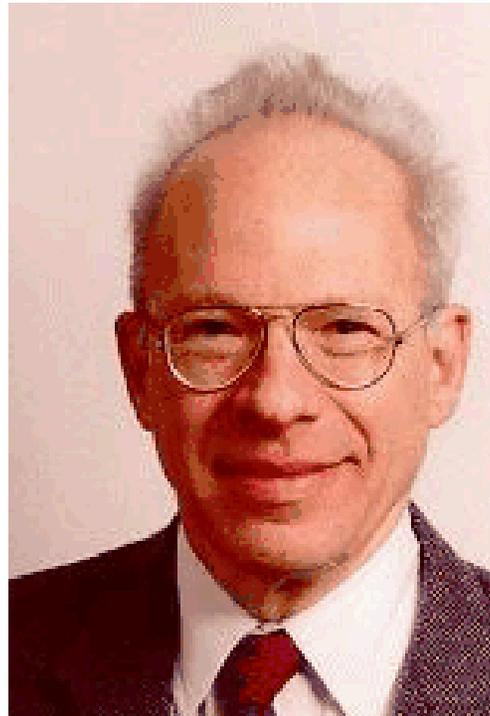


Outlaw Nuclear Weapons? Eliminate Nuclear Weapons? (Presentation at Norwalk Community College, Norwalk, CT 09/26/2018)

by Richard L. Garwin
Advisor to every President since Dwight D. Eisenhower
IBM Fellow Emeritus
Thomas J. Watson Research Center
Yorktown Heights, NY
See "The Garwin Archive" at www.fas.org/RLG/



[As announced:] The prospect of destruction of one of our cities by the explosion of a nuclear weapon-- ours or someone else's-- has since 1950 inspired much work in weapons and defenses, and in efforts to limit the number and spread of nuclear weapons worldwide. Some efforts were successful in reducing the hazard of nuclear attack or accident, and some arguably made it worse.

Richard Garwin created the specific design of the first thermonuclear weapon test of November 1, 1952 at Eniwetok Atoll, with an explosive yield of 11 million tons of high explosive-- almost a thousand times the explosive yield of the Hiroshima bomb of August 5, 1945. Since then he has worked continuously with the U.S. government on nuclear weapons and defenses, and from 1993 to 2001 chaired the State Department's Arms Control and Nonproliferation Advisory Board. He has published and made available hundreds of papers and speeches at the Garwin Archive, www.fas.org/RLG/. You can search it, for instance, via the Google search box

site:fas.org/RLG/ disarmament Reykjavik (10 results)

He will speak briefly on prospects for nuclear disarmament and then discuss with those assembled their views and concerns. Garwin has received many awards, including in 2016 the Presidential Medal of Freedom.

[Draft presentation:] In preparing for this talk, I wanted to be current on options for future nuclear weapons for the United States and (if we can influence others) the world. So although I have written in the past year or so a couple of articles^{1,2} about this, I contacted Dr. Bruce G. Blair, with whom I had worked on a book published in 1988, “Crisis Stability and Nuclear War,” edited by Blair and Kurt Gottfried, of Cornell University. Having begun his career in the Air Force as a Minuteman missile Launch Control Officer, Bruce Blair retained an intense interest and concern that these weapons never have to be used, and has spent much of his life to that end. Among other achievements, he founded “Global Zero” in 2008.

I was in luck, because Global Zero was about to publish on September 18 a massive “*Alternative Nuclear Posture Review*” of which I provide here the Abstract. I have prepared a number of copies with that paragraph and with an article Blair published just a year ago “*My time with Stanislav Petrov: No cog in the machine.*”

¹ "[Strategic Security Challenges for 2017 and Beyond](#)" by R.L. Garwin. Presented to the members of the National Academy of Sciences, May 1, 2017, in Washington, DC.

² “Nuclear weapons dangers and policy options” by S.A. Fetter, R.L. Garwin, F. von Hippel. *Physics Today*, April, 2018.

ABSTRACT of September 2018 Global Zero “The End of Nuclear Warfighting: Moving to a Deterrence-only Posture” (An Alternative Nuclear Posture Review for the United States)

The United States should adopt a deterrence-only policy based on **no first use** of nuclear weapons, **no counterforce against opposing nuclear forces** in second use, and **no hairtrigger response**. This policy requires only a **small highly survivable second-strike force** and **resilient nuclear command, control, and communications (C3)**. **Five new strategic submarines (SSBNs)** backed by a small reserve fleet of 40 strategic bombers would fully support the policy, which requires a robust capability to destroy a nuclear aggressor's key elements of state control and sources of its power and wealth. All other existing U.S. nuclear forces, including silo-based missiles (ICBMs), should be phased out and all other planned U.S. nuclear force programs should be canceled. The top priority of the U.S. nuclear modernization program should be strengthening the vulnerable U.S. C3 system. A larger menu of de-escalatory conventional options to replace escalatory nuclear responses is needed. Achieving these force and C3 objectives would ensure nuclear deterrence vis-a-vis Russia, China, and North Korea while greatly reducing the volatility of a crisis, the pressure to initiate a preemptive strike, the risk of launch on false warning, and the likelihood of rapid escalation to all-out nuclear war. A deterrence-only policy would also cut the U.S. stockpile of operationally deployed weapons by two-thirds to 650, put the "nuclear complex" responsible for nuclear weapons maintenance and production on a sustainable footing, and advance the goals of nuclear non-proliferation and phased, verifiable disarmament. The United States should champion a global treaty to prohibit the first use of nuclear weapons and devise and implement an action plan detailing the technical and diplomatic steps needed to achieve a nuclear-free world.

Blair had become aware of Petrov's momentous decision in 1983, of which you will learn more in the film to come, and ultimately had extensive conversations with him.

We can learn from 1983, but, by then we already had a lot of experience on the U.S. side with errors that brought us within an inch of launching massive nuclear forces against the Soviet Union, which would surely have resulted in a devastating response from their nuclear-armed bombers, silo-based ICBMs, and submarine launched ballistic missiles (SLBMs).

So what does Global Zero propose to do about this? They have a Nuclear Crisis Group attempting to implement these recommendations, with John Wolfsthal, Chair.

The long-term goal of Global Zero is just that: no nuclear weapons at all, worldwide, but neither they nor anyone else sees a way to achieve this. Instead, as the authors state in their Abstract, they propose to eliminate unilaterally if necessary, all U.S. land-based nuclear-armed missiles and replace all planned U.S. nuclear force programs with a much smaller force consisting of 40 strategic bombers, carrying long-range air-launched nuclear-armed cruise missiles as well

as ordinary thermonuclear bombs; and a submarine force of five new Columbia Class ballistic-missile carrying submarines, reducing the U.S. stockpile of operationally deployed strategic weapons by two-thirds to 650.

Specifically, according to the two tables from p. 3 and p. 6 of the document, there would be five new Columbia-Class submarines with a total of 640 deployed nuclear warheads, of which three ships would normally be at sea carrying 384 warheads in 16 missiles with eight warheads each, or 128 warheads per SSBN at sea. An alternative posture, dubbed “Deterrence-Plus-Warfighting” would require seven new submarines with a total of 896 warheads.

The analogous airborne forces under deterrence-only would have 450 warheads not normally loaded aboard the aircraft, for a force of 40 bombers including some new-development B-21 Raiders. The Deterrence-Plus-Warfighting with 900 reserve warheads would have 70 bombers, and there would be no silo-based nuclear missiles. Would this be an adequate force? In my opinion, yes, but I think that a less Draconian reduction would be even better, and here we get to an example of the better being the enemy of the good-enough. Why do so many knowledgeable, concerned people propose to eliminate the silo-based missiles?

Really because of one concern—that with the great improvement in accuracy of the warheads that threaten them, these land-based missiles are “sitting ducks.” This was long recognized, and I was a primary advocate of the logical (and seemingly inevitable) solution—“launch-on-warning” so that the missiles would be launched when the U.S. was certain that a massive attack was underway from the Soviet Union, aimed at the 1000 Minuteman silos.

A brief excursion here, at least for the printed version of this talk: As an active consultant to the U.S. government over many decades, I have often proposed substitute programs or different technologies ongoing programs, and I make the case as well as I can, in an honest fashion, for what I think is right, BUT I feel strongly that it is my responsibility also, given insight into the program, to help make that program a success with whatever technology or approach has been adopted. So I will not conceal any useful knowledge that I have, and I will provide innovations and even inventions to help the program along. Which brings me to the “guillotine joke ...³”

³ **Richard Garwin: Defense Adviser and Critic**, by ELIOT MARSHALL, *Science* 15 May 1981:Vol. 212, Issue 4496, pp. 763-766
DOI: 10.1126/science.212.4496.763

As regards our land-based ICBMs, I note that the 450 existing Minuteman silos⁴, containing 400 ready-to-use missiles, will remain functional for many years. They've become less valuable only against one adversary—Russia. It is not that China or even Britain or France could not have the accuracy to direct nuclear-armed missiles against these silos, approaching so closely when they are detonated that the silo would be destroyed, even with explosive yields far lower than the nominal 500 kt yield (actually 300+ kt) of our own MM-III warhead. In fact, long ago, when a new low-yield warhead was proposed by Los Alamos—for that same reason-- that with a factor five improvement in accuracy between the plans for Minuteman and the achieved accuracy, a nuclear explosive yield 5³ lower would provide the same blast pressure and kill probability against the silo. This is a factor 125, so a 4-kt warhead would do the same job that a 500-kt warhead would have done when it was first built. I noted that no new warheads were necessary—because every U.S. thermonuclear warhead has a boosted-fission primary, in the range of this 4 or 5 kt yield, and many of the warheads

⁴ Hans M. Kristensen & Robert S. Norris (2018) "United States nuclear forces", 2018, *Bulletin of the Atomic Scientists*, 74:2, 120-131, DOI: [10.1080/00963402.2018.1438219](https://www.tandfonline.com/doi/full/10.1080/00963402.2018.1438219) (at <https://www.tandfonline.com/doi/full/10.1080/00963402.2018.1438219>)

already had a “primary-only option,” and for those that didn’t, it would be easy enough to arrange that there would be no secondary yield.

This solution was never popular, in my opinion because it provided no new technical challenge for the weapon laboratories, but it remains feasible now. I, myself, was ambivalent about it because I felt sure that if the U.S. converted all of its warheads to the new low-yield option, it would really lose much of nuclear deterrence, which is not a physical property, but a question of perception by those in the United States and, especially, by those whom U.S. nuclear forces are intended to deter. I felt sure, too, that we would see a rerun of my arguments with Senator Henry Jackson in 1972, who rejected “essential equivalence” as a doctrine for building nuclear forces—which I believe had been accepted (or at least not rejected) by President Richard M. Nixon, arguing in a debate “What’s wrong with real equivalence?”

What’s wrong with real equivalence is that it was easy for the Soviet Union to do some things and the United States chose to do things differently for reasons that we felt were valid and important at the time of the decision—adopting new technologies for missile guidance, reentry vehicles, and the like, and there was

further benefit from these technologies, including navigation by GPS, and the like. So although the nuclear force would be as capable and more usable if the vast majority of 500-kt warheads were replaced by 5-kt warheads (half the yield of the Hiroshima bomb), such a force would not be “arms-race stable” because uninformed arguments could be raised against it on the simple ground that a high-yield Soviet warhead could do more damage than the new low-yield U.S. warheads.

This is a long introduction, which I probably will not have time to give orally, to my conclusion that we should not early-on eliminate these Minuteman-III missiles but that we should move to a deterrence-only posture, in agreement with Global Zero, that we should reject first use of nuclear weapons (using them only to respond to nuclear attack), and that we should take the Minuteman missiles off alert—burying the silos under 60-feet of gravel or taking other measures to show that they (or almost all of them) are incapable of being launched before they are destroyed, and hence eliminating the possibility that a fault in the attack detection system of satellites and radars could provoke an unintended or accidental launch that would, in turn, call forth a massive nuclear response from Russia. This would solve the “problem” of the land-based missiles in a simpler way, while

putting to rest concerns about the survivability of the few missile-launching submarines at sea against new-generation trailing tactics, “bugging” of the submarines, some cyber threats, and the like.

For many years, I chaired the Military Aircraft Panel of the President’s Science Advisory Committee and served on the Strategic Military Panel that each met for two days every month met with representatives from the Defense Department, the armed services, contractors such as Lincoln Laboratories or Bell Telephone Laboratories, to assess the strategic confrontation between the United States and the Soviet Union. And I have had continuing access in recent years in regard to modern defenses against aircraft. I am not confident that current or planned strategic bombers have a high probability of carrying out their nuclear attacks against Russia in case they actually had to perform in large-scale nuclear war.

The problem is that with ordinary (so-called “gravity” bombs) the long-range aircraft must get so close to its intended target that defense of a point target becomes quite simple, totally changing the balance that exists if only a few targets need to be attacked among a large target set.

Of course, the euphemism in the deterrent parlance of “holding at risk the sources of power and wealth” refers to industry, cities, and population and has brought charges that nuclear-armed deterrence and nuclear-weapons themselves violate the laws of war.

Much has been said on both sides of this question, which was actively considered by the U.S. Conference of Catholic Bishops in the 1980s, in connection with the deployment of the MX missile by the United States and the proposed deployment of space-based defense against Soviet nuclear rockets, and the conference held that nuclear deterrence was morally acceptable only for the prevention of attack by nuclear weapons⁵.

Without going into more specifics, I close here, having given you a small window on the big problem of complexity of nuclear forces and the near-impossibility of bringing rationality to this vital question.

Still, we must try.

⁵ Letter of the U.S. Conference of Catholic Bishops in 1983, “The Challenge of Peace”
09/26/2018