Testimony of

Dr. Charles V. Shank
Senior Fellow
Howard Hughes Medical Institute
and
Co-Chairman
National Research Council Committee on Review of the Quality of the Management and of the Science and Engineering Research at the DOE's National Security Laboratories

And

Dr. C. Kumar N. Patel
President & CEO
Pranalytica, Inc., Santa Monica, CS 90401
and
Co-Chairman
National Research Council Committee on Review of the Quality of the Management and of the Science and Engineering Research at the DOE's National Security Laboratories

Before the

Strategic Forces Subcommittee of the Senate Armed Services Committee

April 18, 2012

Good afternoon Mr. Chairman, Ranking Member Sessions, and Members of Strategic Forces Subcommittee of the Senate Armed Services Committee:

My name is C. Kumar N. Patel. I am the President and CEO of Pranalytica, company located in Santa Monica, CA.. Concurrently, I am also a Professor of Physics and Astronomy at UCLA. I had the privilege of co-chairing with Dr. Shank the *Committee on Review of the Quality of the Management and of the Science and Engineering Research at the DOE's National Security Laboratories* at the National Research Council. Dr. Shank and I will provide the highlights of the committee's findings and are available to respond to your questions.

The National Research Council is the operating arm of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine of the National Academies, chartered by Congress in 1863 to advise the government on matters of science and technology.

Study Task:

The FY2010 Defense Authorization Act identified concerns regarding the quality and management of Science and Engineering at the three National Security Labs and in turn mandated that NNSA task the National Research Council (NRC) to study the quality and management of Science and Engineering (S&E) at these Laboratories: Los Alamos National Laboratory (LANL), Lawrence Livermore Laboratory (LLNL), and Sandia National Laboratories (SNL). The study is being conducted in two phases. Phase one, which is completed, concerns management of S&E. The second phase will look in detail at selected S&E subject areas.

Health and vitality of science and engineering is critical for the long term viability of the National Security Laboratories and their ability to support the national defense and security needs, especially as they concern our nuclear weapons. The primary mission of these laboratories, assuring the safety and reliability of our nuclear stockpile, requires that the science and engineering that forms the underpinning of the needed technical capability, remain at the forefront by having the best possible scientists and engineers and by having the best management practices that maximizes the productivity of the available resources.

Our report today addresses the management of the three NNSA laboratories with specific emphasis on how management affects the quality of the science and engineering needed to fulfill the charter of these laboratories. "Quality of S&E" for the purposes of the report measures the expertise and accomplishments in those areas of science and engineering that are necessary to accomplish the laboratories' missions. "Quality of the management of S&E" measures management's capability to build, maintain and nurture S&E personnel and expertise for current and future mission needs. Management includes government (primarily NNSA and its three site offices), operations (M&O) contractors, and on-site laboratory management.

Our overall conclusion is that the laboratory management is aware of the importance of S&E for accomplishing their primary mission and that the management is committed to assuring the long term health and vitality of S&E. However, we have discerned a number of issues that need early, if not immediate, attention to meet the long term goals of excellence of S&E. These include the blurring of the responsibilities of NNSA and the laboratory managers, undue emphasis on formalities of management, often as a result of congressional reporting requirements, an apparent loss of trust between NNSA and the Laboratories and last but not the least enormous pressure on the financial resources available for carrying out the S&E mission. We recognize that some of the onerous reporting requirements arose from serious lapses of safety and security matters. But we have also concluded that most if not all of the safety and security issues are under control and that it is appropriate now to transfer the responsibility for these activities to the local management. We have provided a number of recommendations, which if implemented would help the laboratory management in carrying out their task in a cost effective manner.

Conduct of the Study:

To conduct the first phase, the NRC formed a study committee whose membership was carefully chosen to provide broad and deep applicable expertise and experience in the management of science and engineering at major research and development laboratories. The committee members include former directors of major government and industry laboratories, current and former laboratory executives, and others with relevant experience and expertise. The primary mode of gathering information was through presentations and testimony from, and discussions with, a substantial number of experts. These included current and former managers and technical staff associated with the NNSA, the DOE, and the laboratories, and the site offices. The study committee's meetings included visits to each of the three laboratories for extensive discussions with laboratory staff, as well as open public comment sessions at which current and former laboratory employees, union representatives, and others were given the opportunity to share their views and experiences. The committee also examined the most recent available management and operations (M&O) contracts, performance evaluation plans (PEP), performance evaluation reports (PER), contract management plans, parent organization oversight plans, and other similar documents for each of the three laboratories.

The issue of management of these three laboratories is complex, and has a long history. Within the mandated terms of reference of the study, the committee concluded that the basic questions before it are: (1) how well does the current management system support the conduct of quality science and engineering now and into the future? (2) are there significant management problems that need to be solved? (3) to what extent are these problems the result of the change in contractors at LANL and LLNL? (4) what are the most important problems, and what does the committee recommend to resolve those problems? The committee set as its goal the production of a short report that focuses on what it found to be most important. Accordingly, our report addresses four

topics: the contracts; research base and the evolution of the mission; the broken relationship; and management of S&E at the laboratories. We will speak to these, and then conclude with our observations concerning the future.

Study Findings:

Contracts

The contracting relationships between the DOE and its laboratories have in some cases endured for many decades. In 2004, Congress mandated that the long-standing contracts with the University of California to manage Lawrence Livermore and Los Alamos national laboratories (LLNL and LANL) be re-competed. As a result, these two contracts were awarded to two independent limited liability corporations (LLCs) that both include Bechtel Corporation and the University of California in their parent organizations. Subsequently, Congress developed concerns about the quality of science and engineering at the Laboratories, including whether changes in contracts and contractors may have had a deleterious effect on the quality of science and engineering.

The study committee heard testimony that LLNL and LANL were having morale crises as a consequence of the change of management from a public entity to a for-profit contractor. A number of current and former employees of these laboratories expressed concerns about deterioration of morale at the laboratories along with ongoing or potential declines in the quality of science and engineering. Many attributed those inferred trends to the new M&O contracts and contractors. **While it is true that all three labs have been under cost and funding pressure, we did not find a morale crisis related to actions of the new contractors.** The costs of the re-competed contracts are significantly greater than the previous contracting arrangements; this is due primarily to the changes in contractor fees, state taxes, and pensions. Some have been concerned that contractors pursuing fee might not act in the public interest. The laboratory directors stated that while fee is important, their primary objective remains to manage the laboratories in the public interest. This concern is an important one and constant vigilance will be required.

Evolution of the Mission

An evolution of the laboratory missions to "National Security Laboratories" is well underway. Deputy NNSA Administrator Don Cook presented to the Committee a vision for the laboratories, including a governance charter among four agencies (the Departments of Energy, Homeland Security, and Defense, plus the Office of the Director of National Intelligence) to take advantage of the S&E capabilities of these three laboratories. In a time of constrained budgets, broadening the mandate to a national security mission helps preserve S&E expertise by working on problems posed by partner agencies. Access to this problem set helps the NNSA laboratories to recruit and retain S&E capabilities beyond what could be achieved solely with available funds in the stockpile stewardship program. While such work for others (WFO) is very important

for the future of S&E at the laboratories, all three of the laboratory directors were very clear that maintenance of the stockpile remains the core mission of the labs.

The committee recommends that Congress recognize that maintenance of the stockpile remains the core mission of the labs and that other national security mission work contributes to the accomplishment of that mission and in that context the Congress should consider endorsing and supporting in some way the evolution of the NNSA laboratories to National Security Laboratories as described in the July 2010 four-agency Governance Charter for an Interagency Council on the Strategic Capability of DOE National Laboratories.

A crucial part of the laboratories' ability to conduct their missions is derived from Laboratory Directed Research and Development (LDRD), the primary source for internally directed R&D funding. Among its other benefits, LDRD provides a major resource for attracting, supporting and training staff at each laboratory.

The committee recommends that Congress and NNSA maintain strong support of the LDRD program as it is an essential component of enabling the long-term viability of the laboratories.

Historically, the laboratories had another source of discretionary research spending. The weapons program (at each laboratory) had the flexibility to use part of its budget to fund a robust research program, in support of the core weapons mission. Currently, the weapons program budget is subdivided into so many categories with so many restrictions that this important flexibility is effectively lost. This loss in funding flexibility has significantly reduced the amount of core program research being performed at the laboratories. This lessens the appeal of the laboratories when recruiting.

The committee recommends that Congress reduce the number of restrictive budget reporting categories in the Nuclear Weapons Program and permit the use of such funds to support a robust core weapons research program and further develop necessary S&E capability.

Relationship Between the Labs and NNSA Oversight

We observe that the relationship between NNSA and its National Security Laboratories is broken. This very seriously degrades the ability to manage for quality S&E. Both NNSA and the laboratories recognize the importance of quality S&E, and each believes it is working to achieve that goal, but their dysfunctional relationship seriously threatens that common goal. This is not a new observation, as it has been discussed in previous reports. There has been a breakdown of trust and an erosion of the partnering between the laboratories and NNSA to solve complex S&E problems.

The basic substantive relationship between NNSA and the laboratories is an FFRDC (Federally Funded Research and Development Center) partnership. The management

relationship is a GOCO (Government Owned, Contractor Operated) relationship. The FFRDC relationship is based on a partnership between the government and the laboratory in which the government decides what problems need to be addressed, and the contractor determines how best to address those problems. There is a perception among staff at the three laboratories that NNSA has moved from partnering with the laboratories to solve scientific and engineering problems to assigning tasks and specific S&E solutions with detailed implementation instructions. This approach precludes taking full advantage of the intellectual and management skills that taxpayer dollars have purchased. Similar issues are found in transactional oversight of safety, business, security and operations. Science and engineering quality is at risk when laboratory scientists and engineers are not encouraged to bring forth their creative ideas in partnership with NNSA to solve problems vital to our national security.

There is conflict and confusion over management roles and responsibilities of organizations and individuals. For example, the committee heard reports of mid-level issues being elevated to the laboratory director level because there was no clarity about how to resolve disputes between a laboratory and an NNSA Site Office. These factors do not encourage the stable management that is necessary to ensure success of long-term investment and planning. Another example was a recent instance in which NNSA HQ tried to overrule a Laboratory's best scientific judgment about how to carry out a scientific task. Subsequently, language appeared in a congressional report opposing that NNSA instruction. A better mechanism should be established for resolving technical disputes, and they should definitely not be elevated to top NNSA management and congressional levels. **A technical advisory committee, established at the NNSA level, would be a helpful mechanism for filling this gap in S&E management. More generally, such an advisory committee could monitor progress on other aspects of roles and responsibilities**.

This erosion of the trust relationship is especially prominent with respect to Los Alamos, where past failures in safety, security, and business practices attracted much national attention and public criticism. But it has also spilled over to Lawrence Livermore and Sandia National Laboratories. The loss of trust in the ability of the laboratories to maintain operational goals such as safety, security, environmental responsibility and fiscal integrity has produced detailed scrutiny by NNSA HQ and site offices and increased aversion to risk. A major byproduct of this has been to create a bias against experimental work. The bias is problematic because experimental science is at the very heart of the scientific method.

The committee recommends that NNSA and each of the Laboratories commit to the goal of rebalancing the zmanagerial and governance relationship to build in a higher level of trust in program execution and laboratory operations in general.

The committee recommends that NNSA and the Laboratories agree on a set of principles that clearly lay out the boundaries and roles of each management structure, and also that program managers at headquarters, the Site Offices, and in the laboratories be directed to abide by these principles.

For example, the committee suggests that, among other measures, the Site Manager and the Director and/or Deputy Director of each laboratory apply a team-based process to identify and agree on eliminating certain oversight procedures that are simply not necessary or related to the overall goals of the Laboratory. Similarly, some mechanism should be established to filter program tasks at both the headquarters level and at the laboratory senior management level to assure that each tasking is necessary and consistent with the agreed management principles.

The committee recommends that the goal of rebalancing the relationship and the set of principles laying out the boundaries and roles of each management structure be memorialized in memoranda of understanding between NNSA and its Laboratories. Performance against these understandings should be assessed on an annual basis over a five-year period and reported to Congress.

The Future

A key to ongoing laboratory success has been a strong focus on the long-term and on maintaining deep technical capability. Looking forward, the new management structure of the Laboratories, which relies on the introduction of industrial and other private sector partners, must assure that this long-term focus is maintained in words and in deeds.

A great deal of work that has been accomplished over the years in safety and security has required extensive effort by the NNSA and the laboratories. We believe these efforts have been strengthened to the point where they no longer need the current level special attention to assure high quality results in laboratory operations.

The committee recommends that NNSA, Congress, and top management of the Laboratories recognize that the safety and security systems at the Laboratories have been strengthened to the point where they no longer need special attention. NNSA and Laboratory management should explore ways by which the administrative, safety, and security costs can be reduced over time consistent with maintaining high quality efforts in these areas, so that they not impose an excessive burden on essential S&E activities.

The committee recognizes that this cannot happen unless the broken relationship is fixed, but the committee also recognizes that these operational problems contributed to the broken relationship.