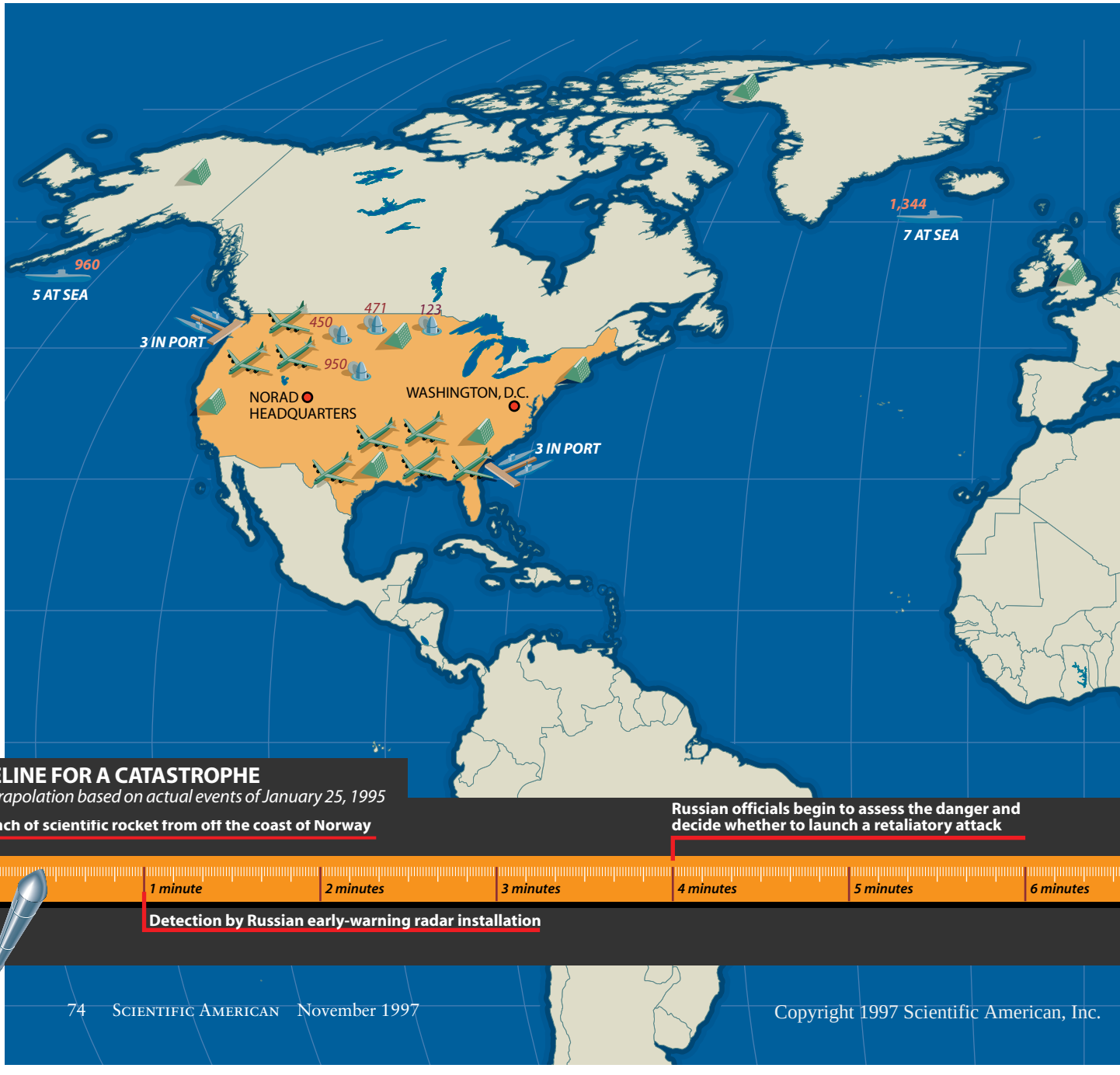
Taking Nuclear Weapons off Hair-Trigger Alert

It is time to end the practice of keeping nuclear missiles constantly ready to fire. This change would greatly reduce the possibility of a mistaken launch

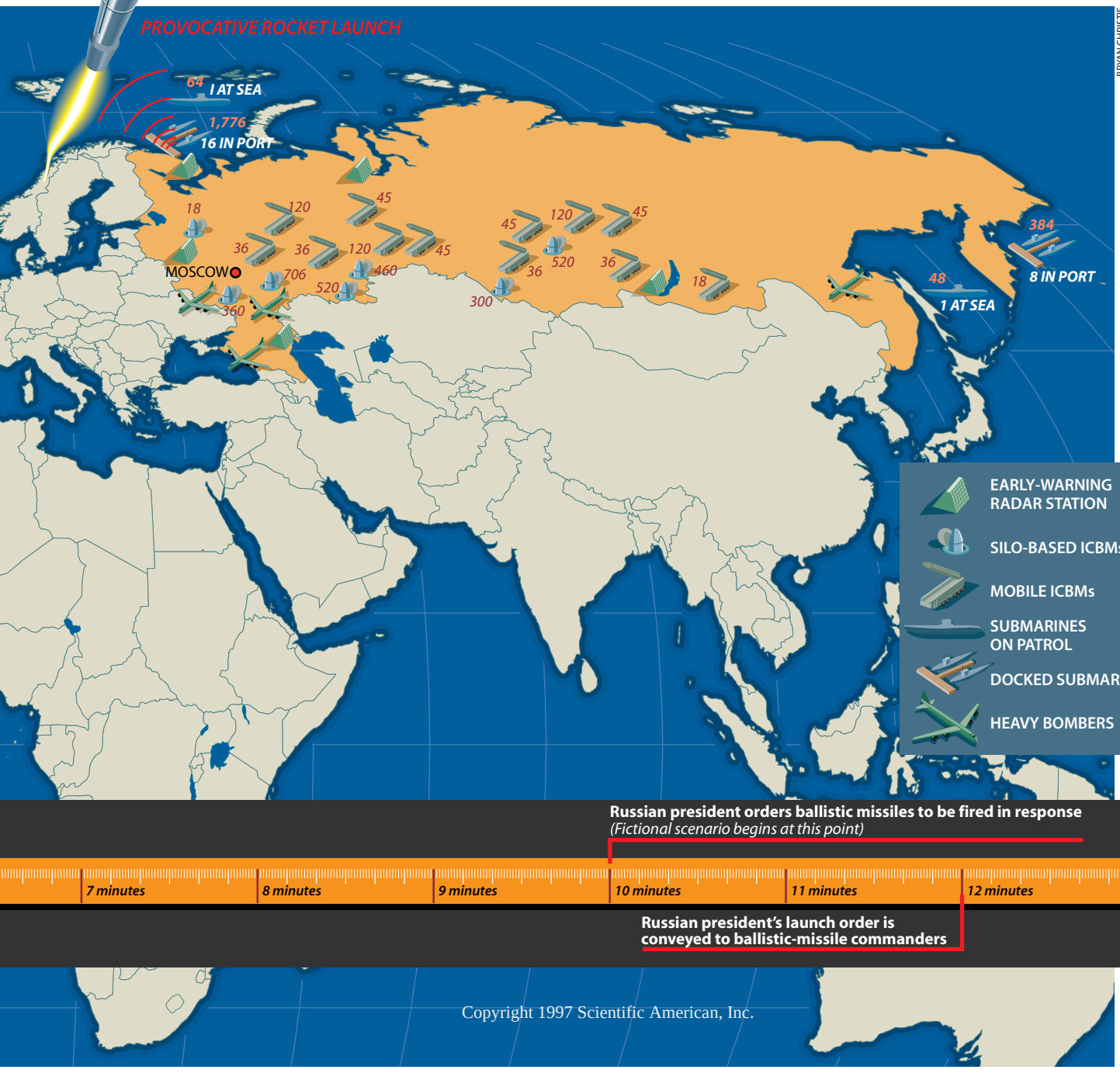
by Bruce G. Blair, Harold A. Feiveson and Frank N. von Hippel



On January 25, 1995, military technicians at a handful of radar stations across northern Russia saw a troubling blip suddenly appear on their screens. A rocket, launched from somewhere off the coast of Norway, was rising rapidly through the night sky. Well aware that a single missile from a U.S. submarine plying those waters could scatter eight nuclear bombs over Moscow within 15 minutes, the radar operators immediately alerted their superiors. The message passed swiftly from Russian military authorities to President Boris Yeltsin, who, holding the electronic case that could order the firing of nuclear missiles in response, hurriedly conferred by telephone with his top advisers. For the first time ever, that "nuclear briefcase" was activated for emergency use.

For a few tense minutes, the trajectory of the mysterious rocket remained unknown to the worried Russian officials. Anxiety mounted when the separation of multiple rocket stages created an impression of a possible attack by several missiles. But the radar crews continued to track their targets, and after about eight minutes (just a few minutes short of the procedural deadline to respond to an impending nuclear attack), senior military officers determined that the rocket was headed far out to sea and posed no threat to Russia. The unidentified rocket in this case turned out to

EQUIPMENT FOR NUCLEAR WAR maintained by the U.S. and Russia includes long-range bombers, ballistic-missile submarines, land-based intercontinental ballistic missiles (ICBMs), early-warning radars and satellites. Despite the conclusion of the cold war, these two former adversaries remain ready to launch thousands of nuclear warheads (*numbers indicated on map*) at each other on minutes' notice.



be a U.S. scientific probe, sent up to investigate the northern lights. Weeks earlier the Norwegians had duly informed Russian authorities of the planned launch from the offshore island of Andoya, but somehow word of the high-altitude experiment had not reached the right ears.

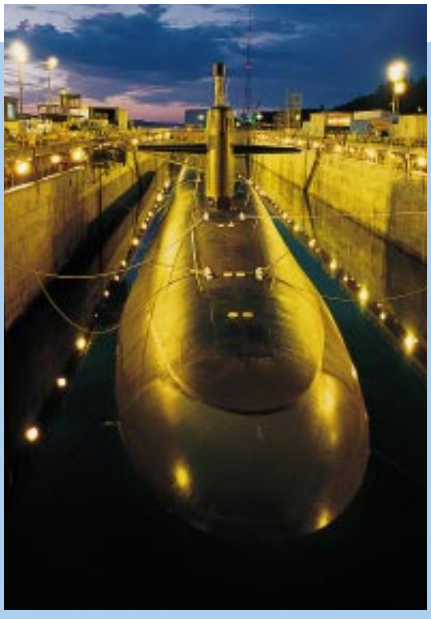
That frightening incident (like some previous false alarms that activated U.S. strategic forces) aptly demonstrates the danger of maintaining nuclear arsenals in a state of hair-trigger alert. Doing so heightens the possibility that one day someone will mistakenly launch nuclear-tipped missiles, either because of a technical failure or a human error—a mistake made, perhaps, in the rush to respond to false indications of an attack.

Both the U.S. and Russian military have long instituted procedures to prevent such a calamity from happening. Designers of command systems in Russia have gone to extraordinary lengths to ensure strict central control over nuclear weapons. But their equipment is not foolproof, and Russia's early-warning and nuclear command systems are deteriorating. This past February the institute responsible for designing the sophisticated control systems for the Strategic Rocket Forces (the military unit that operates Russian intercontinental ballistic missiles) staged a one-day strike to protest pay arrears and the lack of resources to upgrade their equipment. Three days later Russia's defense minister, Igor Rodionov, asserted that "if the shortage of funds persists … Russia may soon approach a threshold beyond which its missiles and nuclear systems become uncontrollable."

Rodionov's warning may have been, in part, a maneuver to muster political support for greater defense spending. But recent reports by the U.S. Central Intelligence Agency confirm that Russia's Strategic Rocket Forces have indeed fallen on hard times. Local utility managers have repeatedly shut off the power to various nuclear weapons installations after the military authorities there failed to pay their electric bills. Worse yet, the equipment that controls nuclear weapons frequently malfunctions, and critical electronic devices and computers sometimes switch to a combat mode for no apparent reason. On seven occasions during the fall of 1996, operations at some nuclear weapons centers were severely disrupted when thieves tried to "mine" critical communications cables for their copper.

Many of the radars constructed by the former Soviet Union to detect a ballistic-missile attack no longer operate, so information provided by these installations is becoming increasingly unreliable. Even the nuclear suitcases that accompany the president, defense minister and chief of the General Staff are reportedly falling into disrepair. In short, the systems built to control Russian nuclear weapons are now crumbling.

In addition to these many technical difficulties, Russia's nuclear weapons establishment suffers from a host of human and organizational problems. Crews receive less training than they did formerly and are consequently less proficient in the safe handling of nuclear weapons. And despite President Yeltsin's promises to improve conditions, endemic housing and food shortages have led to demoralization and disaffection within the elite Strategic Rocket Forces, the strategic submarine fleet and the custodians of Russia's stock-



U.S. BALLISTIC-MISSILE SUBS such as this vessel carry 24 multiwarhead missiles.

ROBERT GENAT *Arms Communications*

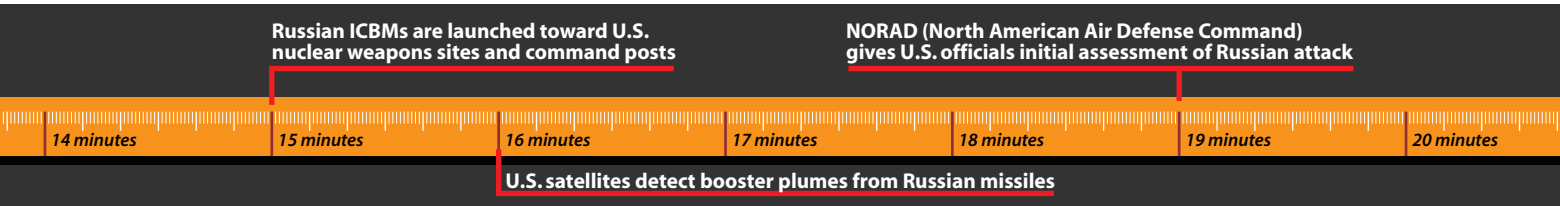
Submarine-Launched Missiles

To achieve START II limits, the U.S. plans to eliminate four of its 18 ballistic-missile submarines and to reduce the count of warheads on submarine-launched missiles from eight to five. Later, to meet the START III goals, the U.S. would most likely eliminate an additional four submarines and reduce the number of warheads on each missile to four. All these actions should be taken at once. Russia could then immediately remove the warheads from the submarines it plans to eliminate under the START agreements.

Without rather elaborate verification arrangements, neither country could determine the status of the other's submarines at sea. Both nations, however, should lower launch readiness. Approximately half the submarines that the U.S. has at sea today are traveling to their launch stations in a state of modified alert: the crew needs about 18 hours to perform the procedures, such as removing the flood plates from the launch tubes, that bring a submarine to full alert. Most U.S. submarines at sea could simply stay on modified alert. Their readiness could be reduced further by removing their missiles' guidance systems and storing them on board. Russian submarines lack this option; their missiles are not accessible from inside the vessel.

Russia should also pledge to keep its missiles on submarines in port off launch-ready alert. (The U.S. does not maintain submarines in port on alert.) The U.S. may be able to monitor the alert condition of these Russian submarines, but Russia should make their status obvious.

—B.G.B., H.A.F. and F.N. von H.



ADOLPH BROTMAN

RUSSIAN SILO LID would require a large crane to tilt upward if the device that generates high-pressure gas for its pneumatically operated hinge were purposefully removed.

Silo-Based Missiles

The START II ban on multiple-warhead, land-based missiles does not go into effect for a decade, but the U.S. and Russia could act earlier to take most of their silo-based warheads off alert. The easiest method would be to physically "pin" open the switches that allow the rocket engines to ignite. Maintenance crews would then have to enter each silo, manually remove the safety pins and close these switches before the missiles would be ready to fire remotely.

Negotiators at the Helsinki Summit envisioned actions that would take even longer to reverse. They agreed that Russia and the U.S. would have five extra years to dismantle the multiple-warhead missiles slated to be eliminated under START II, as long as these missiles are "deactivated by removing their nuclear warheads or taking other jointly agreed steps." The U.S. prefers that Russia deactivate missiles by removing warheads, an act that would take weeks to reverse. Such efforts would be apparent to surveillance satellites, and the absence of the warheads on the missiles could be checked during the inspections permitted under START.

Yet Russian experts argue that their country does not have adequate facilities to store a large number of warheads taken from missiles. They are now considering other options: immobilizing the massive silo lids so that heavy equipment would be required to open them, or removing the battery that operates the missile-guidance system during flight. A third possibility would be to replace the aerodynamic missile nose cones with flat-faced covers, which would shelter the warheads but not allow the missiles to fly. *—B.G.B., H.A.F. and F.N. von H.*

piles of nuclear warheads. As a result, the likelihood increases that desperate low-level commanders might disregard safety rules or, worse still, that they might take unauthorized control of nuclear weapons—something a deteriorating central command might be unable to prevent or counter. Although most Russian launch crews would need to receive special codes held by the General Staff before they could fire their missiles, one recent CIA report warned that some submarine crews may be able to launch the ballistic missiles on board their vessels without having to obtain such information first.

Even at the top, control over nuclear weapons could splinter along various political fault lines. Relations between politicians and military leaders in Russia are strained, and physical control of the launch codes remains in the hands of the military. Thus, the authority to fire ballistic missiles could be usurped by military commanders during an internal crisis. In fact, during the August 1991 coup against President Mikhail S. Gorbachev, top-level allegiances suddenly shifted, and the normal chain of command for Russia's nuclear weapons was broken. For three days, the power to launch nuclear weapons rested in the hands of Defense Minister Dmitri Yazov and the chief of the General Staff, Mikhail Moiseyev. Given the dire conditions in Russia, something similar could happen again.

The Nuclear Hair Trigger

Although international relations have changed drastically since the end of the cold war, both Russia and the U.S. continue to keep the bulk of their nuclear missiles on high-level alert. So within just a few minutes of receiving instructions to fire, a large fraction of the U.S. and Russian land-based rockets (which are armed with about 2,000 and 3,500 warheads, respectively) could begin their 25-minute flights over the North Pole to their wartime targets.

U.S. early-warning radars pick up incoming ICBMs; NORAD makes second assessment

21 minutes | 22 minutes | 23 minutes | 24 minutes | 25 minutes | 26 minutes | 27 minutes

Less than 15 minutes after receiving the order to attack, six U.S. Trident submarines at sea could loft roughly 1,000 warheads, and several Russian ballistic-missile submarines could dispatch between 300 and 400. In sum, the two nuclear superpowers remain ready to fire a total of more than 5,000 nuclear weapons at each other within half an hour.

Why do two countries at peace retain such aggressive postures, ones that perpetuate the danger of a mistaken or unauthorized launch? Because military planners on both sides remain fixated on the remote specter of a deliberate nuclear surprise attack from their former adversary. They assume that such a "first strike" would be aimed against their own strategic nuclear weapons and the command centers that direct them. To deter such an assault, each country strives to ensure that it could respond with a forceful counterattack against the full spectrum of military targets on its opponent's territory, including all nuclear weapons installations. This requirement saddles military planners with a task virtually identical in scope to mounting a first strike: they must be able to guarantee the rapid destruction of thousands of targets spread across a distant continent.

In order to meet this demand, both the U.S. and Russia rely on a launch-on-warning strategy—that is, each side is poised to release a massive retaliatory missile salvo after detecting an enemy missile attack but before the incoming warheads arrive (which might take just 15 minutes if they were fired from submarines nearby). Although it has thousands of warheads securely deployed at sea, the U.S. adheres to this quick-draw stance because of the vulnerability of its missile silos and command apparatus, including its political and military leadership in Washington, D.C.

Russian officials perceive an even greater need to launch their missiles on warning. The General Staff evidently fears that if its nuclear missiles are not launched immediately, then only tens of them would be able to respond after absorbing a systematic U.S. attack. Russian command posts and missile silos are as vulnerable as those of the U.S. to a massive assault.

Russia's current inability to deploy many of its most survivable forces—submarines at sea and mobile land-based rockets—amplifies this worry. A lack of resources and qualified personnel has forced the Russian navy to cut back operations considerably. At present, the Russian navy typically keeps only two of its 26 ballistic missile submarines at sea on combat patrol at any one time. Similar constraints prevent Russia from hiding more than one or two regiments of its truck-mounted mobile missiles by dispersing them in the field. The remaining 40 or so regiments, each controlling nine single-warhead missiles, keep their trucks parked in garages. These missiles are more exposed to attack than those housed in underground silos. Russia also has 36 10-warhead nuclear missiles carried on railway cars, which were designed to be hidden along Russia's vast rail network. But these railcars remain confined to fixed garrisons in keeping with a decision made by President Gorbachev in 1991.

These vulnerabilities have led Russia to ready some of its submarines in port and mobile missiles in garages to launch on warning, along with the missiles in silos. The time available for deciding to launch these weapons is shortened by the presence of American, British and French submarines cruising in the North Atlantic, only about 2,000 miles (3,200 kilometers) from Moscow. This proximity means that the nuclear-release procedures in Russia require a response time of less than 15 minutes: a few minutes for detecting an attack, another few minutes for top-level decision making and a few minutes for disseminating the launch order. Russian leaders and missile controllers are geared to work within this brief time frame and practice regularly with drills. U.S. nuclear forces operate with a similarly short fuse.

It is obvious that the rushed nature of this process, from warning to decision to action, risks causing a catastrophic

SOVFOTO/EASTFOTO

RUSSIAN SS-25 MISSILE can be fired from a truck.

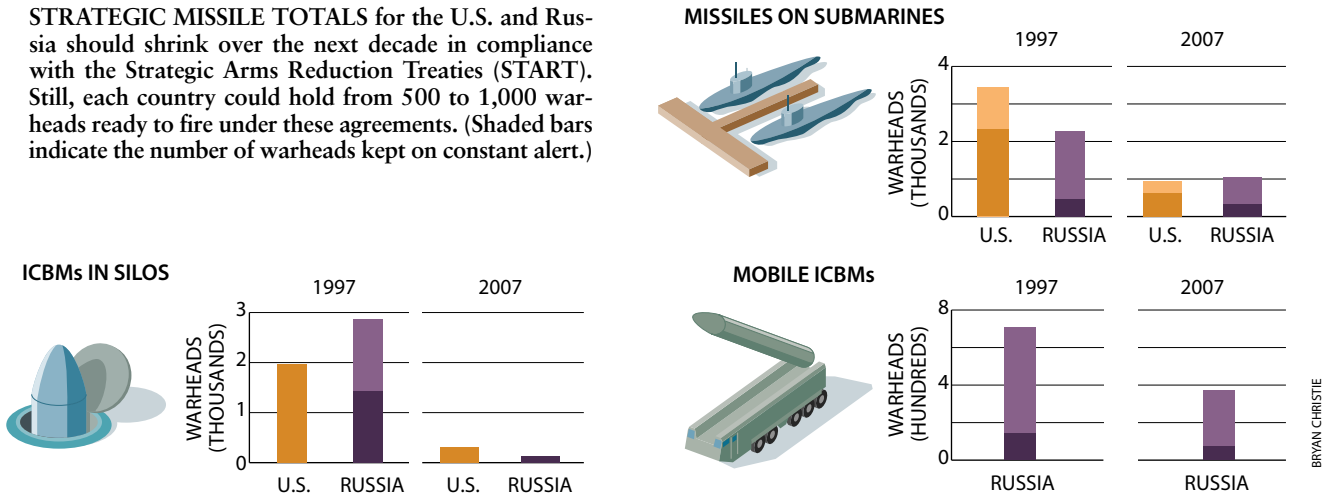
Land-Mobile Missiles

De-alerting" Russia's mobile land-based missiles (the U.S. has none) could begin with removing warheads from the 36 rail-mobile missiles to be eliminated under START II. For the truck-mobile missiles, one possibility might be to alter their garages. Currently the roofs of these shelters are designed to slide open, allowing the launcher inside to tilt upright and fire the missile. Other measures might incapacitate the launcher itself in ways that would take at least some hours to restore. *—B.G.B., H.A.F. and F.N. von H.*

U.S. president receives final recommendations from senior military commanders and the secretary of defense

28 minutes	29 minutes	30 minutes	31 minutes	32 minutes	33 minutes	34 minutes

STRATEGIC MISSILE TOTALS for the U.S. and Russia should shrink over the next decade in compliance with the Strategic Arms Reduction Treaties (START). Still, each country could hold from 500 to 1,000 warheads ready to fire under these agreements. (Shaded bars indicate the number of warheads kept on constant alert.)



mistake. The danger is compounded by the erosion of Russia's ability to distinguish reliably between natural phenomena or peaceful ventures into space and a true missile attack. Only one third of its modern early-warning radars are working at all, and at least two of the nine slots in its constellation of missile-warning satellites are empty.

The dangers stemming from this decline in Russia's technical capabilities are offset, to some extent, by the relaxation of tensions that has come with the end of the cold war. Given the milder political climate, decision makers on both sides should be more inclined to question the validity of any reports they receive of an impending missile attack. Nevertheless, the coupling of two arsenals geared for rapid response carries the inherent danger of producing a mistaken launch and an escalating volley of missiles in return. The possibility of such an apocalyptic accident cannot be ruled out even under normal conditions. And if the control of Russian nuclear weapons were to be stressed by an internal or international political crisis, the danger could suddenly become much more acute.

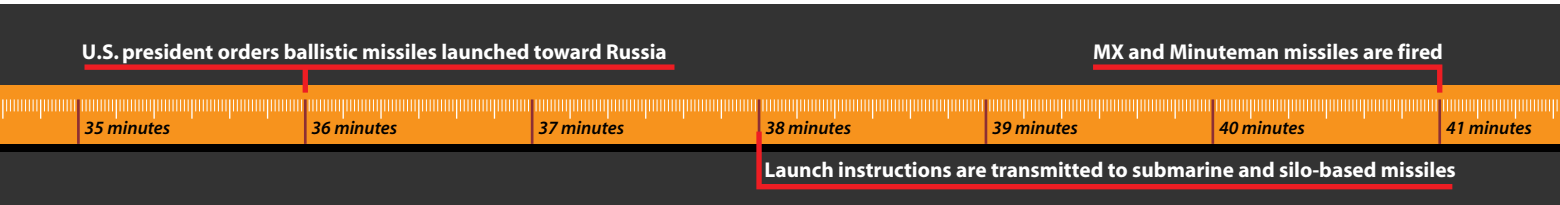
During the cold war, such risks were subordinated to the overriding requirement to deter an enemy believed to be willing to launch a nuclear attack. This rationalization is no longer defensible, if ever it was. Today, when both countries seek normal economic relations and cooperative security arrangements, perpetuating the readiness to launch nuclear weapons on the mere warning of an attack constitutes reckless behavior. Yet this thinking is so entrenched that it will yield only to steady pressure from the public on political leaders—especially presidents—to replace it with a safer policy.

"De-alerting" Missiles

The cuts in nuclear arms set by the Strategic Arms Reduction Treaties (START) should lessen the threat of an accidental nuclear exchange, but those changes will come only gradually. Under the START III framework, endorsed in Helsinki this past spring by President Yeltsin and President Bill Clinton, the U.S. and Russian strategic arsenals would shrink to about 2,000 warheads on each side by the year 2007. But if current practices are not revised, 10 years from now half of those nuclear weapons could still remain ready to launch on a few minutes' notice.

The chance of an accidental launch could be reduced much more rapidly by "de-alerting" the missiles—increasing the amount of time needed to prepare them for launch. The U.S. and Russia should move independently down this path to a safer world, preferably taking quick strides in parallel. Two prominent proponents of this approach are former senator Sam Nunn of Georgia and retired general George L. Butler, commander in chief of the U.S. Strategic Command from 1991 to 1994. This proposal is also gaining support in the community of nongovernmental organizations involved in nuclear security and from some members of the U.S. Congress. In Russia, the Ministry of Defense is seriously studying such an alteration.

President George Bush set a notable precedent for de-alerting nuclear weapons at the end of September 1991, when the Soviet Union began to split apart in the wake of the August coup attempt. On the advice of General Butler, President Bush ordered an immediate standdown of the many U.S. strategic bombers that had remained ready for decades to take off with only a few minutes' warning. Soon afterward, air force personnel unloaded and stored the many nuclear weapons carried on these planes. In addition, President Bush ended the alert for the strategic missiles destined to be eliminated under START I, a set composed of 450 silo-based Minuteman II rockets, along with the missiles on 10 Poseidon submarines. These im-



portant actions took only a few days.

President Gorbachev reciprocated a week later by ordering the deactivation of more than 500 land-based rockets and six strategic submarines, by promising to keep his strategic bombers at a low level of readiness and by putting the rail-based missiles in garrison. In the subsequent months, both countries also withdrew many thousands of shorter-range tactical nuclear warheads that had been deployed with their armies and navies and placed these weapons in central storage depots.

Presidents Clinton and Yeltsin took a further step together in 1994, when they agreed to stop aiming strategic missiles at each other's country. This change, though a welcome gesture, has little military significance. Missile commanders can reload target coordinates into guidance computers within seconds. In fact, the 1994 pact does not even alleviate the concern about an accidental Russian launch, because an unprogrammed missile would automatically switch back to its primary wartime target, which might be a Minuteman silo in Montana or a command center in Washington, London, Paris or Beijing. And Russian missiles, like their American counterparts, cannot be ordered to self-destruct once they are launched.

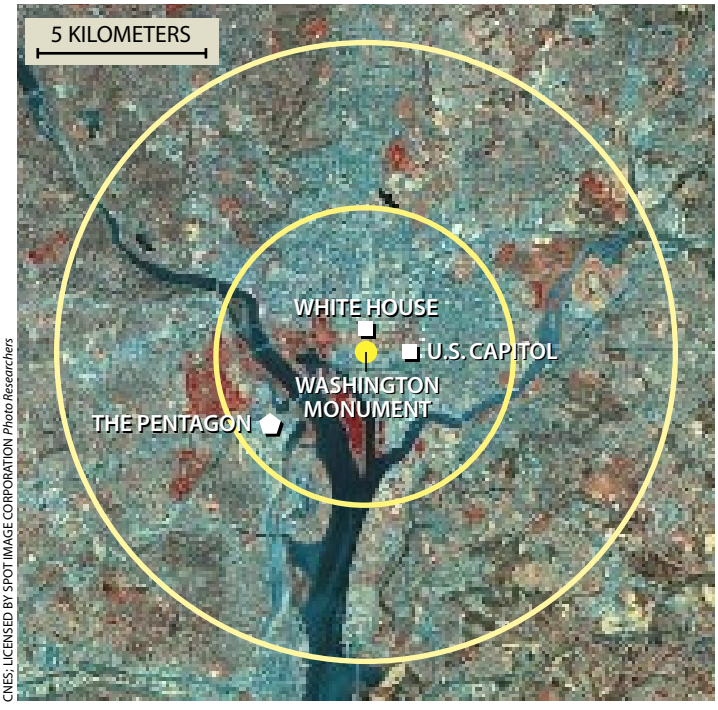
Possessing the most robust forces and cohesive command system, the U.S. government should take the lead in a new round of voluntary actions by announcing that it will withdraw the U.S. warheads that most threaten Russia's nuclear deterrent (particularly those capable of hitting Russia's missile silos and underground command posts). The most menacing warheads are those deployed on the 50 MX silo-based missiles, which are armed with 10 warheads each, and the 400 high-yield W88 warheads fitted atop some of the missiles on Trident submarines. We also recommend immobilizing all of the land-based Minuteman IIIs (about 500 missiles), which are armed with three warheads each, halving the number of submarines deployed in peacetime and cutting the number of warheads on each submarine-borne missile from eight to four. The operation of ballistic-missile submarines should also be altered so that crews would require approximately one day to ready missiles for launching.

These measures would leave almost 600 U.S. warheads remaining invulnerable at sea, each capable of destroying the heart of a great city. With such a force, the U.S. would preserve ample capacity to deter any nuclear aggressor. Such a dramatic shift by the U.S. would fully establish its intention not to pose a first-strike threat to Russia. We believe this change in policy would persuade Russia to follow suit and take most of its missiles off hair-trigger alert. These changes would also help accelerate the implementation of agreements for disarmament already negotiated under START II and START III. We estimate that most of the job could be completed within a year or two.

Capabilities already exist to confirm that nuclear weapons have been taken off alert. For instance, the number of ballistic-missile submarines in port can be monitored using satellites, and most other measures could be checked during the random on-site inspections permitted by START I. Over the longer term, additional technical means could be engineered to provide more frequent checks that nuclear missiles posed no immediate threat. For example, electronic "seals" could be used to ensure that a component removed from a missile had not been replaced. The integrity of such seals could be verified remotely through satellite relay using encrypted communications.

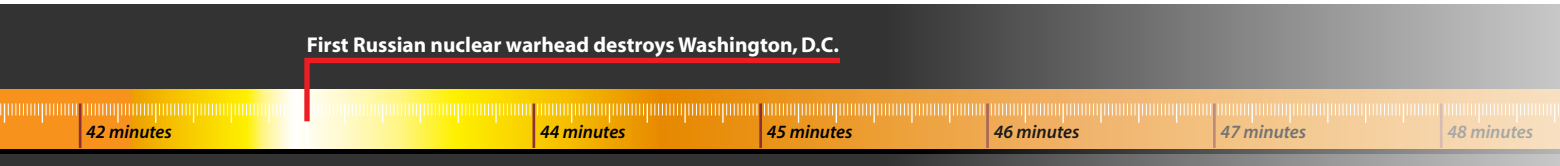
Global Zero Alert

This blueprint for taking U.S. and Russian nuclear forces off alert would substantially diminish the ability of either country to mount a first strike. Thus, it would eliminate both the ca-



CNES; LICENSED BY SPOT IMAGE CORPORATION *Photo Researchers*

ZONES OF DESTRUCTION, were a 500-kiloton nuclear warhead to explode over the Washington Monument, would cover hundreds of square kilometers around metropolitan Washington, D.C. The inner circle encompasses the area where most people would die from the immediate blast. The outer circle delimits the area where many more would perish from subsequent firestorms in built-up areas. The range of casualties would extend even farther.



A Prescription for Change

To reduce concerns that have driven Russia to maintain its missiles ready to launch on warning, the U.S. president should order the following:

1. Immediately remove to storage the warheads of the MX missiles (which will, in any event, be retired under START II).
2. Disable all Minuteman III missiles by having their safety switches pinned open (as was done for the Minuteman IIs in 1991). If Russia reciprocates, these missiles should be immobilized in a manner that would take much longer to reverse.
3. Remove to storage the warheads on the eight Trident submarines that are to be retired under START III and reduce the number of warheads on each remaining submarine missile from eight to four.
4. Take the W88 warheads off the Trident II missiles, place those warheads in storage and replace them with lower-yield weapons.
5. Allow Russia to verify these actions by using some of their annual inspections permitted by START I. Accept a greater number of inspections if Russia will also do so.
6. Put all U.S. ballistic-missile submarines at sea on a low level of alert, so that it would take at least 24 hours to prepare them to launch their missiles, and keep most submarines out of range of Russian targets. Consider ways to make these changes verifiable in the future and discuss possible reciprocal arrangements with Russian officials.

Even after these actions are taken, six submarines carrying up to 576 warheads would remain undetectable at sea, and the immobilized Minuteman IIIs could be destroyed only by a massive attack on about 500 silos.

In response to the U.S. initiative, the Russian president could order the following:

1. Remove the warheads from all 46 SS-24 rail- and silo-based missiles (which will, in any event, be retired under START II).
2. Immobilize all other silo-based missiles that are to be retired under START II.
3. Remove the warheads from the 15 ballistic-missile submarines most likely to be retired under the START agreements.
4. Place all ballistic-missile submarines (in port and at sea) in a condition such that their missiles could not be launched for at least 24 hours.
5. Disable the launchers of all truck-mobile ballistic missiles so that they cannot be activated for at least a few hours.

After these actions are taken, 128 to 400 warheads on two submarines will remain undetectable at sea, and nine to 18 SS-25 warheads on truck-mobile launchers will remain securely hidden in the field. In addition, about 2,700 warheads on silo-based ICBMs could be destroyed only by mounting successful attacks on some 340 missile silos. *—B.G.B., H.A.F. and F.N. von H.*

pacity and rationale for keeping missiles ready to fire on warning. Leaders would have to wait out any alarm of an attack before deciding how to respond, drastically reducing the risk of a mistaken or unauthorized launch.

We recognize that military leaders in the U.S. and Russia might insist on maintaining small portions of their current arsenals on high alert, perhaps hundreds of warheads each, until the other nuclear-weapon states—Britain, France and China—joined in adopting similar measures to reduce the readiness of their nuclear arsenals. But if the U.S. and Russia aspire to establish the highest possible standards of safety for their nuclear armaments, they should move as rapidly as possible to take all their missiles off alert and then follow with further steps to increase the time required to reactivate these weapons.

The ultimate goal would be to separate most, if not all, nuclear warheads from their missiles and then, eventually, to eliminate most of the stored warheads and missiles. To implement such an extensive program fully, the means for verification would have to be strengthened to ensure that every nuclear state would know whether another country was making nuclear missiles launch-ready.

Moving toward a global stand-down of nuclear arms will undoubtedly encounter strong resistance from those whose dominant fear remains a secretly prepared surprise attack. The design of procedures to take nuclear missiles off constant alert needs to take into account this already remote possibility. But these plans must urgently go forward to remove the much more immediate hazard—the mistaken or unauthorized launch of nuclear missiles. SA

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Further Reading

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