The Quality of Management and of the Science and Engineering at the NNSA National Security Laboratories

Report of the

National Research Council

Committee to Review the Quality of the Management and of the Science and Engineering Research at the Department of Energy's National Security Laboratories –

Tasking

FY2010 National Defense Authorization Act, P.L. 111-84

(1) The quality of the scientific research being conducted at the laboratory, including research with respect to weapons science, nonproliferation, energy, and basic science.
(2) The quality of the engineering being conducted at the laboratory.
(3) The criteria used to assess the quality of scientific research and engineering being conducted at the laboratory.
(4) The relationship between the quality of the science and engineering at the laboratory and the contract for managing and operating the laboratory.
(5) The management of work conducted by the laboratory for entities other than the Department of Energy, including academic institutions and other Federal agencies, and interactions between the laboratory and such entities.

PHASE II

- *Began March 2012*
- *Report September 10, 2013*

PHASE I

- *Began Jan 2011*
- *Report delivered February 15, 2012*

Study Committees

Phase 2

Phase 1

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NRC staff:
Alan Shaw
Scott Weidman
Dick Rowberg
Jim McGee

Phase 1 committee chosen for S&E management experience

Phase 2 committee chosen for S&E subject matter expertise

Phase 1: Basic Observations

There are serious management issues that can affect the quality of science and engineering and therefore the ability of the labs to accomplish their missions

- Loss of trust between NNSA and the Labs
- Excessive operational oversight
- Partnership between the labs and the NNSA inherent to the FFRDC concept has declined

  These re-emerged in phase 2 as the committee examined factors affecting quality of S&E work

The change in contractors at LANL and LLNL are not the primary cause of these problems

Phase 2

Four Basic Questions

- Are the laboratory mission needs being addressed today?
- Are the laboratories recruiting and training the next generation of staff?
- Are the tools and facilities at the laboratories adequate to meet mission needs?
- Is the working environment sufficient to attract and retain high quality staff?

Overall Observation—Phase 2

In many areas, the S&E is of very high quality . S&E quality in these four areas of fundamental importance to the nuclear mission is currently healthy and vibrant.

However, Deterioration of the work environment for scientists and engineers can limit the quality of their work, and thus the nation's ability to benefit fully from the laboratories' potential

- Concerns include:
  - Decreasing opportunities to conduct needed experiments
  - Difficulties maintaining smaller experimental facilities
  - Deteriorating infrastructure
  - Perceived increasing burden of rules, regulations, operational formality, constraints and restrictions, and administrative burdens

Maintaining the S&E Workforce

- Special concerns for *computation, modeling and simulation*
  - uncertainty concerning staff's ability to make good use of future high-performance computing systems
  - particular concern in core computer science areas, such as computer architecture, systems software, programming models, tools and the algorithms
  - signs of difficulty in recruiting and retention
    - Among laboratory scientists and engineers, computer-science researchers are the most mobile; easily find challenging and lucrative employment in industry; less likely to come to the labs and more likely to leave mid-career than S&Es working in other disciplines