

THE NUCLEAR NON-PROLIFERATION BARGAIN UNDER SIEGE

— by W. K. H. Panofsky, Professor and Director Emeritus, Stanford Linear Accelerator Center, Stanford University; and US Delegate for treaties on the international control of nuclear weapons.

FEATURE

The U.S. government officially agrees with the world-wide consensus that stopping the spread of nuclear weapons is an urgent task, but doing so is a difficult one indeed. Proliferation of new technology has never been stopped in human history. The discovery of man-made fire, metals, gun powder, explosives and electronics was always followed by the spread of those technologies all over the globe. Each of these new technologies served a dual purpose: they could serve to improve the human condition or they could support violence. But in respect to nuclear weapons the non-proliferation efforts must succeed or otherwise the very future of civilization will be in danger.

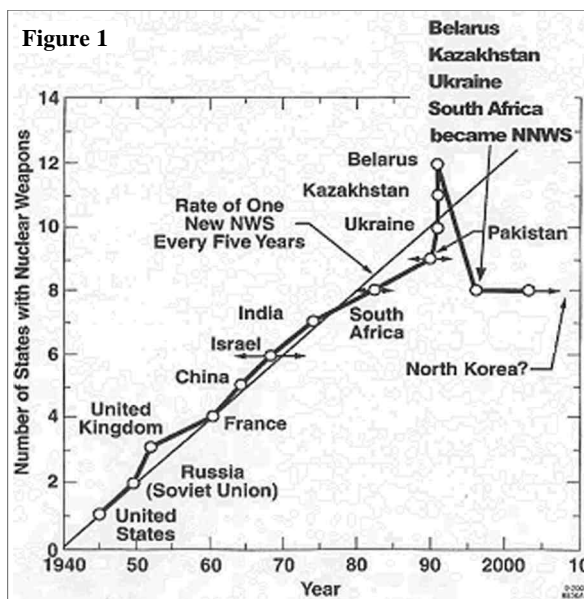
After the first nuclear explosions sixty years ago in Alamogordo, followed by the American nuclear attacks on Hiroshima and Nagasaki, many efforts were made to bring these new destructive weapons, which increase the destructive energy carried by munitions of a given size by a factor of a million, under control. Some of these efforts failed, and some were successful but limited in scope.

A dramatic effort was made through President Eisenhower's "Atoms for Peace" address in 1953; Eisenhower idealistically proclaimed that we could have it both ways: exploit nuclear energy for peace but at the same time prevent the spread of nuclear weapons. Eisenhower's ideas became the basis of the nuclear non-proliferation regime whose cornerstone is the Nuclear Non-proliferation Treaty (NPT). It was signed after long negotiations in 1968 and came into force in 1970. That treaty, together with additional initiatives, has slowed the spread of nuclear weapons beyond what most observers had predicted, as shown in Fig. 1.

I also note that several countries, including Australia, Switzerland, South Korea, Argentina, had nuclear weapon programs, and South Africa actually produced six nuclear weapons. But all these states discontinued their program after having been persuaded that their national security is served better without these weapons. When the Soviet Union broke up, the three countries (Belarus, Kazakhstan and Ukraine) which inherited nuclear weapons released them to the Russian Federation.

The NPT, still the backbone of today's nuclear non-proliferation efforts, seals a complex bargain. Those states, the Nuclear Weapon States or the NWS, which had acquired nuclear weapons before 1968 (the United States, Soviet Union, UK, France, and China) promised not to transfer these weapons, their materials or knowledge of how to make them, to the other signatories. In turn, those others (the Non-Nuclear Weapon States or NNWS) agreed not to acquire nuclear weapons.

To compensate for this blatantly discriminatory nature of this division of the world's nations, the treaty encourages the NNWS to



develop nuclear energy for peaceful purposes and the NWS are committed to assist them in this respect. In fact, the treaty guarantees an "inalienable right" to the non-nuclear weapon states to enjoy the fruits of peaceful nuclear energy. The treaty obligates the NNWS in their pursuit of the "peaceful atom" to submit their nuclear facilities to agreed "Safeguards" to be administered by the International Atomic Energy Agency (IAEA) to prevent diversion of materials to nuclear weapons use. Furthermore, Article VI of the NPT obligates the NWS to work in good faith towards reductions of nuclear armaments with the goal of their eventual prohibition, if not elimination. The components of this bargain are designed to be inseparable. In exchange for foregoing any nuclear weapons ambitions, the NNWS are entitled to the benefits of nuclear energy: at the same time the discriminatory nature of the bargain is to diminish over time by de-emphasis of nuclear weapons in international affairs, accompanied by gradual elimination of nuclear weapons world wide.

The treaty establishes Review Conferences to be held every five years to assess progress and problems. The 1995 conference extended the NPT indefinitely. A subsequent meeting in 2000 was contentious and the most recent meeting in 2005 ended in failure.

That failure is a symptom of the pressure under which the NPT now finds itself. This discord in part derives from deficiencies of the NPT itself which are being exploited by some of its signatories. Nevertheless, the NPT must be considered to be an unprecedented achievement; today it is signed by all the world's nations with the exception of India, Pakistan, and Israel and, after its recent withdrawal, North Korea. The NPT has demonstrably slowed the

(continued on next page)

spread of nuclear weapons but has not succeeded in stopping that spread entirely.

Today, the NPT bargain between the NWS and NNWS is justly considered to be under siege from both directions. Today some countries in their pursuit of “peaceful” nuclear power are with some merit suspected of abusing that pursuit to shorten the lead time needed to acquire nuclear weapons. Historically, the NPT non-signatories Israel and India chose this path to become “de facto” nuclear weapon states: their acquisition of nuclear weapons grew from ostensibly “peaceful programs.” On the other hand, the nuclear weapon states built up their inventories to a cold war peak of about 70,000 nuclear weapons. Even today, well over a decade after the end of the Cold War, these inventories still contain nearly 30,000 weapons, an inexcusable number. Their average explosive power is about twenty times that of the devices which killed 250,000 Japanese in 1945. The policies of all NWS, in particular those of the U.S., imply indefinite dependence of their military strength on nuclear weapons. Thus today’s pressures on the non-proliferation regime derive both from those NNWS suspected of aiming to acquire nuclear weapons and from the NWS retaining inexcusably large arsenals of such weapons and searching for new missions for them.

Let me cite a few technical facts relevant to the nuclear weapon proliferation issue. No nuclear weapons can be fabricated without “a significant quantity”¹ to use the IAEA term, of the 235 isotope of uranium or almost any isotope of plutonium. In turn, U235 is made by “enriching” natural uranium (0.7 percent U235) to Highly Enriched Uranium (generally assumed to contain greater than 90 percent U235). Plutonium is made by “reprocessing” spent fuel from nuclear reactors fed with either natural uranium or Low Enriched Uranium containing 3-4 percent U235. The plutonium is “grown in the fuel,” U238 as it captures a neutron and then beta-decays to neptunium and then plutonium.

Thus a proliferating state or a sub-national group intent on acquiring nuclear weapons must either:

- Acquire complete nuclear weapons from a NWS,
- Acquire quantities of HEU or Plutonium sufficient to make a weapon or weapons,
- Construct or acquire enrichment or reprocessing plants.

Peaceful nuclear power overlaps in part with these requirements; the next figure outlines the major components of such a program. But that overlap can be reduced if:

- Enrichment plants are safeguarded by IAEA inspectors and monitoring instruments to assure that enrichment is not carried out beyond a few percent of U235.
- The fuel cycle remains “open,” i.e., the spent fuel is not reprocessed to recover plutonium.
- The IEAE has authority to search for, and inspect if necessary, suspected sites of nuclear weapons activity.

There is however strong pressure in some countries to reprocess spent fuel to recover plutonium and reuse it in so called mixed oxide (MOX) form or to essentially use it as feed material for “breeder” plants which generate even more plutonium. Economic analysis indicates that reprocessing and use in MOX or breeding can not now be justified and will remain so until uranium is in much shorter supply than it is expected to be for many

decades. But reprocessing and, in particular, breeding does extend the energy that can be extracted from a given amount of uranium.

In view of the above a NNWS can claim to exercise its “inalienable right” under the NPT to pursue an indigenous nuclear power program which includes its own enrichment and even reprocessing facilities. But doing so will also shorten its lead-time toward a bomb, should it choose to withdraw from the NPT, expel the IAEA inspectors and remove their instruments. This is what North Korea has done and what the U.S. is accusing Iran of planning to do; a path however which Iran has denied that it is intending to pursue.

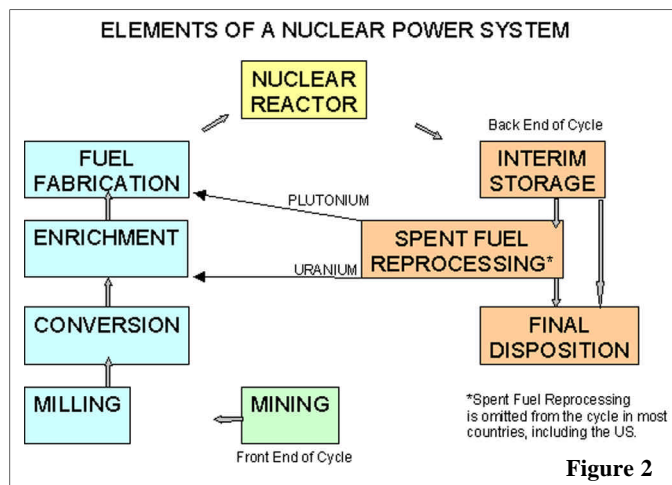


Figure 2

What can be done to reduce these risks and inherent threats of proliferation? The world will increasingly need nuclear power; therefore we must find means to have it both ways: expand nuclear power but reduce the opportunities for proliferation of nuclear weapons. I will give here only the briefest of outline of possible steps toward that goal:

- Limit the right of withdrawal from the NPT. Currently the NPT incorporates a clause permitting a party to withdraw after giving three months notice with little explanation. This could be changed by requiring United Nations Security Council approval after accepting the stated reasons for withdrawal.
- Eliminate “enrichment” and “reprocessing” as an inalienable right under the NPT and replace it by a guarantee of assured supply of reactor fuel from a Nuclear Weapon State, or even better, from an international entity managing the production of such fuel.
- Strengthen the IAEA by:
 1. Increased funding, which currently is inadequate in view of the expanded responsibilities of the Agency,
 2. Requiring all parties to the NPT to accept the “Additional Protocol.” This document gives the IAEA expanded access to inspect essentially all suspected facilities and expanded authority in other respects. Currently only about a quarter of the NPT parties have accepted this “Additional Protocol.”
- Expand the use of binding positive and negative “security assurances” by NWS to NNWS. A “negative” assurance provides a guarantee by the NWS not to use nuclear weapons against non-

(continued on next page)

nuclear weapons states under any circumstances, unless they were allied with a nuclear weapons state. A “positive” assurance is a commitment to defend a NNWS with nuclear weapons if necessary, if they were attacked by a nuclear weapon state.

Article VI of the NPT is an inseparable part of the non-proliferation bargain. It specifies that each of the parties shall pursue, in good faith, negotiation to end the nuclear arms races “at an early date,” and to proceed toward nuclear disarmament and to a Treaty on general disarmament. Not surprisingly, during the original negotiation leading to the NPT, the NWS made an effort to strengthen the non-transfer provisions of the Treaty designed to prevent NNWS from acquiring nuclear weapons while the NNWS promoted Article VI in its function to deemphasize the role of nuclear weapons in international affairs. However, the NNWS failed to persuade the NWS to accept any specific timetable for nuclear arms reductions and prohibitions.

Today the nuclear activities criticized by the U.S. Administrations are highly selective.

In the more acrimonious public discourse and during the recent Review Conferences, the “Rogue States” or “Axis of Evil” so designated by the U.S. (North Korea, Iran, and Pre-war Iraq and formerly Libya), were accused of clandestine nuclear weapons programs. At the same time, Israel’s well known acquisition of nuclear weapons, hidden under Israel’s “neither confirm nor deny” policy, was never publicly denounced by any U.S. Administration. Similarly, Pakistan’s nuclear weapons activities were not publicly resisted by the U.S. since we “needed” Pakistan’s assistance in resisting the Soviet Union’s expansion into Afghanistan and today, Pakistan’s help in the “War on Terror.” Similarly, the U.S. reaction to India’s nuclear weapons developments has been essentially mute. Today the U.S. is strongly resisting Iran’s plans for uranium enrichment, while similar activities in Brazil are not criticized publicly.

The much heralded “Proliferation Security Initiative (PSI)” is an agreement among a limited group of states cooperating with the U.S. to intercept nuclear weapon related shipments by and to “rogue” states. Thus a major challenge to the non-proliferation “bargain” is the lack of an even-handed enforcement policy by the United States. The IAEA as an organ of the United Nations does a significantly more equitable job, but has limited authority and resources.

During the NPT Review Conference the NNWS attempted to flag the alleged non-compliance of the NWS, in particular Russia and the U.S., with Article VI charging these states with insufficient progress in Nuclear Arms Control. But this is a difficult case to make since the NPT does not provide quantitative language which specifies a time-table for nuclear arms reductions by agreed amounts. Indeed after the end of the Cold War the United States and the Soviet Union combined still retain about 30,000 nuclear weapons, over 95 percent of the world’s total. These numbers include long-range (strategic), short range (tactical) weapons and nuclear weapons held in reserve. While the U.S. and Russia agreed in 2002 under the Moscow Treaty to reduce “operationally deployed strategic weapons” to about 2200 by the year 2012, that category is only a minor fraction of their total inventory. The Moscow Treaty expires in the year 2012 and contains no provisions for monitoring or control and specifies no stages through which its

goal should be reached. So the U.S. and Russia continue to maintain that they are “in compliance” with Article VI, while the NNWS take the position that these vast numbers, and the policies of using these weapons, contradict the spirit, if not the legal text, of Article VI. Both sides are technically correct, but this inherent conflict undermines the Treaty.

These are the overt conflicts putting the NPT “under siege.” But the basic causes for this tension are fundamental: they are rooted in the nature of nuclear weapons and the historical difficulty of preventing the proliferation of any new technology.

Indeed, the NPT has greatly slowed the spread of nuclear weapons beyond expectations. But nuclear weapons in a fundamental sense are the “great equalizer” between the great powers and the lesser states. Since even a single nuclear weapon detonated in a city can kill about a million people and can dwarf the damage of the September 11 attacks, a small state, once having acquired a very small number of such weapons, becomes a very serious factor in the affairs of nations. In turn, the military policies of the U.S. drive nuclear proliferation. As long as the United States, as the remaining “super power,” flaunts its nuclear and conventional military power and its willingness to use that power, other countries, unable to match that power, will be induced to acquire nuclear weapons. In the words of a former Deputy Defense Minister of India: “Never negotiate with the United States unless you have a nuclear weapon.”

But above all, in the long run, states must be persuaded that their National Security is served better if they do not acquire nuclear weapons than if they do. In other words, we must consider the motivation for nuclear weapons proliferation.

Thus I conclude that the siege now confronting the non-proliferation treaty will not be totally lifted unless the use of violence in resolving international conflicts is drastically diminished. Many of the measures cited here in summary can make this siege less oppressive, but true long range relief must await the emergence of a less violent world.

¹ A significant quantity of plutonium is 8kg and of U235 is 25kg.



L-R (back row) Frank Press, Anthony Turkevich, Hans Bethe, John Tukey, (front row) Wolfgang Panofsky, James Fisk, Carl Romney. The American delegation signs an agreement at the 1959 Geneva Conference on the Discontinuance of Nuclear Weapons Tests.