

# The Magnitude of the Nuclear Arms Race

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**F**rom primitive rocks and clubs to the present nuclear arsenals, the history of warfare is characterized by the dramatic increase in the number of civilians killed in each war and by scale changes in our ability to do harm to each other. All of the explosives used in World War I amount to an estimated 1 million tons.<sup>1</sup> Those explosives killed 8 million people with a substantially increased percentage of civilian deaths over previous wars. In World War II, 3 million tons of explosives were used with 50 million people killed. But in World War II, *four times* as many civilians were killed as soldiers.

We now have 18,000 million tons of explosive capacity in the arsenals of the world — 6,000 times all of the explosive capability of World War II.<sup>2</sup>

The World Health Organization has provided a baseline estimate of what would happen if 5,000 megatons, less than one-third of the total megatonnage in the world, were exploded: 1.1 billion people would be killed outright and another 1.1 would eventually die of burns.<sup>3</sup> In addition, recent studies into the “nuclear winter” effect indicate that temperatures would drop to below –10 degrees F., that all crops and animals would die of radioactivity and starvation, and that the radioactive clouds of dust and smoke and debris would spread to the southern hemisphere as well.<sup>4</sup> Such a 5,000-megaton nuclear exchange has the capability of virtually destroying humankind. Computer-simulated meteo-

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<sup>1</sup> Lester G. Paldy, NSF/AAAS Chautauqua short course on “Science, Technology and Arms Control,” Salt Lake City, Utah, 11–12 Nov. 1982.

<sup>2</sup> James Geier, “A Map of Megatons,” 348 North Street, Burlington, Vermont, 05401. See also Ruth Leger Sivard, *World Military and Social Expenditures 1983* (Arlington, Va.: World Priorities, 1983), p. 18.

<sup>3</sup> Carl Sagan, “The Nuclear Winter,” *Parade Magazine*, 30 Oct. 1983.

<sup>4</sup> *Ibid.*

rological models indicate that even a 100-megaton exchange would generate cold and dark almost as severe as the 5000-megaton case. Even 100 megatons is thirty-three times the explosives used in World War II. Soviet scientists agree on these effects of a major nuclear exchange between the United States and the Soviet Union.<sup>5</sup>

If we look at strategic warheads instead of total amounts of megatonnage, the situation is equally discouraging. According to the Center for Defense Information, in September 1983 the United States possessed 10,173 strategic nuclear warheads, the Soviet Union, 7,742. On each side these warheads are deployed on land, sea, and air:

USA 10,173 warheads		USSR 7,742 warheads	
Sea	50%	Land	73%
Land	22%	Sea	22%
Air	28%	Air	5%

Sea missiles are on submarines, land missiles are intercontinental ballistic missiles (ICBMs) in hardened silos, and air missiles are deployed on bombers. Clearly the USSR, with 73 percent of its missiles in known locations, is much more susceptible to a first-strike attack than is the United States. Over half of the US missile force is on submarines which are currently invulnerable to detection, a situation estimated as likely to prevail for at least twenty years. As a result, the Soviets never know where these missiles are and could not hit them in a first strike.

It is also apparent that the Soviet Union has a very small bomber force. Because they are kept on the ground, they also are vulnerable to a preemptive first-strike attack. In contrast the United States' B-52 bombers are kept on ready alert with a substantial percentage in the air at all times. Many people complain that the American bomber force is obsolete; however, the B-52s currently flying are G and H models that have been upgraded with latest radar guidance and even stealth technology.<sup>6</sup> The American chairman of the Joint Chiefs of Staff, when asked if he would be willing to trade Soviet submarines for our submarines, answered "No!" Would he trade Soviet bombers for American bombers? "Absolutely not!" Would he trade the Soviet ICBM force for ours? Again "No!"<sup>7</sup>

The bomb dropped on Hiroshima weighed approximately five tons and yielded 15,000 tons of explosive capability. Weapons have since increased in efficiency approximately 150 times so that the current per-weapon yield is substantially higher and the warheads are so small that one of them could be carried in a suitcase.

<sup>5</sup> Richard P. Turco, Owen B. Toon, Thomas P. Ackerman, James B. Pollack, and Carl Sagan, "The Climatic Effects of Nuclear War," *Scientific American* 251 (Aug. 1984): 33-43.

<sup>6</sup> "Stealth technology" involves the use of both special materials and radar confusion devices which has the result of making an airplane "invisible" to radar detection.

<sup>7</sup> Paldy, "Science, Technology and Arms Control"; and Richard Arvin, USU Convocations, 10 Feb. 1983.

The total number of warheads — strategic (between continents), theater (such as Europe), and tactical (battlefield) — in the arsenals of the world today amount to over 50,000 warheads — 96 percent in the United States and USSR. There are currently five nuclear powers in the world: the United States, United Kingdom, France, USSR, and China. Fifty-four countries, however, have nuclear reactors, each of which produces 500 pounds of weapons-grade plutonium per year which has the potential of making 7,000 bombs a year.<sup>8</sup>

Current United States plans call for deploying 17,000 new nuclear warheads in the next decade, while retiring 6,000.<sup>9</sup> This means that in ten years the USA would have over 21,000 strategic warheads. There are now fifteen major weapons planned or currently under deployment. They include the Pershing II missile, the ground-launched cruise missile (GLCM), the air-launched missile (ALCM), the submarine-launched cruise missile (SLCM), the MX missile, the Trident submarines, the neutron bomb, the B-1 bomber, and the stealth bomber along with new warheads and guidance systems for some of our current missiles. To support these new weapon systems, the defense budget during the past fiscal year, including amounts carried over from other fiscal years amounted to 274.1 billion dollars or over \$1,200 for every man, woman, and child in the United States. The MX alone costs approximately \$400 per family in the United States.

These statistics document an awesome potential in two countries to destroy all human life, a truly sobering possibility. There is strong tendency to believe that the issue is so big and complex that only scientists or government officials with access to secret briefing papers could truly understand the dimensions of the nuclear arms race. This is false! Perhaps no information in the world is as widely and frequently leaked as data on the nuclear arms race. Publications, spy satellites, and other monitoring devices provide a constant flow of updated information.

Here is a simple exercise. Obtain a copy of *Soviet Military Power* from the Department of Defense.<sup>10</sup> This slick publication gives a current breakdown of the entire Soviet military establishment with photographs, charts, and color diagrams. Also order the Soviet *Whence the Threat to Peace*, 2nd edition.<sup>11</sup> This exact counterpart of *Soviet Military Power*, also has colored photographs, slick reproductions, charts, and tables. A neutral, independent source is the Stockholm International Peace Research Institute, supported by the Swedish government, which annually publishes a *SIPRI Yearbook*, chronicling the nuclear arms race around the world. A shortened version of the *SIPRI*

<sup>8</sup> Ruth Leger Sivard, *World Military and Social Expenditures 1982* (Arlington, Va.: World Priorities, 1983), p. 10.

<sup>9</sup> *The Defense Monitor*, 12, no. 7 (1983), p. 5. This can be obtained from the Center for Defense Information, 303 Capitol Gallery West, 600 Maryland Avenue SW, Washington, DC 20024.

<sup>10</sup> 3rd ed. April 1984. Obtain from Superintendent of Documents, US Government Printing Office, Washington, D.C. 20402, cost \$4.

<sup>11</sup> Military Publishing House, Moscow 1982. Obtain from the Russian Embassy, 1125 16th Street NW, Washington, DC 20036, no cost.

*Yearbook* is *The Arms Race and Arms Control*.<sup>12</sup> Another excellent publication is *World Military and Social Expenditures 1983* by Ruth Leger Sivard.<sup>13</sup> *Scientific American* has also printed a series of extremely interesting and informative articles on the nuclear arms race.<sup>14</sup> I especially recommend the November 1982 issue for its table of weapons, ranges, weapon yields, delivery systems, and warheads. Making such a survey should have two effects: you will realize that the basic data is well-known and well-understood and you will be able to ascertain the basic correctness of the assessment. Next time someone tells you that "only the experts understand this issue," you should take exception.

In the early 1960s, the United States estimated that 400 warheads would be entirely adequate to kill over 100 million Soviet citizens and destroy at least 70 per cent of the industrial capacity of the Soviet Union. We now have over twenty-four times that number of warheads. For years we have been working on the concept of Mutually Assured Destruction (MAD). This concept is that if the Soviets hit us, we could counter with such a devastating blow that there would be no advantage to their initial attack. The MIRVing of our warheads, that is, putting multiple independently targeted reentry vehicles on each missile, means that we would be able to hit Russian silos with several warheads, possibly destroying their force in place before it could be fired. The Soviets lag only about five years behind us in installing the same technology, and the level of threat is thus increased to a higher plane.

The most recent hope for a totally safe defense is the so-called "star wars" effort. The April 1984 report entitled, "Space Based Missile Defense" published by members of a study panel for the Union of Concerned Scientists, indicates that this approach is also a security chimera.<sup>15</sup> Missiles would need to be intercepted during the "boost phase" when they are emitting a brilliant flame and before their multiple warheads are released. Intercept weapons of the highest velocity would be necessary. Candidates are "directed energy weapons" such as laser beams or particle beams. The lasers can be divided into three types: chemical lasers that emit infrared light, excimer lasers that emit ultra-violet light, and a laser pumped by a nuclear explosion that emits X-rays. Unfortunately the X-rays cannot penetrate the atmosphere and are not considered a viable ballistics missile defense weapon. Particle-beam weapons are also not feasible in the foreseeable future. Thousands of chemical laser battle

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<sup>12</sup> Stockholm International Peace Research Institute, SIPRI, 1982, obtainable in the US from Oelgeschlager, Gunn & Hain, Inc., 1278 Mass. Ave., Harvard Square, Cambridge, Mass. 02138, cost \$8.95.

<sup>13</sup> Obtainable from World Priorities, Box 25140, Washington, DC 20007, cost \$4.

<sup>14</sup> Examples include "The Verification of a Comprehensive Nuclear Test Ban" by Lynn R. Sykes and Jack F. Evernden, Oct. 1982; "A Bilateral Nuclear-Weapon Freeze" by Randall Forsberg, Nov. 1982; "Bilateral Negotiations and the Arms Race" by Herbert F. York, Oct. 1983; "The Uncertainties of a Preemptive Nuclear Attack" by Matthew Bun and Kosta Tsipis, Nov. 1983; "Launch Under Attack" by John Steinbruner, Jan. 1984; "'No First Use' of Nuclear Weapons" by K. Gottfried, H. W. Kendall and J. M. Lee, March 1984; "The Climatic Effects of Nuclear War," by Turco et al., Aug. 1984.

<sup>15</sup> The Union of Concerned Scientists, 1384 Mass. Ave., Cambridge, MA 02238.

stations in low orbits would be required to give adequate coverage to the Soviet silo fields. Excimer lasers on the ground would have to be reflected by thousands of orbiting mirrors that would require power plants costing in the billions of dollars.<sup>16</sup>

All of these technologies seem relatively easy to circumvent presently. One technique would be to use cruise missiles which never leave the atmosphere or submarines. Other "depressed trajectory" missiles could be developed in a new technological phase of the arms race escalation. In addition, ICBMs could be fitted with more powerful engines so that the boosters would burn out quickly inside the atmosphere and the amount of time available to intercept them would be diminished. Cheap decoys could be thrown into orbit from fake silos to overwhelm boost phase interceptors. The mirrors or space stations necessary to mount such a ballistics missile defense are extremely vulnerable to anti-satellite weapons. In addition, numerous other countermeasures make a "star wars" defense virtually unattainable. The costs of attempting to mount such a defense, just for the research and development portion would have eight components, according to Dr. Richard Delauer, Under Secretary of Defense for Research and Engineering, "every single one . . . equivalent to or greater than the Manhattan project."<sup>17</sup>

In short, there is and can be no security in technological escalation and the continuing build-up of nuclear weapons. Eighty per cent of all technological innovations have been initiated by the United States and most have been replicated on Soviet weapons within five to ten years.

Under the International Conventions of warfare — the Hague Convention of 1907 and the Geneva Conventions of 1929 and 1949 — there can be no aggressive war, there must be proportionality in warfare, and warfare should distinguish between combatants and noncombatants, that is, between soldiers and civilians. Even World War II demonstrated that distinguishing between combatants and noncombatants was an impossibility. MAD strategy aims at destroying cities, civilians, and nonmilitary targets. According to the International Conventions of Warfare, such a strategy is therefore morally and humanly deplorable. The "nuclear winter" phenomenon suggests that no strategy will produce anything but losers in nuclear war.

The argument is made that our nuclear build-up is a credible deterrent to war. What does or will deter aggressiveness on one side? Will one weapon deter the Soviets? Will a massive buildup of weapons? What are the intentions of those who possess these weapons? How can these intentions be estimated? The logic of deterrence might be tested by the observation that Finland has had a policy of neutrality with their next-door neighbors, the Soviets, since World War II. Finland has no nuclear retaliatory capability, but Finland's policy has been to deter aggression by good relations and negotiations with the

<sup>16</sup> See "Reagan's Star Wars," and excerpt from the Union of Concerned Scientists report entitled "Space-based Missile Defense" in *The New York Review of Books*, 26 April 1984.

<sup>17</sup> *Ibid.*

Soviets. It is hard to claim that the *only* reason that we have not had nuclear war is because of our massive nuclear weapons.

Another argument is that only the free world is threatened for we are peace-loving peoples and the Soviets are aggressors. A visit to the Soviet Union, however, easily uncovers intense fear on the part of the Soviet people of our threatening rhetoric, our aggressive strategic weapons build-up, and our massive expenditures. After visiting the Soviet Union many times in the previous twenty-five years, I now sense a fear more intense than ever. Over and over, the Soviets remind us that we are the only nation on earth to have used nuclear weapons on people. Their present feeling is that our president wants and intends nuclear warfare. As a result, the people are fearful, the government is angry, and USA-USSR relations are extremely poor.

What can be done to defuse this threatening situation? The only options in my view, for both strategic and moral reasons, are agreements to reduce the threat while gaining a better estimation of the Soviets so that our own estimate of their intentions will be more accurate and responsible. Gary Browning's "The Russian Chimera," *Sunstone* 7 (Nov.-Dec. 1982): 18-24, makes a notable and detailed contribution.

A careful review of the Arms Control Agreements between the United States and the Soviet Union over many years reveals that the Soviet record of keeping the provisions is as good as our own. Those who argue that we cannot trust the Soviets and must insist on verifiability are generally not aware of the sophistication of spy satellites and other monitoring devices. They are also generally not aware that the Soviets during the Carter Administration agreed to black-box monitors on Soviet soil as well as on-site inspectors at weapon testing sites. And they are almost never aware the United States decided it would be too dangerous to allow Russian on-site inspectors into the country and scuttled the Comprehensive Test Ban Treaty Negotiations that were mandated to go forward by the Limited Test Ban Treaty previously signed.

It seems mandatory to me that we pursue this Comprehensive Test Ban Treaty. Neither side likes to deploy weapons that have not been tested and, over time, even deployed weapons are less reliable without such tests. In addition, "star wars" negotiations need to go forward immediately. Such projects appear to violate existing treaties between the US and USSR, they are extremely expensive, and they provide no reliable hope for increased security. Negotiations to reduce the levels of every kind of nuclear weapons need to be pursued vigorously. Now they are not being pursued at all! Threatening new deployments on both sides only aggravate the political situation. A mutually verifiable bilateral freeze on further testing could also prevent tests that could lead to depressed trajectory weapons which could circumvent any "star wars" defense after all — now the likely next level of technological escalation. Like the MIRVs of the past, they also destabilize extremely quickly.

These strategies and weapons by their very nature violate the international conventions of warfare. They are therefore inherently illegal and immoral in their anticipated use.