

New report reviews science and engineering quality at national security laboratories

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The science and engineering capabilities that underpin the nuclear weapons stockpile stewardship and nonproliferation missions at the nation's three national security laboratories are "healthy and vibrant," says a new report from the National Research Council. The committee that wrote the report found no problems with the quality of science and engineering that would prevent certification of the stockpile. However, the report identifies several issues that, if not addressed, have the potential to erode the ability to perform high-quality work at the laboratories.

Congress asked the Research Council to review the quality of scientific research and engineering at Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratories (SNL), which are part of the National Nuclear Security Administration. This report is the second of the two-phase study; the first report, released in February 2012, examined management of the laboratories.

The new report examines the laboratories' capabilities in four areas of fundamental importance to their primary missions: (1) weapons design; (2) system engineering and understanding of the effects of aging on system performance; (3) weapons science base; and (4) [modeling and simulation](#). In many areas, science and engineering at the laboratories is of very high quality. But the report identifies several stresses that could contribute to the deterioration of the work environment for scientists and engineers and limit the quality of their work in the future – and thus the

nation's ability to benefit fully from the laboratories' potential.

The United States declared a unilateral moratorium on nuclear weapons testing in 1992. In the absence of new test data, the science-based stockpile stewardship program relies on pre-moratorium test data, computer models and simulations, surveillance, and other experiments . The laboratories are building enhanced computational models that account for changes in weapon properties as they age, and this requires state-of-the-art S&E capabilities in a number of areas, the report says. NNSA should conduct a detailed assessment of simulation and modeling needs over the next decade and implement an adequately funded plan to meet those needs.

Experimental work is essential to the laboratories' missions. While the safety risks inherent in some experimentation must be controlled, the report says that the current system for managing these risks is contributing to escalating costs and schedule delays, and in some cases may limit experimentation. The U.S. Department of Energy and NNSA should work with laboratory managers to review the system for assessing and mitigating these risks to improve efficiency while maintaining a safe working environment.

The laboratories maintain and operate world-class experimental facilities, but smaller experimental facilities are also essential for the laboratories to conduct their work and to attract and retain staff, the [report](#) says. For example, these smaller facilities are important for producing weapons components such as neutron generators or for processing plutonium and evaluating how it ages. The laboratory directors should ensure a proper balance between these small scientific facilities and the larger signature facilities.

Provided by National Academy of Sciences

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