Union of Concerned Scientists

KEY FINDINGS

Rethinking Land-Based Nuclear Missiles

Sensible Risk-Reduction Practices for US ICBMs

The United States developed its core nuclear weapons policies early in the Cold War, some 60 years ago. These policies were shaped by the limitations of weapons technology at the time, yet remain largely the same today despite the fact that these technical limitations have not existed for decades.

In particular, US policy on land-based intercontinental-range ballistic missiles (ICBMs) is not only outdated but also creates the risk that the United States could launch these missiles by mistake in response to a false alarm—and start a nuclear war. The reasons that led the United States to accept this risk in the 1960s are no longer valid.

Technological Progress Makes ICBMs Redundant

When the United States first developed ballistic missiles, land-based ICBMs were more accurate and carried more powerful warheads than submarine-launched ballistic missiles (SLBMs), and the Pentagon was not confident in its ability to securely communicate with submarines at sea. For these reasons, the United States believed ICBMs were essential.

As Soviet missile technology improved, US ICBMs became increasingly vulnerable to attack. In response, the United States placed these missiles on high alert so they could be launched quickly on warning of an incoming attack. Because it takes only 30 minutes for an ICBM to reach the United States from Russia, this policy required the United States to develop a highly time-compressed process for deciding whether to launch. This created the risk that the United States would launch a nuclear attack by mistake on false warning, which would almost certainly have led to Soviet nuclear retaliation.

For decades now, SLBMs have been at least as accurate as ICBMs and armed with powerful warheads, and the Navy has had a highly reliable and secure communication system for submarines. Moreover, SLBMs have the advantage of being essentially invulnerable to attack when the submarines are hidden at sea. Yet the United States continues to not only keep its ICBMs, but also maintain them on high alert with a "launch-on-warning" option, creating unnecessary risks.

Airman 1st Class Braydon Williams/US Air Force

Keeping US ICBMs on high alert creates the risk of launching a nuclear attack by mistake on false warning. These missiles can easily be taken off high alert by using an existing safety switch in the silos that maintenance crews (such as this team at the F. E. Warren Air Force Base missile complex in Wyoming) routinely use to prevent a launch while they are working in the silo.

Forces against Change

Although many security experts have concluded there is no military reason to continue to deploy ICBMs, the United States appears unlikely to retire its ICBM force anytime soon. Political barriers—having nothing to do with security—stand in the way: senators in the ICBM Coalition greatly value the jobs and economic benefits the Air Force bases that host ICBMs bring to their states, the Air Force is loath to give up a major weapons program, defense contractors are eager to build a new ICBM system, and—perhaps most important—political and military officials are generally reluctant to question the value of the nuclear triad (ICBMs, SLBMs, and nuclear bombers).

The Air Force is in the early stages of building a new generation of ICBMs—the Ground-Based Strategic Deterrent (GBSD)—with the first one slated for deployment around 2030. The current official cost estimate for developing and producing these new missiles is $100 billion.

No Need for New ICBMs

If the United States continues to field an ICBM force, there is no technical reason for it to build new missiles. Continuing to maintain and upgrade the existing Minuteman III ICBMs would be far less expensive than proceeding with the GBSD program. The Air Force already uses a straightforward process to refurbish

and upgrade its ICBMs, and today the Minuteman missiles are "basically new missiles except for the shell," according to an Air Force analyst. Official studies show that the Air Force can continue to extend the operational life of the Minuteman missiles for many decades.

Rocket motor lifetime. An important factor limiting the service lifetime of a missile is the aging of its rocket motors. However, the Air Force's process for estimating the operational lifetimes of ICBM motors appears to be overly conservative based on data recording the actual performance of rocket motors from retired Minuteman II missiles that were then used for other purposes. If the actual operational lifetime of the current Minuteman III motors is significantly longer than the estimated lifetime, the current ICBM force could be retained with less need for refurbishment.

Flight testing. Data from the past 20 years show that the Air Force has flight tested an average of three missiles per year during this time to provide statistical information on reliability. The estimated current stockpile of Minuteman III missiles would allow the Air Force to continue flight testing at that rate for about 30 years—until around 2050.

Because of the large amount of data collected from past flight tests, the Air Force may be able to assess Minuteman III reliability using fewer annual tests going forward. Moreover, a RAND study for the Air Force found that continued advancements in monitoring the aging effects of missile motors and improved modeling and simulation of the aging effects will likely reduce the number of flight tests needed.

If the Air Force continues to conduct three flight tests per year, it would need to reduce the number of fielded ICBMs by three per year starting around 2050—to 370 by 2060 and 340 by 2070. These reductions could potentially be made in the context of a future US-Russian arms agreement. But if the United States wanted to maintain the current overall level of deployed warheads, it could slowly increase the number of warheads on SLBMs.

A Smarter, Safer Policy

Based on these findings, the Union of Concerned Scientists recommends the following actions.

1. The United States should retire the US ICBM force.
2. Until that time, it should immediately:
   - Remove ICBMs from high alert, to eliminate the possibility of launching these missiles on false warning and starting a nuclear war by mistake.
   - Eliminate launch-on-warning options from US war plans, which would preclude the option of re-alerting the ICBMs.
   - Revise the current process for making launch decisions, which is currently constrained by the short time available to launch ICBMs before incoming missiles could land.
3. Moreover, the United States should continue to extend the operational life of the Minuteman III missiles and should not build the new GBSD missile.
4. As part of this effort it should commission an independent study to:
   - Develop better ways to assess the aging effects of Minuteman III missiles, including incorporating sensors and nondestructive testing methods and technologies to allow evaluations of individual motors.
   - Validate these new methods of assessing aging, as well as the current one, against actual test and launch data from Minuteman II motors.
   - Determine the number of flight tests required to assess the reliability of US ICBMs, taking into account advanced monitoring and nondestructive tests as well as data collected from past tests.

Union of Concerned Scientists

FIND THE FULL REPORT ONLINE: www.ucsusa.org/resources/rethinking-icbms

The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with people across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.

NATIONAL HEADQUARTERS
Two Brattle Square
Cambridge, MA 02138-3780
Phone: (617) 547-5552
Fax: (617) 864-9405

WASHINGTON, DC, OFFICE
1825 K St. NW, Suite 800
Washington, DC 20006-1232
Phone: (202) 223-6133
Fax: (202) 223-6162

WEST COAST OFFICE
500 12th St., Suite 340
Oakland, CA 94607-4087
Phone: (510) 843-1872
Fax: (510) 843-3785

MIDWEST OFFICE
One N. LaSalle St., Suite 1904
Chicago, IL 60602-4064
Phone: (312) 578-1750
Fax: (312) 578-1751

WEB: www.ucsusa.org

PRINTED ON RECYCLED PAPER USING VEGETABLE-BASED INKS