

# Short Fuse to Catastrophe

The Case for Taking Nuclear Weapons  
Off Hair-trigger Alert



Photograph © 1998 Paul Shambroom

A Joint Report of the Back from the Brink Campaign  
and the Project for Participatory Democracy

This is a joint report on de-alerting by Back from the Brink, a campaign working nationally and internationally with individuals and organizations to take nuclear weapons off hair-trigger alert, and the Project for Participatory Democracy, an initiative of the Tides Center. Paul Shambroom generously donated the use of his photographs.

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This is the ninth in a series of *Facing Reality* reports, preceded by:

*FACING REALITY: The Future of the U.S. Nuclear Weapons Complex*; a companion  
*Citizens' Guide to the Future of the U.S. Nuclear Weapons Complex*;

*BEYOND THE BOMB: Dismantling Nuclear Weapons  
and Disposing of their Radioactive Wastes*;

*Nuclear Weapons "CLEANUP:" Prospect Without Precedent*;

*OFFICIAL USE ONLY: Ending the Culture of Secrecy  
in the U.S. Nuclear Weapons Complex*;

*CITIZEN LAW ENFORCEMENT: Fighting Environmental Crime at Facilities  
of the U.S. Departments of Energy and Defense*;

*REPROCESSING: The U.S. Department of Energy's Wasteful,  
Dangerous Scheme to Resume Plutonium Separation*; and

*STOCKPILE STEWARDSHIP OF NUCLEAR WEAPONS: The Deal to Subsidize Nuclear Weaponers.*

Funding for this publication has been provided by the W. Alton Jones Foundation,  
The John Merck Fund, Rockefeller Financial Services, the Public Welfare Foundation,  
and the Project for Participatory Democracy of the Tides Center.

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Cover photograph: *Launch Control Center O-1 for Minuteman III missiles, Grover, Colorado. The two launch control officers' hands are shown on the launch switches of an upgraded Rapid Execution and Combat Targeting (REACT) console, which is now used for all U.S. land-based missiles.*

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***In 1995, long after the Cold War ended, Russia mistakenly identified a research rocket as a nuclear-armed missile targeting Moscow. Fearing that the United States had launched a surprise attack, Russia came within minutes of launching missiles at U.S. cities. Even now, the United States and Russia each keep more than 2,000 nuclear weapons on “launch-on-warning” alert.***

## Introduction

The cold, hard truth of the post-Cold War world is that the United States and Russia still court nuclear disaster. While talk of cooperation and financial investments has, for the most part, replaced the saber-rattling of the past, both countries still maintain thousands of nuclear weapons poised to be launched in minutes – a status known as hair-trigger alert. This launch-on-warning posture means that in a time of crisis or perceived attack, the president of either country has only minutes to make the most fateful of all decisions: whether to plunge the planet into nuclear war.

Both countries are pursuing policies that increase the danger of nuclear war by accident or miscalculation. To compensate for its decline in conventional military capabilities, Russia relies increasingly on a threat to use nuclear weapons. The United States is poised to try to develop a National Missile Defense system, that would inevitably increase Russia’s fear of losing its retaliatory ability, and in turn force it to rely more heavily on instant responses.

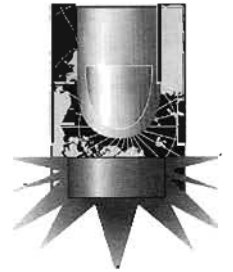
Ironically, at the highest levels of government, the United States fully understands this dangerous destabilizing effect. According to documents leaked to *The New York Times* (April 28, 2000), U.S. Undersecretary of State John Holum offered Russia a *quid pro quo*: if the United States deploys national missile defenses, Russia can keep its weapons on hair-trigger alert indefinitely.

The United States and Russia are like two gunslingers, each staring down the barrel of the ultimate weapon of mass destruction.

Each has his finger tensed on the trigger of a pointed gun, ready to shoot at the first sign that the other is firing. But what if a sign is misinterpreted? What if one gunfighter inadvertently moves his arm? The other might fire anyway, just in case.

But there is a difference between gunslinger shoot-from-the-hip showdowns and *nuclear High Noon*. In the world of nuclear weapons, whoever shoots first and aims right still loses. When one nuclear superpower launches its missiles, the other will retaliate immediately – leaving both countries in ruins, and the planet engulfed in deadly radioactivity. This is the essence of a launch-on-warning policy with nuclear weapons on hair-trigger alert. That is why it has always been called Mutually Assured Destruction (MAD).

This global peril led people from around the country to found **Back from the Brink: A Campaign to Take Nuclear Weapons Off Hair-trigger Alert**. The campaign, with the Project for Participatory Democracy, has published *Short Fuse to Catastrophe* to describe the perils of the nuclear hair-trigger alert posture and to detail the increased safety offered by concrete actions to verifiably de-alert all nuclear weapons. Although a full discussion of nuclear strategy, deterrence, and disarmament is beyond the scope of *Short Fuse to Catastrophe*, this report is based on a belief that keeping thousands of nuclear weapons on hair-trigger alert is a colossal accident waiting to happen, an accident the world cannot afford. This report recommends that the United States and Russia immediately take steps to back away from the Cold War policy of launch-on-warning.





## Nuclear Weapons on a Hair Trigger

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**Hair-trigger Alert:**  
*a state of military preparedness in which nuclear weapons are ready to fire within minutes of a launch order. Forces maintained in this posture are capable of firing on demand when warned of an apparent hostile attack. Hair-trigger alert increases the chance of a nuclear war caused by accident or miscalculation.*

Most people believe that, with the United States and Russia no longer enmeshed in Cold War hostility, a nuclear holocaust is not possible. The presidents of the United States and Russia have assured us that nuclear weapons were “de-targeted” and are now aimed at the oceans. What we have not been told is that these weapons of mass destruction can be re-targeted at U.S. and Russian cities with a few keystrokes at a computer terminal and launched at a moment’s notice, leaving no meaningful time to consider whether an actual attack has begun or whether it is a false alarm.

The United States and Russia are still mired in Cold War-era thinking: they have not stopped preparing to fight a nuclear war. Just as they did during the Cold War, both countries strive to maintain the ability to launch massive numbers of nuclear weapons on warning; that is, to fire their missiles *after* detecting an apparent hostile attack but *before* the arrival of enemy warheads. The United States and Russia each have about 2,000 nuclear weapons on hair-trigger alert status—the equivalent of 100,000 Hiroshima bombs ready to be launched in minutes.

Consider the present-day U.S. launch sequence for nuclear missiles. Current procedures require the duty commander at the North American Aerospace Defense Command (NORAD) in Colorado, the hub of the U.S. early warning network, to judge the validity of missile attack indicators within minutes after receiving an initial report from sensors in space or on the ground. Then the duty commander at Strategic Command in Omaha has about 30 seconds to brief the President on his options and their consequences. The President has only eight minutes to make the decision whether to fire U.S. missiles in retaliation. Once a launch order is given, launch crews in the field decode and validate the order, activate wartime targets in the missile’s memory (immediately overriding the de-targeting pact), send arming codes to the missiles, and launch them—all within about three minutes in the case of land-based missiles, and in about 15 minutes in the case of submarines.

The timeline to launch on the Russian side is even tighter. U.S. strategic nuclear submarines are typically on patrol close to major Russian cities and missile bases, and the distance (and therefore time) between launch and target is very short.

### Alert Status of Warheads in the Nuclear-armed Nations

Country	Total Arsenal*	Warheads on a Hair Trigger**
Britain	185	0
China	400	0
France	450	0
Russia	20,000	1,960
United States	10,500	2,400

\* An estimated 50% of Russian warheads are active; the rest are retired or in reserve. About 20 of China’s warheads have enough range to reach the United States, but even those cannot be maintained on high alert.

\*\* Britain’s warheads are all on submarines, de-alerted to a preparation time of about 18 hours. French warheads would require several hours to launch. China would require one or several days to prepare its warheads for launch.



## The Countdown to Catastrophe

RUSSIA	Minutes	UNITED STATES	Minutes
Total flight time for U.S. submarine-launched missiles to reach their Russian targets.	10	Total flight time for Russian land-based missiles to reach their U.S. targets.	25
Time available for Russian military to decide that a U.S. attack has begun and to prepare missiles for launch.	- 7	Time available for U.S. military to decide that a Russian attack has begun and to prepare missiles for launch.	- 17
Time remaining for Russian President to decide whether to order a missile attack against the United States.	= 3	Time remaining for U.S. President to decide whether to order a missile attack against Russia.	= 8



NORAD Commander in Chief's seat in "Battle Cab" - North American Aerospace Defense Command, Cheyenne Mountain Complex, underground attack warning command center, Colorado Springs, CO.

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*“Six minutes to decide how to respond to a blip on a radar scope and decide whether to unleash Armageddon! How could anyone apply reason at a time like that?”*

Former U.S. President  
 Ronald Reagan  
*An American Life,*  
 1990

Photograph © 1993 Paul Stanbroom



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“No one can guarantee the reliability of our control systems.... Russia might soon reach the threshold beyond which its rockets and nuclear systems cannot be controlled.”

Former Russian Defense Minister Igor Rodionov, 1997

Within minutes, the United States and Russia could launch 4,000 to 5,000 strategic warheads, wreaking utter devastation. Such massive strikes are still important options in both countries' strategic war plans. The U.S. nuclear war-fighting plan, for instance, includes strikes against up to 2,300 targets in Russia including 1,000 Russian nuclear weapons sites, and several hundred targets in China. In addition, the plan calls for dropping nuclear weapons on about 500 units of the Russian conventional army, 500 factories in Russia's deteriorating industrial economy, and nearly 200 so-called national leadership targets.

Dramatic political changes in Russia have had no discernible effect on U.S. war plans. The danger of nuclear war is still with us. With nuclear weapons on a hair trigger, and with increasing chances of misreading the other country's intentions, a blip on a radar screen could turn into nuclear Armageddon.

The danger of nuclear war in this environment is far from theoretical. In 1995, more than five years after the fall of the Berlin Wall, Russia was minutes away from launching an all-out nuclear war by mistake. On January 25, the United States and Norway fired a research rocket from an island off Norway's northwestern coast, which borders Russia's northern Arctic coastline. The Russian radar image of the four-stage rocket resembled a U.S. submarine-launched, multi-stage ballistic missile, and the Russians thought they were under attack. For the first time ever, the electronic case used to order missile launches was activated for emergency use. President Boris Yeltsin was within minutes of ordering what he thought would be a retaliatory attack on the United States when a radar crew saw that the research rocket was headed out to sea.

A U.S. notification about the benign rocket launch had not made it through the Russian chain of command to its early warning personnel. Because of the continuing U.S. and Russian adherence to a so-called use-them-or-lose-them high-alert policy, that simple error almost led to a nuclear exchange. It was, as far as we know from public information, the closest the world has come to all-out nuclear war since the 1962 Cuban missile crisis. But in contrast to that near-disaster, when the U.S. and Soviet governments deliberated for days

over questions of global life and death, the 1995 crisis developed in minutes, unknown to all but a few Russian military and civilian leaders. Had even a handful of nuclear warheads been used, the effect would have been devastating.

Fortunately, Russian satellites and radar were in relatively good working order in 1995, and the research rocket's flight path was plotted correctly. President Yeltsin got the correct information in time, and the order to launch was averted. But since 1995, Russia's early warning systems have deteriorated dramatically. The problem was highlighted recently by the Institute of Electrical and Electronic Engineers:

Perhaps more alarmingly, Russia's network of missile-launch warning satellites is also collapsing. A full constellation needs 21 satellites, but as of mid-1999, only three were left, the last of which had been launched in 1997. On average, the surviving payloads provide only "single-string" coverage, meaning there is no possibility of a launch warning being confirmed by another satellite. And even that single-string coverage exists only for about half of every day. Six new satellite launches are required to resume 24-hour coverage, but neither the payloads, nor the boosters have been funded.

("Russia's Sorry Infrastructure," James Oberg, *IEEE Spectrum*, December 2000)

In other words, the risk of inadvertent nuclear war is much higher than it was in 1995. A heightened sense of vulnerability, lack of accurate information, and nuclear weapons on hair-trigger alert could turn political stresses into an immense catastrophe.

Historically, times of tension (such as the Suez crisis in 1956, the Iran hostage crisis of 1979-80, and high U.S.-Soviet tensions during the early 1980s) have increased the frequency of nuclear false alarms.

Serious disagreements between the United States and Russia are likely to persist. For instance, differences over NATO expansion, the December 1998 U.S.-British bombing of Iraq, and the 1999 NATO-Yugoslavia war developed long after the end of the Cold War. If the United States decides to deploy missile defenses without an agreement with Russia, far-reaching tensions might rise again.

Bilateral tensions are made even more dangerous by Russia's domestic situation. During the past decade, Russia's economy and society have been under extreme stress. In addition to its early warning satellite system being blind nearly half the time, resource scarcity and low or nonexistent pay have led to poor military morale and rapid deterioration of Russian nuclear weapons command and control systems. Russia's military vulnerability is increased because few if any of its nuclear submarines are seaworthy, and most of its mobile long-range nuclear missiles are vulnerable to a U.S. surprise attack.

It would be wrong to conclude that Russia has been responsible for all the close calls. The United States has had its share of errors as well. U.S. missiles and aircraft have prepared for immediate retaliation against perceived massive Soviet nuclear attacks that were later traced to problems such as a single faulty computer chip or the misinterpretation of a computerized nuclear war training exercise as the real thing. In all, perhaps a dozen close calls have arisen from the thousands of false

alarms in the two countries since the 1960s. Maintaining weapons on high alert increases the likelihood that a close call will become a disaster.

The standard rationale for keeping nuclear weapons on hair-trigger alert is that it deters a deliberate, cold-blooded massive attack. But we have long known that such deterrence can be achieved by far smaller arsenals on far lower levels of alert. In fact, perpetual readiness to launch thousands of nuclear weapons itself creates a pervasive and constant danger. The way to increase both national and international security is for the United States and Russia to slow the process of launching their nuclear weapons by taking them off high alert. This would be like putting safety locks on nuclear weapons so they can't be fired accidentally, illicitly, or because of technical failure or human error, particularly in times of internal political and military turmoil. By de-alerting their nuclear arsenals, the United States and Russia can increase mutual confidence that neither will launch a suicidal surprise attack.

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*We have long known that deterrence can be achieved by far smaller arsenals on far lower levels of alert.*



Photograph © 1998 Paul Stambroom

*Minuteman III missile installation - with Transporter Erector Vehicle, silo J-6, Peetz, Colorado.*



## The Effects of a Relatively Small Nuclear Attack

In the table, it is assumed that eight U.S. urban areas are hit: Atlanta, Boston, Chicago, New York, Pittsburgh, San Francisco, Washington, DC, and Seattle – four with four warheads and four with eight warheads. Each warhead is 100 kilotons. We also assume that the targets in these areas have been selected according to standard military priorities: industrial, financial, and transportation sites, and other components of the infrastructure that are essential for supporting or recovering from war. Since low-altitude bursts are required to ensure the destruction of structures such as docks, concrete runways, steel-reinforced buildings, and underground facilities, most if not all detonations will cause substantial, immediate fallout.

### Predicted Immediate Deaths from Firestorm after Nuclear Detonations in Eight U.S. Cities

City	Number of Warheads	Number of Deaths
Atlanta	8	428,000
Boston	4	609,000
Chicago	4	425,000
New York	8	3,193,000
Pittsburgh	4	375,000
San Francisco Bay Area	8	739,000
Seattle	4	341,000
Washington, DC	8	728,000
<b>Total</b>	<b>48</b>	<b>6,838,000</b>

Source: *The New England Journal of Medicine* – April 30, 1998 – Vol. 338, No. 18.

NOTE: The above table is from an analysis published in *The New England Journal of Medicine* (April 30, 1998) and is available through the Physicians for Social Responsibility website at: <http://www.psr.org/consequences.htm>. We know of no comparable study involving Russian cities, but the effects of a small U.S. attack on Russia would be similar. Two additional points should be noted: first, the estimated death tolls include only immediate fatalities near the nuclear blasts, omitting the inevitably higher numbers of lingering deaths from radiation, burns, and disease that would overwhelm the entire U.S. medical system; second, this devastation would result from the use of only about one percent of the explosive power in Russia's nuclear arsenal.

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*Detonation of about one percent of the Russian arsenal could cause nearly seven million immediate deaths in the United States.*





Photograph © 1992 Paul Stambaugh

*Peacekeeper Missile Warheads - W87/Mk-21 re-entry vehicle storage, F. E. Warren Air Force Base, Wyoming. Each warhead has an estimated 300 kiloton yield, about 20 times the explosive power of the Hiroshima bomb.*

## The Road to Mutually Assured Security

If nuclear weapons are not on hair-trigger alert, our leaders will have more time to make the most accurate assessment of any possible nuclear threat. De-alerting will decrease dramatically the chance that nuclear weapons will be launched because of a technical error or a human mistake.

By eliminating the possibility of a massive surprise attack, de-alerting would also go far toward reducing the chance of an overreaction to a false alarm. The time required to prepare an attack and, in many cases, the number of people involved in physical preparations, would provide a safety buffer, allowing decisions to be reversed or conflicts resolved before all-out nuclear war.

There are no particularly difficult technical challenges to de-alerting weapons systems, and the military performs many of the necessary steps as part of customary arsenal management. Specific, feasible ways to de-alert nuclear warheads include:

- pinning open the switches of missile motors so they cannot be started by remote electronic command;
- taking launch keys away from missile officers so they can't act independently;
- shutting off missile launch circuits;
- deploying submarines out of range of their targets;
- removing warheads from delivery systems, storing them, and putting them under international monitoring;
- reducing the yields of all warheads by removing components known as tritium bottles and storing them separately.

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*De-alert: to lengthen the time needed to launch nuclear weapons. It can be accomplished through technical modifications and changes in the Cold War policy of launch-on-warning.*

*Unlike the incalculable damage from a nuclear war, de-alerting is reversible.*



## One De-alerting Option: Removing Tritium Bottles

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“For two nations at peace, keeping so many weapons on high alert may create unacceptable risks of accidental or unauthorized launch.”

George W. Bush,  
Governor of Texas  
May 23, 2000

*The following explores in detail one of the methods noted in this report for de-alerting nuclear weapons by making them relatively unusable for an overwhelming surprise attack.*

A key motive for continuing a launch-on-warning posture is fear of a massive first strike. Removing the cause of that fear can be a de-alerting step. Since most Russian submarines are in port while most U.S. submarines can easily hide at sea, Russia may fear a first strike from the United States and refuse to de-alert its land-based strategic weapons. One way to lessen such fears while retaining the capacity for retaliatory deterrence would be to substantially reduce the yields of all warheads of both countries. That way, no matter how warheads were based or deployed, neither would have warheads that could be used in a silo-busting first strike. But the residual yield of the warheads could be great enough that it would still pose a severe threat of retaliatory damage.

Modern nuclear warheads have a primary fission component whose power is boosted by a small amount of a mixture of tritium and deuterium, which are two isotopes of hydrogen gas (tritium is radioactive, deuterium is not). The mixture is kept in a bottle, commonly called the tritium bottle, screwed into the warhead.

If tritium bottles were removed from all nuclear warheads, yields would be reduced from as much as hundreds of kilotons to between a few hundred tons and a few kilotons of TNT equivalent. For comparison, the bomb that destroyed the Alfred P. Murrah building in Oklahoma City was far smaller—equivalent to five tons of TNT, or 1/200 of one kiloton. Strategic warheads capable of silo-busting first strikes may have yields of hundreds of kilotons.

Reducing the yields of warheads to roughly one kiloton would leave an enormous retaliatory capacity, since a thousand or more weapons would still be in place, even after the largest reductions that have been discussed to date between the United States and Russia. The accuracy of the warheads would be maintained, so the threat of damage from the remaining yield would be substantial.

Since tritium gas is radioactive, it can be monitored relatively easily. Bilateral monitoring of tritium would ensure that neither country could carry out a surprise first strike, yet both would have a retaliatory capacity. If both the United States and Russia would declare how and when their reactors and other nuclear materials production facilities have operated over time, it would be possible to calculate cumulative tritium production and compare it with the stored amounts (adjusted for radioactive decay) with a reasonable amount of confidence. Any new production would also have to be mutually verified. Since hiding some tritium would not enable the perpetrator to carry out a massive first strike, the incentive to cheat with this de-alerting option is essentially nil.

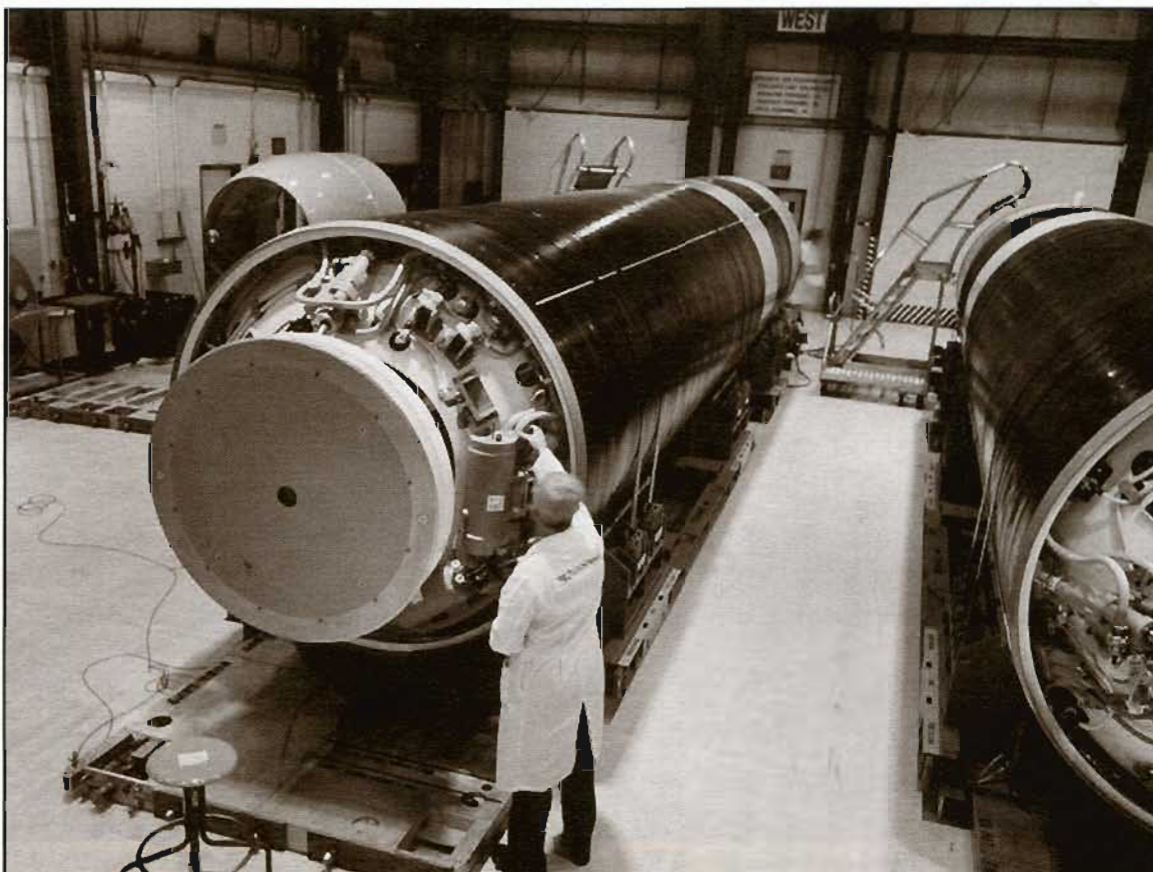
Tritium bottles can be removed from the warheads in the field, and a warhead can remain deployed while this de-alerting measure is carried out. This takes a very short time, since the bottle can simply be unscrewed and removed. Therefore, de-alerting by tritium bottle removal is quite distinct from warhead removal. It is also compatible with a number of other measures for lengthening decision-making and firing times, such as pinning open missile motor switches or removing guidance sets. Verification would be enhanced if the tritium bottle removal and storage were carried out under bi-lateral monitoring arrangements.





Photograph © 1992 Paul Shanbroom

*Blast Door - Minuteman II missile underground Launch Control Center N-1, Newell, South Dakota. The Minuteman IIs in this Air Force wing were decommissioned and the silos destroyed by START treaty agreement. Other Minuteman IIs have been replaced by Minuteman III and Peacekeeper missiles.*



Photograph © 1994 Paul Shanbroom

*Missile Assembly - Trident II (D5) submarine-launched ballistic missiles being assembled at Naval Submarine Base, Kings Bay, Georgia.*



## A Precedent for Action

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*“American and Russian nuclear missiles are still maintained in a hair-trigger alert status, susceptible to being launched in a spur-of-the-moment crisis or even by accident.”*

Former U.S. President Jimmy Carter  
*The Washington Post, February 23, 2000*

Taking nuclear weapons off hair-trigger alert could be initiated unilaterally by the United States in order to encourage reciprocal de-alerting measures by Russia. The actions taken by President George Bush in August 1991 provide a compelling precedent for careful calculation to reduce nuclear risks.

An attempted coup in the Soviet Union had raised serious questions about who, if anyone, was in charge of the Soviet nuclear arsenal. Thousands of Soviet nuclear weapons were in far-flung locations, and many were in areas that were soon to become independent states. Moreover, internal turmoil increased the danger that small tactical nuclear weapons might be stolen and sold on the black market. There was no time to negotiate treaties.

In perhaps the boldest single step to reduce nuclear dangers in the entire nuclear era, former President Bush unilaterally removed thousands of U.S. tactical nuclear

weapons from deployment and ordered the de-alerting of 450 Minuteman missiles. He ordered all U.S. strategic nuclear bombers taken off high alert. President Mikhail Gorbachev reciprocated in about one week. This set of unilateral, reciprocal measures helped avert the threat of so-called loose nukes at a time of crisis in the Soviet Union. Without these steps, thousands of nuclear weapons might have remained in countries that left the Soviet Union after December 1991.

The actions taken by presidents Bush and Gorbachev in 1991 help point the way to greater security today. The first steps can be unilateral and might only lengthen firing times by several hours or days. Some of the easier measures to implement, such as pinning open missile motor switches, could be used to initiate the process. As verification measures come into effect and both sides grow more confident that a surprise attack won't occur,



Photograph © 1995 Paul Sharrbroom

**B83 Nuclear Gravity Bombs** - Barksdale Air Force Base, Louisiana. Each aircraft-delivered bomb has an estimated one-megaton yield, roughly 65 times the explosive power of the Hiroshima bomb. All U.S. nuclear warheads carried by bombers were de-alerted in the early 1990s.



the time needed to put weapons back on alert can be lengthened even further.

How would taking weapons off hair-trigger alert affect the U.S. ability to respond to an attack? It would only affect the time required for launching warheads and, taken alone, would have no effect on the size of the nuclear arsenal, on the vulnerability of individual weapons, or on the U.S. capability for responding to an attack. In fact, an arsenal more than adequate for devastating retaliation could be kept entirely on submarines, the most invulnerable weapons system available. Moreover, de-alerting could be reversed if the world situation changes again.

Permanent reductions in nuclear arsenals would still be the province of formal strategic arms negotiations. But arms reductions operate too slowly to address the dangers of mistaken or unauthorized launch. For instance, the strategic arms reduction treaty known as START II was signed in 1993 but is not due

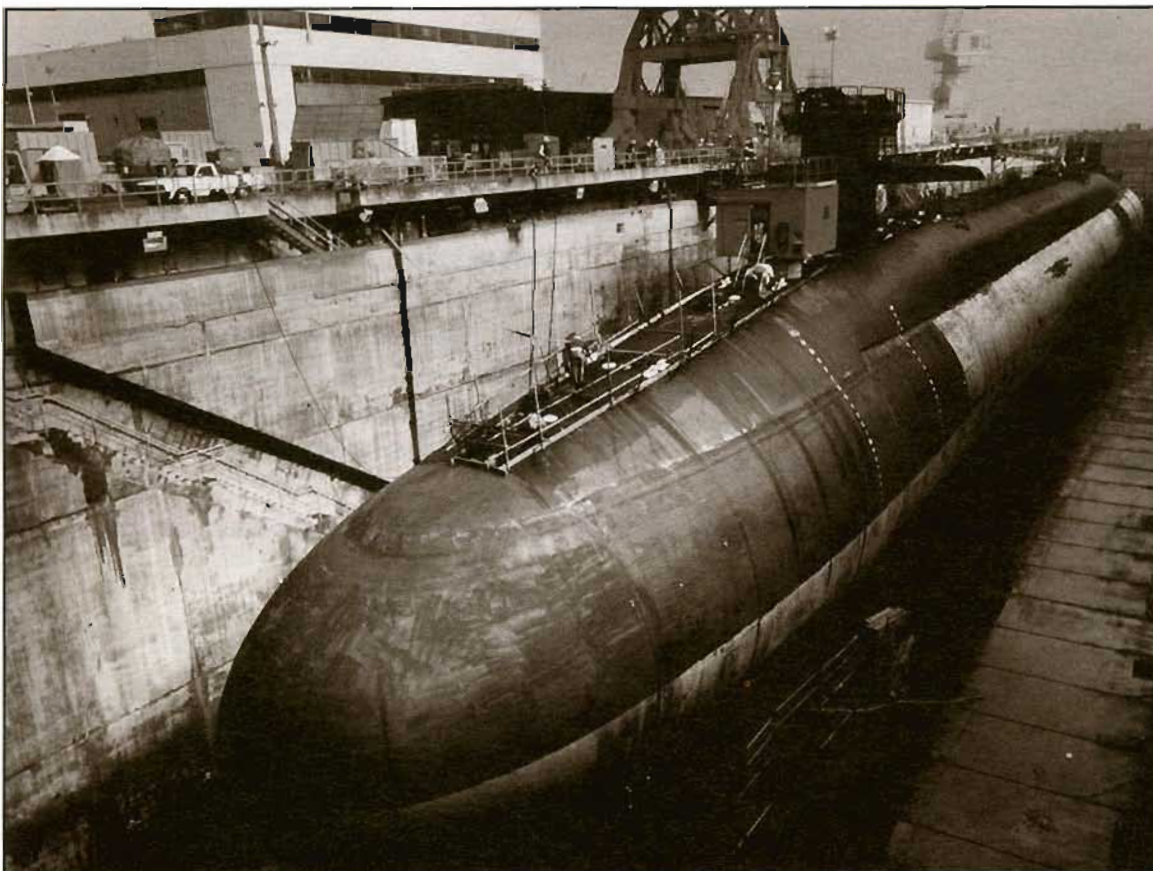
to be fully implemented until 2007 (and only if both sides agree to the conditions that the legislatures of the United States and Russia set during ratification). In the meantime, the danger of accidental nuclear war continues to increase, primarily because of continuing deterioration in Russia's infrastructure.

De-alerting nuclear weapons is a measure of faith that human beings will cooperate to remove an obvious and imminent threat, and that leaders of powerful states with huge nuclear arsenals will want to increase the safety of their own people. And while de-alerting could constitute a step towards disarmament, it does not require disarmament.

De-alerting reduces clear and present dangers that advocates of nuclear weapons and advocates of nuclear weapons abolition can agree upon. No one can look at the world and ignore the history and the current peril of all-out nuclear war by miscalculation or accident.

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*De-alerting nuclear weapons is a measure of faith that human beings will cooperate to remove an obvious and imminent threat, and that leaders of powerful states with huge nuclear arsenals will want to increase the safety of their own people.*



Photograph © 1992 Paul Shanbroom

*Trident Nuclear Missile Submarine - USS Alaska in drydock for refit, Bangor Naval Submarine Base, Washington.*



## Reducing the Risks of Nuclear War

De-alerting can reduce the risks of each of the three most likely causes of a nuclear weapons exchange:

### **Technical error**

Nearly all of the close calls with nuclear war have grown from failures in early warning systems, faulty electronics or communications, or human error. A nuclear attack stemming from such errors might be termed “inadvertent” or “accidental,” but would be no less devastating. A nuclear weapons system, particularly one that can be used on a few minutes’ notice, relies on complicated electronic instruments, computers, and software – all run by fallible human beings.

We can never anticipate every possible kind and combination of error or failure. Verified de-alerting of nuclear weapons would dramatically reduce the likelihood of inadvertent nuclear war by making a massive surprise attack virtually impossible (thus eliminating the rationale for launch-on-warning), by shifting some of the current dependence on early warning systems to more reliable routine surveillance and periodic inspections, and by providing hours or days, rather than minutes, for identifying mistakes.

### **Unauthorized use**

While past experience suggests that an unauthorized launch by a rogue commander is less likely than an inadvertent one,

the possibility remains, particularly in times of international tension.

To help prevent an unauthorized attack, missile launch codes are supposedly accessible only to top national leaders. However, short decision times and the possibility that national leaders could be killed in the first moments of conflict mean that some launch authority has been distributed to lower ranks. A submarine captain or missile base commander, with some cooperation from a few officers, would probably be capable of launching an attack.

De-alerting would greatly reduce the risk of unauthorized use by requiring more people and more time to prepare a missile launch than are needed now.

### **Deliberate attack**

During the Cold War, the United States and the Soviet Union built tens of thousands of nuclear weapons, with the stated purpose of deterring each other from using those arms through a guaranteed retaliatory capability. This policy of Mutually Assured Destruction was the basis for placing thousands of warheads in a launch-on-warning status, where they now remain.

De-alerted nuclear arsenals would mean longer launch decision times, even in periods of high international tension, which would allow more room for diplomatic consultation and negotiation.

.....  
*Nearly all of the close calls with nuclear war have stemmed from failures in early warning systems, faulty electronics or communications, or human error.*



## Getting from Here to There: Specific De-Alerting Steps

The United States could lead the way toward confronting the increasing threat of accidental nuclear war. It should do so. It has the strongest military forces on earth. Its ability to detect changes in weaponry far surpasses Russia's, both because Russian weapons are more easily observable and because the United States possesses far greater reconnaissance capacity. A well-integrated policy and practical modifications could result in the verified de-alerting of all nuclear weapons. One favorable sequence might be:

**Step 1** The United States realistically assesses its entire alerted, deployed arsenal. Even an 80-percent reduction from the current U.S. arsenal of more than 2,000 fully alerted warheads would maintain a wide margin of overkill. As it reduces its ready-to-launch arsenal, the United States calls upon Russia to make similar reductions. Russian President Vladimir Putin has already suggested deeper nuclear arms reductions than the United States has considered officially.

**Step 2** The U.S. President initiates de-alerting by ordering that all U.S. ballistic missile submarines assume a low level of alert. The four U.S. submarines currently on 15-minute notice-to-fire (two in the Atlantic and two in the Pacific) adopt the same low-level alert stance as the other eight U.S. submarines routinely kept at sea. Submarines are deployed out of range of their targets, where they periodically surface for observation by satellites or aircraft. Vital components from their missiles are removed and stored onboard. The U.S. President invites Russia to reciprocate.

**Step 3** The smaller U.S. retaliatory arsenal is allocated entirely to submarines, and all land-based nuclear missiles are fully de-alerted by such measures as shutting off their launch circuits and detaching their warheads. Many of the warheads are stored in nearby empty silos where they are monitored. (U.S. strategic bombers have been de-alerted, but without explicit international monitoring, and bomber crews still train with live nuclear weapons.)

**Step 4** The presidents of the United States and Russia eliminate launch-on-warning from the repertoire of options in their countries' war plans and immediately order changes in command systems and emergency war order procedures, thus doing away with the need for weapons on hair-trigger alert.

**Step 5** Both presidents engage the other nuclear powers (China, Britain, and France) in establishing a full-scale de-alerting and verification regime and agree to put their entire arsenals under international observation on the condition that the other nuclear powers follow suit in a transparent manner. At this stage, they also engage the three undeclared nuclear weapons countries: India, Israel, and Pakistan.

There are many other ways that the United States and Russia might proceed to reduce the threat of nuclear war. For instance, land-based missiles could be de-alerted first or the United States could immediately de-alert all the nuclear weapons that would be dismantled under proposals for the START III arms reduction treaty, and invite Russia to do the same.

.....  
*"The risk of accidental launch would evaporate in an environment in which warheads and missiles were de-mated and preferably widely separated in location."*

General George Lee Butler (USAF, ret.),  
Commander of U.S. strategic nuclear forces,  
1992-94  
*Bulletin of the Atomic Scientists,*  
January-February 2000



## The Role of Submarines

De-alerting warheads on submarines at sea poses special though not insurmountable challenges. Alert status can be reduced while retaining retaliatory capacity, and verification measures can increase mutual confidence that there will be no surprise first strike.

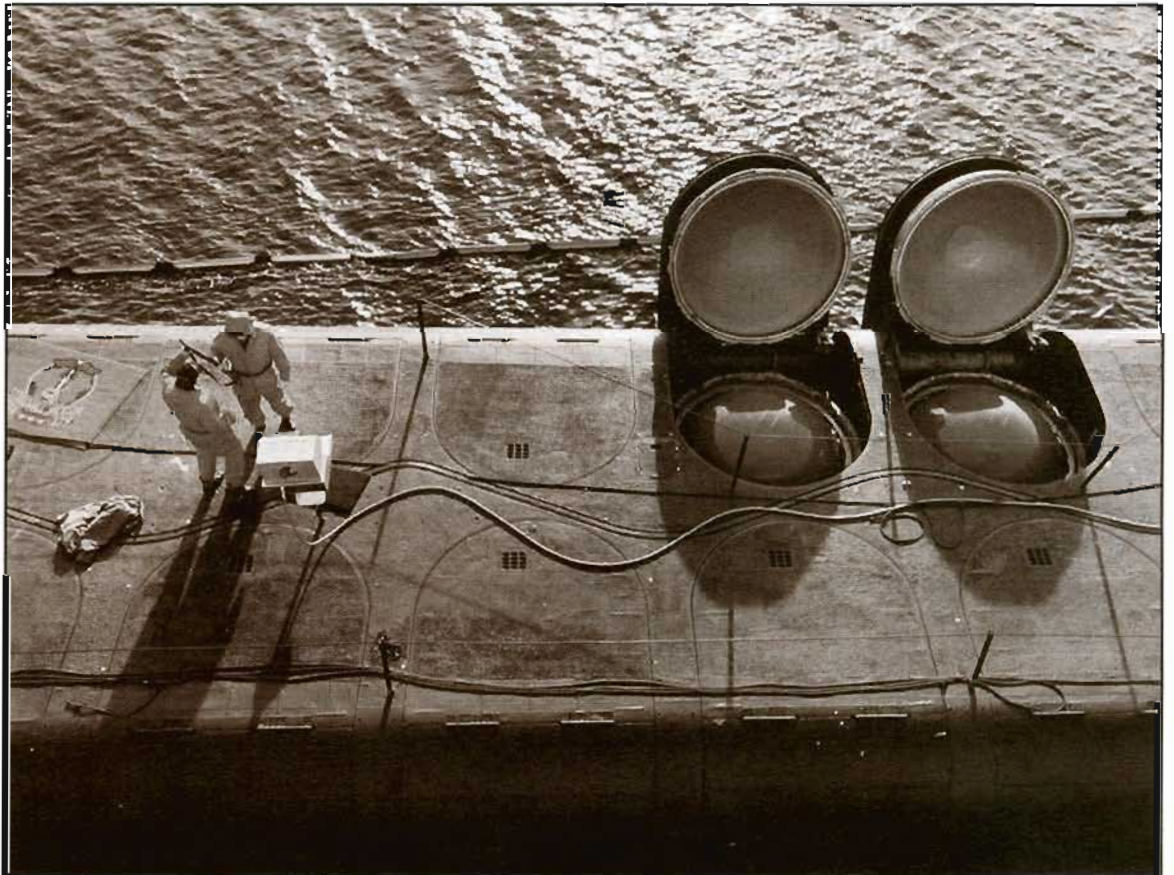
Most U.S. strategic nuclear weapons are in underground silos or on submarines. U.S. submarines have highly accurate warheads that could be used in a surprise attack. Since submarines can be hidden at sea and are invulnerable, they also constitute the most secure means of retaliation. A country with invulnerable weapons is less likely to over-react to indications that it is under attack.

In contrast, most Russian warheads are in silos or on mobile, land-based missiles on trucks or trains. Russia simply cannot afford to keep many of its submarines at sea, and most or all remain in port. Although some Russian submarines in port have open launch tubes with missiles ready to fire, they remain

vulnerable to attack. Russia's fuel and parts shortages also keep most of its mobile missiles in vulnerable fixed locations.

Russia's exposed position has been further eroded by new generations of U.S. submarine-launched ballistic missiles (SLBMs) with longer range, greater accuracy, and more explosive power. To Russia these missiles appear to be first-strike weapons, for they might plausibly be used in a surprise attack. As the 1995 crisis demonstrated, Russia is keenly concerned about the ability of U.S. submarines to fire their missiles from positions close to the Russian heartland. U.S. submarines increase the apparent threat and reduce Russia's response time.

If Russia were to de-alert its strategic weapons, the safety and security of the people of the United States would increase greatly. However, Russia is not likely to do this if the United States is capable of launching a surprise attack from the deep oceans.



Photograph © 1994 Paul Shambrum

*Poseidon Nuclear Missile Submarine - USS Stonewall Jackson, with two missile tubes open, Naval Submarine Base, Kings Bay, Georgia. This submarine class has been replaced by the Trident.*

.....  
*“Our national security will not be endangered by leaders having two days, rather than two minutes, to make life-and-death decisions about nuclear war.... We should seriously explore the possibility of the United States and Russia standing down all forces from hair-trigger alert.”*

U.S. Senator Bob Kerrey (D-NE),  
Council for Foreign Relations,  
November 17, 1998





Photograph © 1994 Paul Shumhroom

Trident Submarine Nuclear Missile Fire Control Trigger - USS West Virginia, Naval Submarine Base, Kings Bay, Georgia.

.....  
“The United States should make it the most urgent national public health priority to seek a permanent, verified agreement with Russia to take all nuclear missiles off high alert and remove the capability of a rapid launch.”

*The New England Journal of Medicine, April 30, 1998*

## De-alerting Submarine-based Weapons

A realistic path to mutual security is:

**1:** The force of U.S. submarines kept at sea is reduced from about a dozen ships to five or six, and these submarines patrol in parts of the ocean far from Russia. The number of missiles per submarine is reduced from 24 to 12.

**2:** Crucial SLBM electronic components such as guidance systems are removed, stored onboard, and electronically sealed. Reinstalling these components in one submarine requires about 18 to 36 hours.

**3:** For verification purposes, on a rotating basis, individual submarines surface or release a radio buoy to send an encrypted signal (using codes provided

by Russia) proving that the electronic component seals have not been broken. These transmissions also demonstrate that the submarines have not left their remote patrol areas.

**4:** After Russian forces have been verifiably de-alerted, the United States takes one or more steps to further lengthen nuclear launch time. For example, all the warheads could be removed from missiles and stored in empty launch tubes in the same submarine. The warheads could be reinstalled if necessary, but not without surfacing, and only in calm seas or a sheltered harbor. This operation would be time-consuming and readily observable.



## Broader Nuclear Risk Reduction

Removing all nuclear weapons from hair-trigger alert would do more than increase public safety and reduce the danger of accidental war. It would also increase the political, legal, and moral standing of the United States and Russia to pursue nuclear risk reduction in other arenas.

De-alerting would go a substantial way toward fulfilling long-standing commitments to disarmament that the nuclear weapons states made to non-nuclear weapons states through the Nuclear Non-Proliferation Treaty (NPT), first in 1968, and again in 1995 and 2000. In the global consensus document adopted at the sixth Review Conference of the NPT in May 2000, the nuclear weapons states, including the United States, unanimously agreed to reduce the alert status of their nuclear weapons. By actually taking de-alerting steps, the United States would increase its credibility in dealing with issues of nuclear proliferation, particularly in its efforts to dissuade countries in South Asia, for instance, from deploying nuclear weapons or putting them on high alert.

By de-alerting their nuclear missiles, the United States and Russia would also downgrade the importance of nuclear weapons by more clearly defining them as instruments of last resort. In recent years, the majority of the world's countries that are non-nuclear signatories of the Nuclear Non-Proliferation Treaty have demanded de-alerting as a vital step in reducing the importance of nuclear weapons.

### Verification

Policies and technical procedures to verify de-alerting are absolutely essential to building mutual confidence and ensuring that increases in security are real and enduring. The United States and Russia have a wealth of successful experience in verifying nuclear arms control during the almost four decades since the 1963 Partial Test Ban Treaty. The Intermediate Range Nuclear Forces Treaty of

1986 required the United States and Russia to destroy all of their medium-range nuclear missiles. Since the end of the Cold War, the US-Russian cooperative threat reduction program to protect Russian nuclear weapons and nuclear materials has provided more experience with on-site monitoring and security upgrades at nuclear facilities.

Verification of de-alerting can build on these regimes developed for nuclear testing and arms reduction treaties and agreements. Many de-alerting measures can be verified through long-established external surveillance methods such as satellite reconnaissance, round-the-clock video monitoring, and smart electronic seals. Technical verification can be complemented with on-site inspections and monitoring teams.

Measures to de-alert nuclear missiles differ in their ease of verifiability. Pinning open missile motor switches can be accomplished within a few days, but it is relatively difficult to monitor. The missile launch procedures on British Trident submarines (which are essentially the same as the submarines in the U.S. fleet) have been lengthened to 18 hours, but these procedures can be shortened on demand and cannot be verified under current international arrangements. As de-alerting becomes multilateral, verification measures can be made more thorough and transparent, making reversal to high-alert status less likely and more readily detectable.

Verification options include:

- Store warheads away from their delivery systems so international observers could simply monitor storage sites.
- Store warheads, guidance systems, or other vital components of nuclear weapons apart from missiles and electronically tag and equip them to automatically signal their status and location.
- Remove tritium bottles from all warheads. Tag tritium stores and put them under bilateral monitoring, reducing the likelihood of a surprise first strike.

.....  
*“De-alerting would create a judicious delay in the capacity for launch in order to assure more reliable control over nuclear weapons, to reduce daily tensions, and to strengthen mutual confidence in each other’s nuclear intentions.”*

Former U.S. Senator Sam Nunn and Bruce G. Blair, Center for Defense Information, *The Washington Post*, June 22, 1997



## The International Picture

- Station submarines at sea out of range, with one of them surfacing at a time to demonstrate that it is still out of range. The others would remain hidden. The frequency of surfacing would depend largely on how far out of range the submarines were positioned.
- Remove power batteries from nuclear warheads and put them under bi-lateral monitoring in a manner similar to the separation of tritium bottles or warheads from their delivery systems.
- Establish citizen verification measures with the results made public to increase the confidence of citizens of all countries.

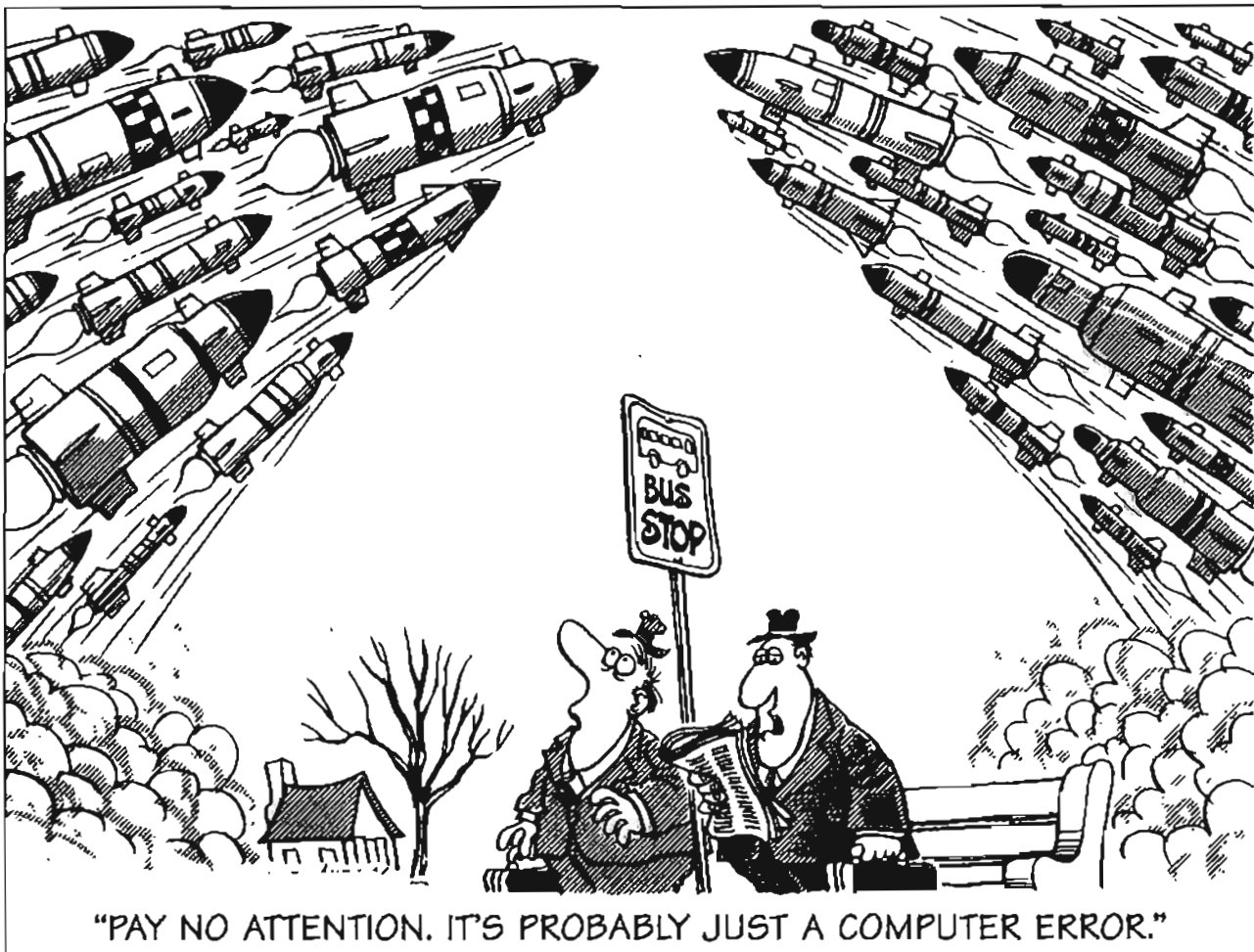
For nearly forty years, the United States and Russia have developed and refined the technologies that will be needed for verifying the alert status of nuclear weapons. We now need the political will to establish a verifiable – and verified – de-alerting regime.

The United States and Russia appear to be the only nuclear powers to keep their missiles on hair-trigger alert, and they have by far the world's largest nuclear arsenals. Britain, China, and France have all assumed a *de-facto* de-alerted posture.

France has taken unilateral steps to reduce the alert status of its nuclear weapons. In response to the end of the Cold War, it withdrew and dismantled its short- and intermediate-range, land-based nuclear missiles. France has also reduced the number of ballistic missile submarines at sea from three to two, and it keeps its subs on lower alert levels than does the United States. Whereas U.S. missile submarines on combat patrol are prepared to fire within 15 minutes of receiving an order, the reaction time of France's subs is apparently hours rather than minutes. France also lowered the alert status of its Mirage IV nuclear bombers in 1996.

.....  
*“As we seriously review stockpile size, we should also consider stepping back from the nuclear brink by de-alerting.”*

Senator Pete Domenici  
(R-NM), Chairman of  
Energy and Water  
Appropriations  
Subcommittee,  
November 1997



.....  
*“We in the United States cannot at once hold sacred the mystery of life while we retain the capacity to destroy it.”*

General George Lee Butler (USAF, ret.), Commander of U.S. strategic nuclear forces, 1992-94

In July 1998 the British government announced in its Strategic Defense Review that it was lengthening the launch time of its nuclear missiles. Great Britain’s nuclear arsenal is now housed only on Trident submarines, and its missiles’ “notice to fire” status is 18 hours rather than the few minutes maintained throughout the Cold War. Britain has thus lengthened the launch time for these forces considerably compared to the United States or even France. However, the alert status of British and French forces has not been open to outside monitoring and verification. As U.S. and Russian de-alerting proceeds, Britain and France could be asked to make their alert status similarly verifiable.

Out of an arsenal of about 400 warheads, China has roughly 20 single-warhead nuclear missiles that could reach the United States. These warheads are not on high alert; indeed, they cannot be, since they are liquid-fueled and cannot be stored containing their fuel. Chinese warheads are also detached from the missiles and stored separately. The missiles would take about a day to prepare for use. China might add to its long-range strategic arsenal, especially if the United States deploys missile defenses. It is developing solid fuel rockets that, if produced and deployed, will give China the ability to maintain its nuclear weapons on hair-trigger alert and pose a plausible threat of surprise attack on the United States.

By keeping their nuclear missiles off hair-trigger alert, the other nuclear powers have built a valuable margin of safety into their nuclear weapons policies, more nearly reflecting post-Cold War reality than do U.S. and Russian policies. They will be encouraged to maintain this safety margin if the United States and Russia de-alert their nuclear arsenals now.

As for the three undeclared nuclear weapons countries – India, Israel, and Pakistan – they have smaller arsenals, and they do not appear to have their weapons ready for immediate launch. If the major nuclear powers de-alert their weapons, they will help restrain the undeclared powers from adopting dangerous launch-on-warning postures.

## Conclusion

Preventing nuclear war may be the ultimate tribute to what we value as a society. As General Lee Butler, former commander of U.S. strategic nuclear forces, put it: “We in the United States cannot at once hold sacred the mystery of life while we retain the capacity to destroy it” (National Press Club, February 1998). *Short Fuse to Catastrophe* illustrates the potentially catastrophic policy that keeps thousands of U.S. and Russian nuclear weapons on high alert. At a time when the United States is making financial investments in Russia and seeking cooperative security arrangements, it is madness to also be minutes away from a massive nuclear exchange.

It is time to put the same political will and intellectual capital that we have used to build high precision weapons of mass destruction into de-alerting our nuclear arsenals. If we can develop a nuclear weapon that can hit a single target thousands of miles away, we can also develop a process to take these weapons off high alert in a verifiable manner. Certainly we can do as much to prevent an accidental nuclear war as we are doing to prepare to use these weapons.

However, taking nuclear weapons off high alert status will not come easily. It will depend on public pressure at a time when concern about nuclear war is not on the public’s radar screen. The **Back from the Brink Campaign** strives to change that. It seeks to finally replace the dangerous Cold War policy of mutually assured destruction with one of mutually assured security.



## Broad Support for Action

- During the past five years, more than **60 generals, admirals, and other military leaders around the world** have written or spoken publicly on the need to de-alert all nuclear weapons.
- More than **250 cities and municipalities worldwide** have passed resolutions calling on the nuclear-armed nations to de-alert all nuclear arsenals.
- More than **100 political leaders from around the globe, including former U.S. President Jimmy Carter, former Soviet President Mikhail Gorbachev, and 50 other past and present presidents and prime ministers**, have called for de-alerting measures, and that number is growing.
- A 1999 United Nations resolution called for the removal of nuclear warheads from delivery vehicles, among other safety and disarmament measures. Sweden, Brazil, and South Africa sponsored the resolution, which was supported by more than **100 countries**.\*
- **Fifty-five national religious leaders** of major denominations have called for de-alerting nuclear weapons. That number is growing.
- More than **2,000 non-governmental organizations representing millions of people in 95 countries**, from every populated continent, advocate removing nuclear weapons from high alert.

\* UN Resolution 54/54/G. "Towards a nuclear-weapon-free world: the need for a new agenda." adopted December 1, 1999. Seven of the eight nuclear-armed countries (Britain, France, India, Israel, Pakistan, Russia, and the United States) voted against the resolution; China abstained.

## How You Can Help

**T**he **Back from the Brink Campaign** was created in December 1999 with one goal: to educate the public, the media, and public officials about the need to take nuclear weapons off hair-trigger alert. The campaign also collaborates with organizations in other countries to help educate the public, notably in Russia and other nuclear weapons states. To reach our goal, the Brink Campaign works with individuals and organizations to demand a change in nuclear weapons policy. The public call is strengthened by expert testimony, particularly from elected officials and senior military officers who have had nuclear commands.

Following the Cold War, most American political leaders tend to support increases in military spending. While wanting a strong defense, typically they are uncritical about the role of the military or the meaning of defense in the post-Cold War world. There has been no widespread public debate about post-Cold War nuclear policy because most Americans mistakenly assume the nuclear danger passed with the ending of the Cold War. They have never heard about the need to take nuclear weapons off hair-trigger alert nor about the persistent danger of accidental nuclear war. If asked for an opinion, many simply defer to the Defense Department on the assumption that it will make rational strategic policy.

Advocates for taking nuclear weapons off hair-trigger alert must make the case that it is a feasible and politically sensible step to make the United States and the world more secure. This is where the public has a crucial role. The Back from the Brink Campaign is working to raise the level of public understanding about the need to de-alert all nuclear weapons. The campaign can provide educational resources and support for those who are committed to speaking out on this important issue.

Where possible, individuals should join with organizations committed to the issue at the local, regional, and national levels. Back from the Brink may be able to help you locate



one near you. Those who do not find such an organization in their area might consider forming one. Below are specific steps that concerned people can take.

**JOIN the Back from the Brink Campaign.** We need community organizations, clubs, congregations, and associations to sign up as campaign endorsers, to sponsor joint activities within communities, and to link web sites with the campaign. We invite individuals to volunteer and to participate in national activities and local events. For information and resources, everyone can use the Back from the Brink website, [www.backfromthebrink.org](http://www.backfromthebrink.org), call the Campaign's toll free number at 1-877-55BeSafe, or email us at [brinkprogram@backfromthebrink.net](mailto:brinkprogram@backfromthebrink.net).

**SHOW the video "End the Nuclear Threat Now."** Show this professionally produced video at your school, community organization, or faith-based association. The 15-minute video features international experts detailing the risks in our current hair-trigger alert status and explains what can be done to reduce the risks. To receive the video and suggestions on how to use it, please call our toll-free number or visit our website, sign-up to volunteer, and then check out the resources in the Volunteer Center.

**DISCUSS de-alerting in a local organization meeting or organize a forum in your community.** Consider organizing a program on de-alerting for your church, synagogue, campus, or service organization. We can provide organizing resources or help with a speaker. Please call our toll-free number.

**MEET with your elected representatives.** Set up meetings with your Senators and U.S. Representatives at their district offices. Organize carefully for the meetings. Form a delegation, present your de-alerting position, and ask for the support of these elected officials. We can send extra copies of *Short Fuse to Catastrophe* and additional materials to hand out. If this is your first meeting with an elected official, feel free to call the Campaign for some pointers.

**CONTACT the President.** Visit our website, sign up to become a volunteer, and send a letter to the President. Circulate a group letter among friends, associates, and/or organizations in your area. We have a sample letter on our website.

**BE PERSISTENT.** Creative, organized, and well-informed public efforts are essential.

## Recommended Reading

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"Accidental Nuclear War – A Post-Cold War Assessment," *New England Journal of Medicine*, April 1998.

*Global Zero Alert for Nuclear Forces*, Bruce G. Blair, The Brookings Institution, 1995.

*The Logic of Accidental Nuclear War*, Bruce G. Blair, The Brookings Institution, 1993.

"Russia's Aging War Machine," Bruce Blair and Clifford Gaddy, *Brookings Review*, Summer 1999.

"Taking Nuclear Weapons off Hair-Trigger Alert," Bruce G. Blair, Harold A. Feiveson and Frank N. von Hippel, Nov. 1997, *Scientific American* (available through: <http://www.backfromthebrink.policy.net/factsheets.vtml>).

*The Nuclear Turning Point: A Blueprint for Deep Cuts and De-alerting of Nuclear Weapons*, Harold A. Feiveson, Editor, The Brookings Institution, 1999.

*Briefing Book on U.S. Leadership and the Future of Nuclear Arsenals*, Peter Gray, Council for a Livable World Education Fund, 1996.

*Briefing Book on the Non-Proliferation of Nuclear Weapons*, Peter Gray, Council for a Livable World Education Fund, 1993.

"Nuclear Weapons After the Cold War," Carl Kaysen, Robert S. McNamara, George Rathjens, *Foreign Affairs*, Autumn 1991.

"Don't Get Mad, Get De-Alerted," James Kitfield, *National Journal*, January 3, 1998.

*Verification: How Much is Enough?*, Allan S. Krase, Stockholm International Peace Institute, 1985.

"A Longer Nuclear Fuse," Frank von Hippel and Bruce Blair, The Brookings Institution, 1995.





### **Back from the Brink Management Board:**

Bruce Blair, Beatrice Brailsford, Jay Coghlan, Susan Gordon, Marylia Kelley, Arjun Makhijani

### **Participating Organizations:**

Alliance for Nuclear Accountability, American Friends Service Committee/Denver, Carolina Peace Resource Center, Center for Defense Information, Concerned Citizens for Nuclear Safety, Council for a Livable World, Environmental Defense Institute, Federation of American Scientists, Fernald Residents for Environmental Safety and Health, Fourth Freedom Forum, Friends Committee on National Legislation, Global Resource Action Center for the Environment, Global Security Institute, Government Accountability Project, Institute for Energy and Environmental Research, International Physicians for the Prevention of Nuclear War, Lawyers' Committee on Nuclear Policy, Los Alamos Study Group, Nuclear Age Peace Foundation, Nuclear Watch of New Mexico, Peace Action and Peace Action Education Fund, Peace Links, Physicians for Social Responsibility, Portsmouth/Piketon Residents for Environmental Safety & Security, Rocky Mountain Peace & Justice Center, Snake River Alliance, Tri-Valley Communities Against a Radioactive Environment, 20/20 Vision, Western States Legal Foundation, Women's Action for New Directions, Women's International League for Peace and Freedom (U.S. section)

### **For further information and additional copies of this report, contact:**

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Nuclear Weapons

