

## EDITORIAL

# A comprehensive nuclear test ban

A permanent end to nuclear explosive testing, combined with sustained reliable deterrence, is in the national security interest of the United States and its allies and friends. The next U.S. Administration and the Congress should revisit the Comprehensive Nuclear Test Ban Treaty (CTBT) in view of current realities and work together toward enhanced security through ratification and an international push for entry into force.

Nuclear weapons have been central to strategic stability among nations and alliances for more than half a century. Even as American and international leaders aspire to and work toward a stable world verifiably free of nuclear weapons, this outcome cannot be expected for a considerable time. Voluntary suspension of nuclear testing by the permanent members of the United Nations Security Council for over two decades has made an enormous contribution to stability and nuclear nonproliferation. India and Pakistan ceased testing nearly as long ago, adding a degree of stability in a challenging security environment. The international agreement that verifiably eliminates the risk of an Iranian nuclear weapon greatly mitigates the risk of a proliferation sprint in the Middle East. The glaring exception is North Korea with its nuclear testing as recently as September, demonstrating vividly the regional and global destabilizing effect of nuclear tests. All of this argues for a binding no-test regime.

In 1999, the Senate evaluated the CTBT, but did not consent to its ratification. Two principal objections needed to be addressed. The newly created science-based stockpile stewardship program, designed to replace nuclear test explosions with an integrated scientific program of computer simulations, data analysis, and laboratory tests of weapons subsystems, was at least a decade away from having its suite of new tools in place. There was also uncertainty about the ability to detect low-yield clandestine underground tests anywhere in the world. At that time, I argued within the Clinton Administration for a time-limited CTBT approval, providing a period during which the needed science and technology could be developed

and deployed. Although the approval didn't happen, the science and technology did mature. The time has come to revisit CTBT ratification.

The stockpile stewardship innovation that took place in the Department of Energy's (DOE) national laboratories since the end of testing in 1992 is remarkable. Nothing was off the shelf, including a new supercomputing architecture and experimental facilities that explore previously unattainable pressures and temperatures. These capabilities have led to a continuously increasing understanding of nuclear weapons properties and dynamics that could not be approached within the testing

paradigm. Each year, the Secretaries of Defense and of Energy provide the president with an assessment of the deterrent, building on a peer review carried out by the DOE national security laboratory directors and the commander of the Department of Defense's Strategic Command. All indications are that the stockpile will remain safe, secure, and reliable indefinitely without testing, even as the weapons age and are reduced in number. The new toolkits of supercomputer systems and lab facilities are unlocking additional benefits, such as simulating fluid dynamics for better engines and turbines, handling enormous data sets for cancer research and treat-



*“The time has come to revisit CTBT ratification.”*

ment, and probing energetic astrophysical phenomena.

The global monitoring network necessary for worldwide detection of nuclear explosions has been built. Incredibly sensitive measurements can now detect and identify radionuclide signatures associated with nuclear explosive tests, including low-yield or evasive tests. With the treaty in force, international experts will conduct an on-site inspection after a suspect event.

In short, the United States and its partners have the technology needed to make the CTBT work for deterrence and strategic stability. Clearly, ratification by the Senate will not itself bring the treaty into force, but it will provide a stronger foundation for achieving a global testing ban and for amplifying international pressure and sanctions on any country that does test.

—Ernest J. Moniz



*Ernest J. Moniz is the U.S. Secretary of Energy*

# *Erratum*

**Erratum for the Editorial “A comprehensive nuclear test ban” by E. J. Moniz**

In the print version of the Editorial “A comprehensive nuclear test ban,” reference to the time frame of the effect of the international nuclear agreement with Iran was misstated. The online version of the Editorial contains the correct text.

# Science

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Ernest J. Moniz

*Science* **354** (6316), 1081.

DOI: 10.1126/science.aal4864 originally published online November 30, 2016

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