former post-docs or graduate students at the Lab. LLNL employs 110-120 post-docs per year on average, and approximately 1/3rd of these are foreign nationals. LLNL also retains about 50% of its post-doc population as future employees. The Lawrence Scholar program allows graduate students from UC and Texas A&M to complete their PhD theses on-site² at LLNL; 60% of these students return later as post-docs. Members were concerned about overall morale among post-docs and graduate students at both Labs, but especially among foreign nationals (restrictions on procurement, etc.). Lab representatives responded that the Labs are often held to a higher standard when it comes to technology on the Labs (e.g., computers and even iPods). However, they said that most foreign nationals understand these limitations.

LLNL/Sandia CA Open Campus Proposal: LLNL and Sandia National Lab are proposing an open campus site to foster academic and private sector collaborations for non-classified research and work. It was noted that LANL already has a similar park in operation. This space will be physically separate from both Sandia and LLNL ("outside the fence"), and will incorporate the combustion research facility at Sandia and the Hertz Hall at LLNL. The proposed use of Hertz Hall raises issues involving the existing lease of that facility by UC Davis however.³ The initiative, which recently received concept approval, anticipates some new construction for open high performance computing, transportation research, and biological research; it is envisioned that some of the activities will center on high-energy physics and NIF users. The current

² In 2006, students in this program were required to be on-site at LLNL due to contract and liability issues in the post-contract environment.

³ This will be discussed at a future ACSCOLI meeting.

timeline to open up space is later this year. Members expressed the concern that this could simply be an expansion of LLNL, but representatives assured them that this would indeed be akin to the former “white space” that existed before 9/11. Finally, some members asked if differential overhead costs would be associated with this new site; Lab representatives replied that this site would not incur massive overhead costs as only unclassified research would be carried out there.

LBNL Update: The Regents appointed Paul Alivisatos as the Director of LBNL in November. However, there is currently an ongoing search for a new deputy director. LBNL is enjoying almost \$1B in short-term funding, partially as a result of the federal stimulus package. Other updates included the following: 1) LBNL is making progress on resolving a number of compliance issues; 2) LBNL expansion is continuing, but is concentrated in “old town” to minimize the impact on the local neighborhood; and 3) LBNL is developing a new leadership program in conjunction with the Haas School of Business at UC Berkeley.

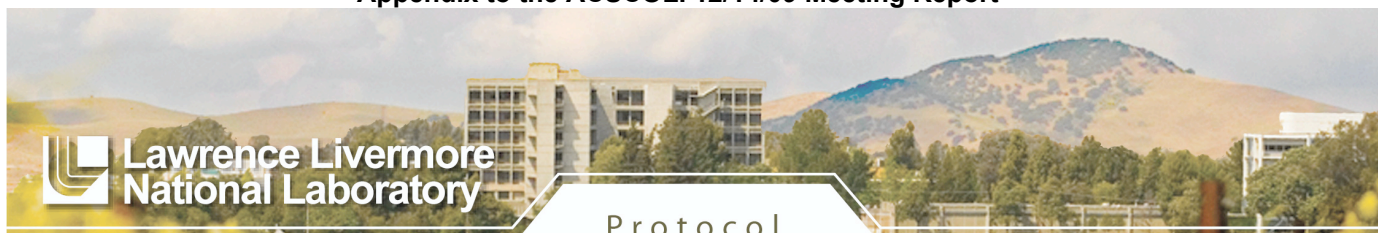
Laboratory Governance: Bill Eklund, UC General Counsel, provided an overview of the University’s governance of the Labs. The governance of LANL and LLNL are facilitated through the respective limited liability companies (LLCs) of LANS and LLNS respectively. Each LLC is organized as a partnership, and carries with it some of the benefits of a corporation. This set-up accommodates the commercial objectives of the private partners (Bechtel, B&W, WGI), as well as the research and public service missions of the University. UC has the fiduciary duties to the LLCs and to the other members; the UC Governors are responsible for fulfilling these obligations. In short, the University undertakes the governance of these LLCs as if they were any other major UC R&D program; however the governance arrangements can be modified via the LLC Agreements, or through the prime contracts with the DoE.

National Academy of Sciences Review of the National Security Laboratories: The National Defense Authorization Act calls for an examination by the National Academy of Sciences on the costs associated with the new contracts for LANL and LLNL. The Senate expanded this study to include the management and operation of all of the national weapons labs, and the final legislation places the focus on the maintenance of quality at the Labs. In brief, the study will look at five specific aspects of the Labs: 1) the quality of scientific research; 2) the quality of engineering work; 3) the criteria of conclusions; 4) any relationship(s) between the current quality of the Labs and the contracts; and 5) the Labs’ relationship(s) with other national agencies. The final report is due on January 1, 2011, is expected to be unclassified.

UC Laboratory Management Fee Research Program: Vice President for Research and Graduate Studies Steven Beckwith updated members on the outcome of the UC Lab Management Fee Research Program, which reinvested \$19M in new grants. This competition was designed to increase scientific collaboration between UC and LANL/LLNL PIs. In total,

this program awarded 66 grants out of 550 proposals.⁴ Given that most of the grants awarded received three-year funding, there should be another funding opportunity in two years' time.

⁴ The results of the competition can be found at: <http://www.ucop.edu/labresrfp/>.



Protocol

AGENDA

Academic Council Special Committee on Laboratory Issues (ACSCOLI)
UNIVERSITY OF CALIFORNIA

Monday, December 14, 2009

10:00 a.m.	<i>Arrival and Badging</i>	Westgate Badge Office Met by Protocol
	<i>Transport to Bldg. 111</i>	LLNL Driver
10:15 a.m.	Welcome/Hospitality/Introductions	George H. Miller Glenn L. Mara John H. Birely Bldg. 111, Calif. Rm.
10:30 a.m.	ACSCOLI Background and Objectives	Daniel L. Simmons
10:45 a.m.	Lawrence Livermore National Laboratory (LLNL) Overview	Bruce E. Warner
11:30 a.m.	Los Alamos National Laboratory (LANL) Overview	Terry C. Wallace
12:15 p.m.	Actinide Research, Plutonium Processing and Pit Fabrication at LANL	Charles F. McMillan
12:25 p.m.	Working Lunch/Panel Discussions: — Nuclear Weapons — Global Security	By Invitation Glenn L. Mara, Moderator Bruce T. Goodwin Charles F. McMillan John H. Birely, Moderator Penrose (Parney) C. Albright Michael J. Burns Bldg. 111, Calif. Rm.
1:35 p.m.	<i>Break</i>	

Host: George H. Miller, Laboratory Director
 Protocol: Rose O'Brien, (925) 423-6820, Cell:(925) 784-6052, Pager: 55504, e-mail: O'Brien12@llnl.gov
 Clearance: Unclassified
 Agenda Date: December 10, 2009



2:00 p.m.	Roundtable Discussion: <ul style="list-style-type: none"> — Employment, with Focus on Postdocs and Graduate Students — LLNL/Sandia CA Open Campus Proposal — Report on LBNL Developments — Laboratory Governance — National Academy of Sciences Review of National Security Laboratories — UC Laboratory Management Fee Research Program 	Daniel L. Simmons Terry C. Wallace John P. Knezovich Annie B. Kersting William H. Goldstein Harry C. Powell William A. Eklund Kenneth J. Jackson Steven V.W. Beckwith Bldg. 111, Calif. Rm.
3:30 p.m.	<i>Break</i>	
3:50 p.m.	National Ignition Facility (NIF), National Ignition Campaign (NIC), Laser Inertial Confinement Fusion-Fission Energy (LIFE)	Edward I. Moses Bldg. 111, Calif. Rm.
4:25 p.m.	Wrap-Up	All
4:40 p.m.	<i>Adjourn/Transport to Westgate Badge Office</i>	LLNL Driver