S. MORRISON/EPA/CORBIS

SWIRLING DUST SHOCKS PHYSICISTS
Swarms of self-charging particles defy expectations.
www.nature.com/news

US nuclear policy could boost basic research

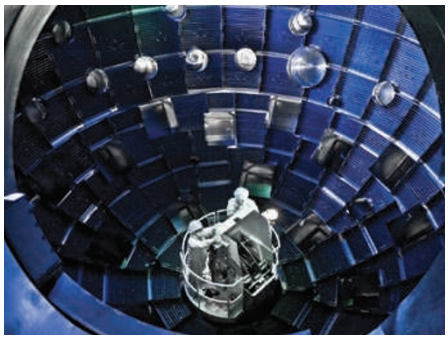
US President Barack Obama's nuclear-weapons policy represents a delicate compromise that could limit research on new warheads but bolster the workforce of scientists at the national security laboratories. The balancing act came into sharp focus in the 2010 Nuclear Posture Review (NPR), publicly released last week.

The policy downplays the role of nuclear weapons in US foreign policy and formally abandons efforts to build new warheads. But the language contains loopholes that could allow most nuclear-weapons design work at the laboratories, Los Alamos and Sandia in New Mexico, and Lawrence Livermore in California, to continue unfettered.

The NPR also emphasizes the need to modernize nuclear infrastructure (see 'Laser-fusion showdown') and maintain and expand scientific expertise at the weapons labs. The National Nuclear Security Administration, which manages the nuclear-weapons programme, employs thousands of scientists and engineers at these labs and draws recruits from fields such as astrophysics. The document follows up the president's fiscal 2011 budget, which would boost weapons and non-proliferation spending by more than 13%, to US$11.2 billion. Many experts see the administration's moves as an effort to please the leadership at the weapons labs.

"The administration needs to work with the lab directors very closely to make sure they are happy," says Stephen Young, a nuclear expert with the Union of Concerned Scientists in Washington DC. Obama will need their support as he tries to finally win Senate approval of the 1996 Comprehensive Nuclear-Test-Ban Treaty outlawing all nuclear testing. "The large budget increases for the labs are a principal demonstration of that fact," says Young.

Obama unveiled his international agenda on nuclear security and non-proliferation a year ago in Prague, recommitting the United States "to seek the peace and security of a world without nuclear weapons". On 8 April, two days after releasing the NPR, Obama signed a new arms-reduction treaty with Russia, reducing the cap on deployed weapons from 2,200 to 1,550 per country over the next seven years. He followed that up earlier this week by hosting a two-day summit in Washington DC to discuss broader nuclear-security issues.



LLNL

The National Ignition Facility is part of the US push to modernize its nuclear infrastructure.

William Press, a physicist who is on the president's science advisory board and who formerly served as deputy director for science and technology at the Los Alamos lab, supports the general thrust of the new weapons policy but regrets that the NPR doesn't make clear what kind of work will be allowed at the labs. For example, although modifying nuclear components in a weapon would require authorization from the president and Congress, Press says that one loophole would allow the labs to build weapons that are in many respects 'new' by mixing and matching components that have been tested in the past. Although this may satisfy lab directors who are concerned about maintaining the skills of weapons designers, Press is worried about these loopholes and says that they deserve broader discussion.

Nonetheless, Press supports the additional funding for nuclear-weapons research. "The labs have been starved in a way that is not healthy," he says.

The extra money, he adds, will benefit the full suite of US scientific work — from climate and materials sciences to all manner of computational and simulation expertise — that underpins the nuclear programme and provides it with new talent.

William Rees, who manages non-proliferation programmes as principal associate director for Global Security at Los Alamos National Laboratory, says that the lab needs to ensure a broad scientific base as an entry point for new recruits. Initially, these researchers might start work at the lab in its non-weapons programmes, such as projects in studying greenhouse-gas emissions and seismology. Some of those may then move into the weapons programme.

Rees says there are no guarantees that Congress will agree to the budget boost or that those numbers will be sustained in future years. He adds, however, that "we are cautiously optimistic". ■

Jeff Tollefson

Laser-fusion showdown

A watchdog office of the US government criticized the Department of Energy's showcase laser-fusion facility last week, warning that management problems there could hamper the ability of scientists to use it to ensure the reliability of the US nuclear arsenal.

Construction of the US$3.5-billion National Ignition Facility (NIF) began at Lawrence Livermore National Laboratory in California in 1997 and was completed in 2009. NIF's 192 lasers are designed to blast a target smaller than a dime with 1.8 megajoules of energy, igniting the fusion reaction that occurs in hydrogen bombs.

The most powerful laser facility in the world, NIF was billed as a tool that would allow scientists within the energy department's National Nuclear Security Administration (NNSA) to ignite tiny fusion explosions, gleaning data needed to maintain nuclear weapons in the absence of actual underground tests, which ended in 1992. But the new report, from the Government Accountability Office (GAO), says that NIF is 25% above its original $1.6-billion budget for 2006–12 and may not achieve 'ignition' within that time frame.

"Any long-term failure to achieve ignition and produce significant energy gains could erode NNSA's confidence in its ability to certify the safety and reliability of the nuclear weapons stockpile," the GAO warned.

The report says that the NNSA has not resolved problems with the laser optics as well as with key scientific challenges. JASON, an independent committee of eminent scientists, recommended in 2005 that the NNSA appoint a separate science panel to advise on the project, but the agency waited four years before doing so. Even then, the NNSA failed to give that panel the needed authority, scope and representation, the GAO said.

In its response to the GAO, the NNSA said the report is generally "fair and properly reflects the significant progress NIF has made". **J.T.**