Union of Concerned Scientists

FACT SHEET

A Simple Method for Taking U.S. Land-Based Nuclear Missiles Off High Alert

HIGHLIGHTS

Taking ground-based U.S. intercontinental ballistic missiles off high alert is critical to eliminating the risk of accidental or unauthorized launch, or preventing a deliberate launch in response to a false or mistaken warning of an incoming attack. "Safing" these missiles to prevent them from launching can be done by simply turning a key in a control switch that isolates the missiles from outside launch signals. This control switch is already used by maintenance and security workers in underground missile silos, and requires no additional equipment. Using the same switch, maintenance crews could return the missile fleet to hair-trigger status within two days if there were a decision to do so.

The United States keeps its ground-based intercontinental ballistic missiles (ICBMs) on high alert so they can be launched within minutes. Taking these missiles off high alert would essentially eliminate the risk of accidental or unauthorized launch. It would also prevent a deliberate launch in response to a false or mistaken warning of an incoming attack, as the president could no longer launch in a matter of minutes in response to such a warning.

Many methods are available to remove missiles from high alert. Some are straightforward and easy to apply—and to reverse—while others would require considerably more time and effort.

The Union of Concerned Scientists advocates a method that is particularly simple and straightforward. That approach entails simply turning a key in the safety control switch—a standard component at all U.S. ICBM silos. This switch opens a circuit that prevents a launch command from causing the missile's first-stage motor to ignite (Blair 2008).

That operation—known as "safing"—is used to prevent a missile from launching when maintenance and security workers are in an underground missile silo. Indeed, one of the first things such a crew does when entering the nuclear launch facility attached to a silo is to manually safe the missile.

Safing the U.S. ICBM Fleet

The nation's ICBM fleet is composed of 450 Minuteman III missiles in hardened, underground silos. These silos are separated by at least three miles, to prevent a

A Minuteman II missile in its silo. "Safing" missiles (using a switch that isolates the missile from outside launch signals) eliminates the risk of an accidental or unauthorized launch.

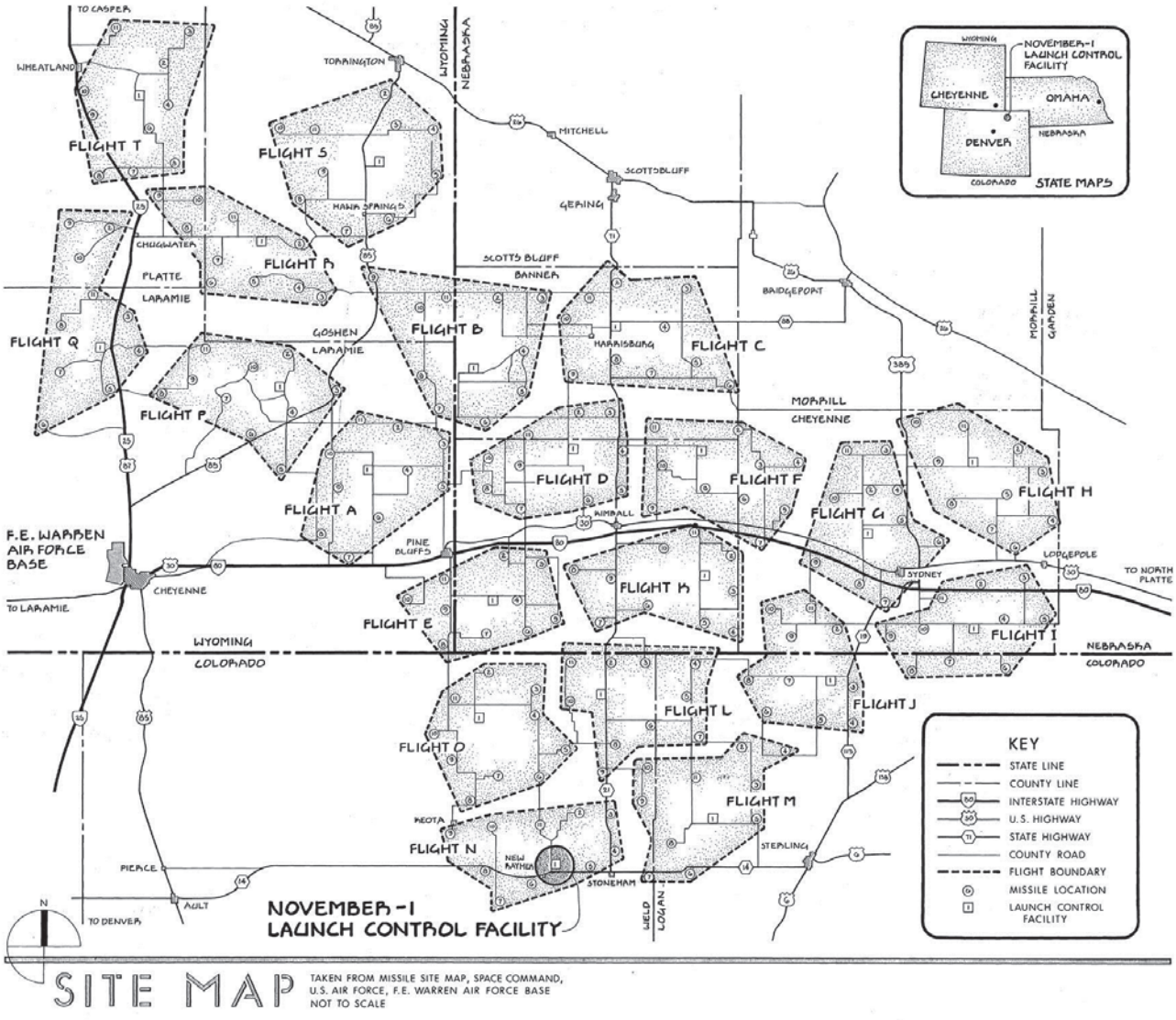
single incoming warhead from destroying multiple silos (Ahlborn et al. 2007).

Unlike for earlier Titan missiles, the launch crew for Minuteman III ICBMs is not located at each silo. Instead, two launch officers—called the missile combat crew—are stationed in a hardened, underground Launch Control Center several miles from each silo. Each such center controls and monitors 10 missiles, known as a "flight."

The 10 missiles controlled by each center are distributed over a region that is typically 10 to 20 miles on a side (Figure 1). Each control center, in turn, sits at a missile alert facility, which also contains a ground-level building that houses six members of a security force (Ahlborn et al. 2007).

Workers visiting a silo complex enter its missile launch facility through a hatch, and then go to the launcher equipment room (Figure 2). This room contains the electronic

FIGURE 1. Warren Air Force Base Launch Control Facility

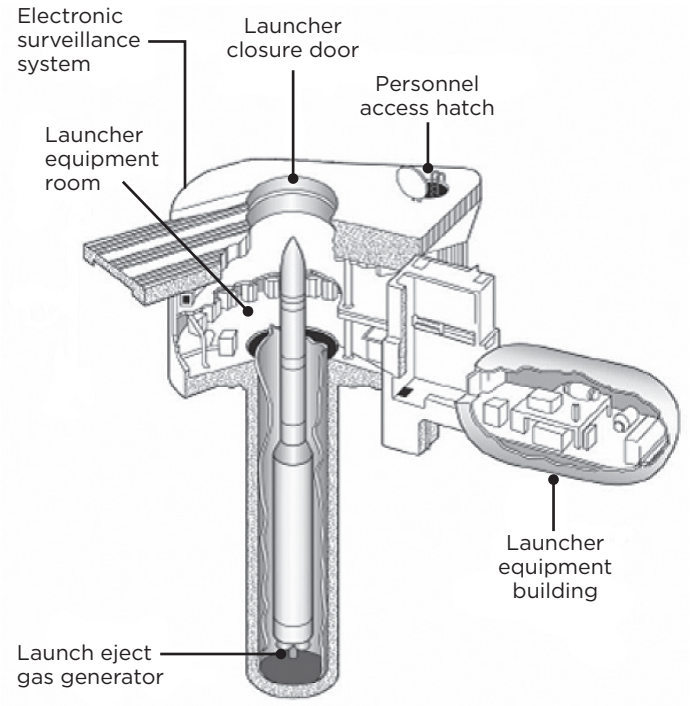


Each gray area represents a region with one launch control center and its "flight" of 10 missiles in the missile field near Warren Air Force Base in Wyoming.

Note: Flights P through T have been deactivated and do not contain missiles.

SOURCE: NATIONAL MUSEUM OF THE USAF 2009.

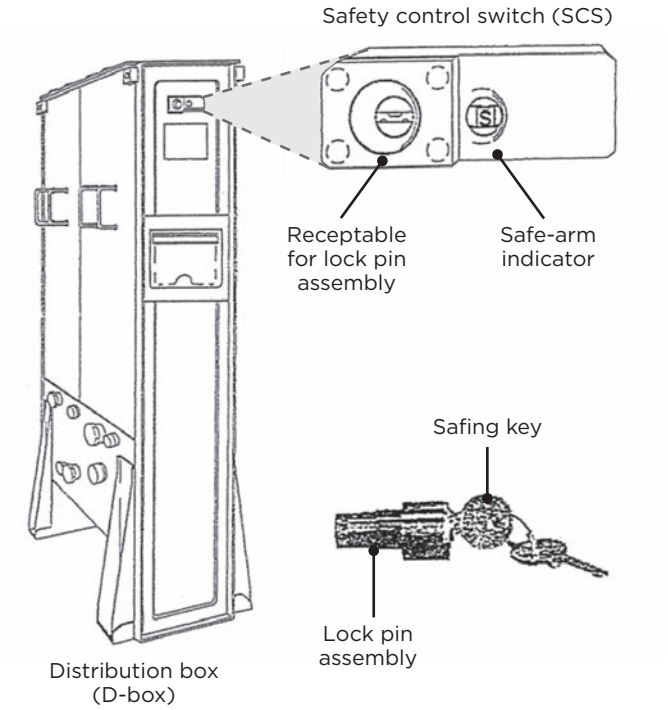
FIGURE 2. Minuteman III Launch Facility



As this schematic shows, the launch facility is fully housed underground with a hatch at ground level that allows a crew to enter the facility.

SOURCE: AHLBORN ET AL. 2007.

FIGURE 3. Safety Control Switch Schematic



The safety control switch for each missile is on the distribution box (D-box) (left) in the equipment room of a missile launch facility. The diagram at right shows the switch in more detail.

SOURCE: SAC 1994.

> ***Once a worker turns the safing key in the safety control switch and pulls out the lock-pin assembly, the missile is considered manually safed.***

equipment that connects the missile to its launch control center and monitors the missile's status. The safety control switch is on the distribution box (D-box) in this room (Figure 3). Once a worker turns the safing key in that switch and pulls out the lock-pin assembly, the missile is considered manually safed (SAC 1994). While the missile is safed the missile launch crew in the launch control center can still monitor its status but cannot launch it.

Time Required to Change Alert Status

If all ICBMs were taken off high alert and the president decided to return them to high alert, two maintenance workers and two security personnel would travel to each missile site, enter the silo, and return the switch to its operational position (Fortney 1999). That process—which would restore all functionality—would be followed by "a weapon and security system test verified by the missile combat crew on duty" (Fortney 1999).

Estimates vary on how long the process of taking all ICBMs off high alert—or putting them back on—would take. In 1994, the U.S. Strategic Command stated that changing the alert status of the ICBM force—then 580 missiles—would take about four days. However, the actual time appears to be shorter: a history of the Strategic Air Command reports that when President George W. Bush ordered 450 Minuteman II missiles immediately removed from high alert in 1991, maintenance crews needed no more than two days to safe the missiles (SAC Office of the Historian 1991).

> ***The "safing switch" method for taking ICBMs off high alert requires no additional equipment, can be implemented quickly, and has been used in the past for this very purpose.***

Moreover, Bruce Blair, who served as a missile control officer and has written extensively about this process, estimates that crews could restore the full ICBM force to high alert in as little as "about one-half day" (Blair 2008). In describing the steps of such a process, he notes that the time it would take would depend on the number of crews available:

> *Upon their arrival, a given team authenticates with the local launch control center over dedicated telephone links, receives the combination to open the entry hatch, waits 1 hour for the security plug on the hatch to open, descends into the silo, deactivates the safety switch, notifies the local launch center, and departs for the next silo. Since the silos in a given flight of 10 missiles are located within a few miles of each other, the travel time between silos would be short. The time needed to re-alert the entire force in this manner would depend mainly on the availability of maintenance teams. We assume that two teams would be available for each flight of 10 missiles. There are 45 flights of Minuteman III ICBMs in the current arsenal. Based on an initial preparation and travel time of 1 hour, plus 1.5 hours at each silo, plus travel time between silos (.15 hours), the maintenance teams would return 100 ICBMs to full alert status in 2.5 hours* (Blair 2008).

At that rate, crews could restore all 450 ICBMs to high alert in less than 12 hours.

This method for taking ICBMs off high alert has several advantages: it requires no additional equipment since it uses a switch that is a standard part of Minuteman III silos, it can be implemented quickly, and it has been used in the past for this very purpose. Safing missiles in this way would essentially eliminate the risk of accidental, erroneous, or unauthorized launch.

REFERENCES

All references were accessed in March 2015.

Ahlborn, D., D. Coleman, S. Hogan-Conrad, D. Jury, and M. Malle. 2007. Environmental assessment for Malmstrom Minuteman III deactivation. Great Falls, MT: Malmstrom Air Force Base. Online at *http://www.dtic.mil/dtic/tr/fulltext/u2/a496029.pdf*.

Blair, B. 2008. De-alerting strategic forces. In: *Reykjavik revisited: Steps toward a world free of nuclear weapons*, edited by G.P. Shultz, S.D. Drell, and J.E. Goodby. Stanford, CA: Hoover Institution Press. Online at *http://media.hoover.org/sites/default/files/documents/Drell_Goodby_Schultz_Reykjavik_Revisited_25.pdf*.

Fortney, M.E. 1999. Nuclear de-alerting and the search for post-Cold War nuclear strategy. Montgomery, AL: School of Advanced Airpower Studies, Air University, Maxwell Air Force Base. Online at *http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA391824*.

National Museum of the USAF. 2009. Minuteman III composite site map. Online at *http://www.nationalmuseum.af.mil/factsheets/factsheet_media.asp?fsID=13569*.

Strategic Air Command (SAC). 1994. NPR questions. Obtained by Hans M. Kristensen, Federation of American Scientists, under the Freedom of Information Act. Omaha, NE. Online at *http://www.nukestrat.com/us/reviews/35usstratcom021694.pdf*.

Strategic Air Command (SAC), Office of the Historian. 1991. Alert operations and the Strategic Air Command, 1957–1991. Omaha, NE: Strategic Air Command, Offutt Air Force Base. Online at *https://books.google.com/books?id=Y8jh37NJf3YC*.

Union of Concerned Scientists

FIND THIS DOCUMENT ONLINE: www.ucsusa.org/safing

The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with citizens 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