A CISAC Agenda on Nuclear Weapons

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GOALS

1. Preserving and strengthening the Nonproliferation Treaty (NPT) so that additional states do not acquire nuclear weapons.

2. Keeping nuclear weapons and improvised nuclear weapons (INW) out of the hands of terrorists-- individual and organized.

3. Preventing the detonation-in-place of nuclear weapons-- the analog of men, women, or children in suicide jackets.

Preserving and Strengthening the Nonproliferation Treaty So That Additional States Do Not Acquire Nuclear Weapons

A principal tool for keeping states within the NPT is the Comprehensive Test Ban Treaty (CTBT) signed by almost every state[1] beginning in 1996 but which won't enter into force under present conditions until it is ratified by all states possessing nuclear energy or nuclear weapons. The NPT of 1970 is long in force and prevents signatories not only from detonating a nuclear weapon, unless they are one of the five official nuclear weapon states-- U.S., Russia, UK, France, and China—but also from developing or possessing nuclear weapons. But a key element of the NPT is the commitment by nuclear weapon states to reduce and ultimately eliminate their nuclear weapons, to avoid the ultimate asymmetry between the rights of the historic nuclear weapons states—NWS-- and the non-NWS-- NNWS. So a reasonable declaratory nuclear weapons policy on the part of the NWS, including only non-explosive testing of nuclear weapons is essential (but not sufficient) to maintain NNWS within the NPT.

A continued reduction in nuclear weapons holdings-- not just the deployed nuclear weapons-- is also essential, and for that one would need to include the lesser nuclear powers once the U.S. and Russian military stockpiles are decreased below 1000 each.

[1] Except Bhutan, Cuba, Dominica, India, Pakistan, Mauritius, North Korea, Saudi Arabia, Somalia, Syria, Tonga, and Tuvalu.

Strategic Nuclear Warheads and Treaties' Ceilings (corresponding counting rules)

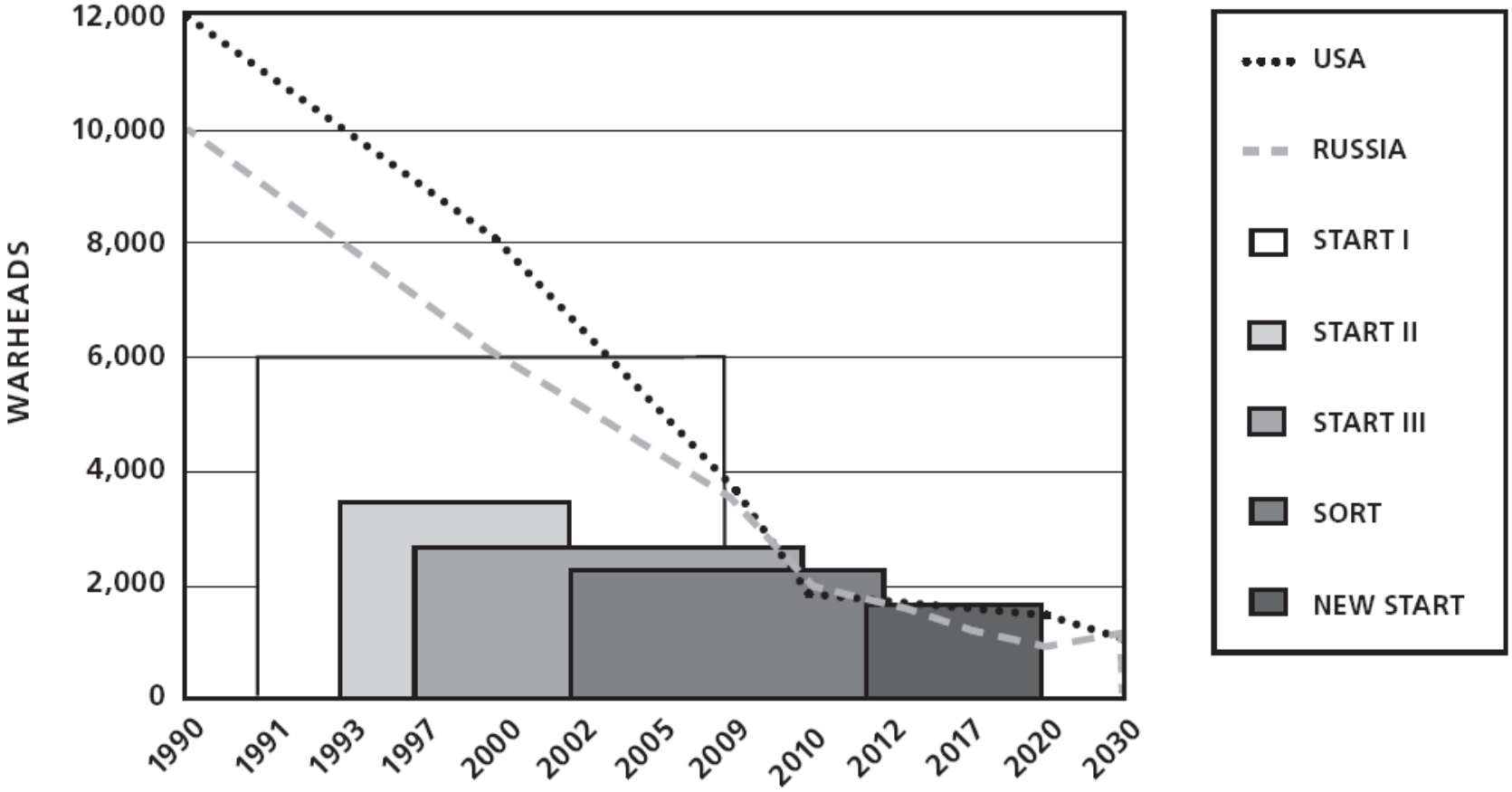
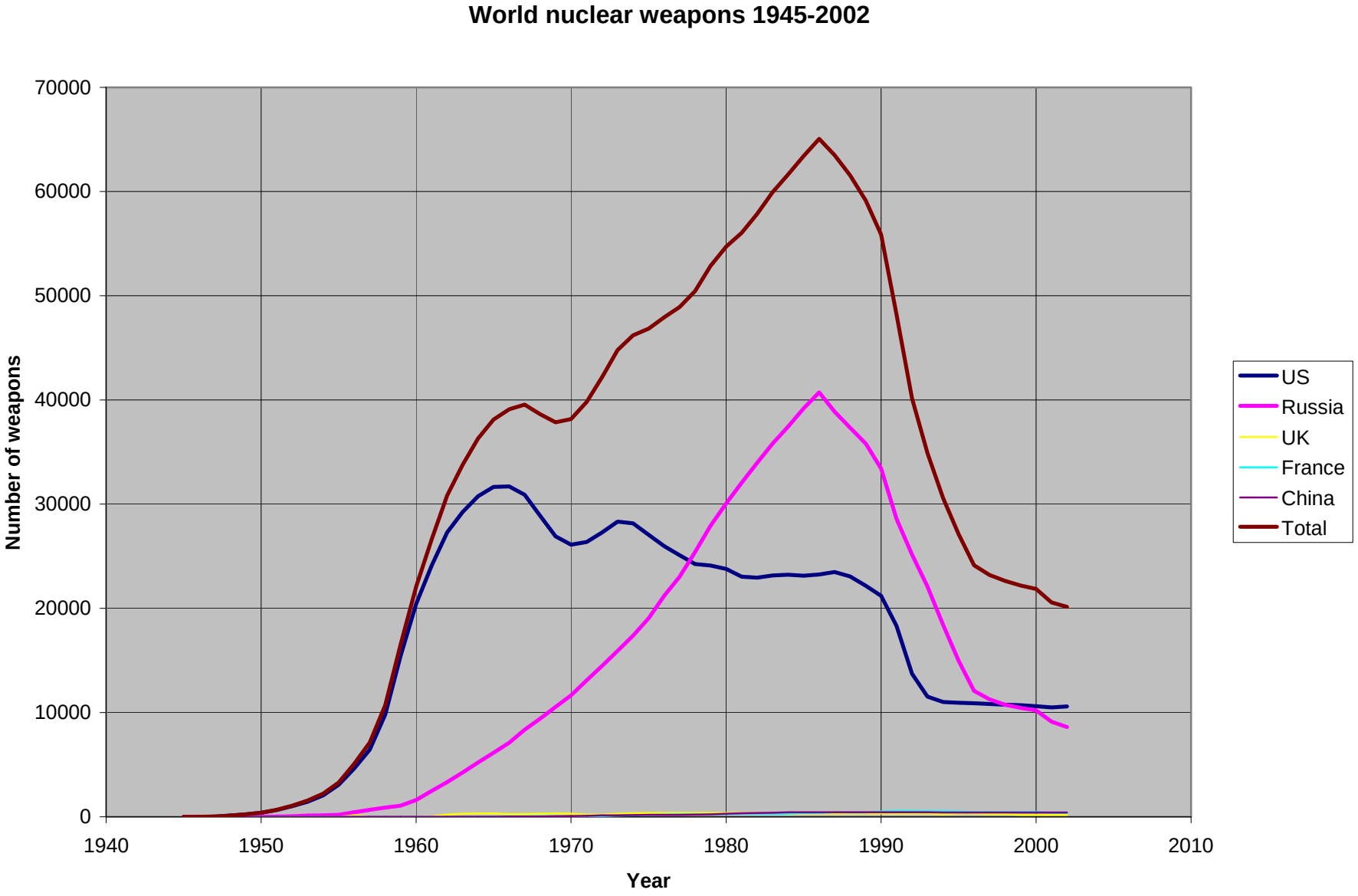


Figure from Alexei Arbatov, *Gambit or Endgame? The new state of arms control.*, The Carnegie Papers, March 2011.

These are enormous stocks of deliverable nuclear weapons, but look where we have been!



(Plotted from Robert S. Norris and Hans M. Kristensen, Global Nuclear Stockpiles, 1945–2002 *Bulletin of the Atomic Scientists* 2002 58:103-104; doi:10.2968/058006020)

As nuclear weapon stockpiles are reduced, there needs to be a monitoring of the transfer of the weapon-usable materials from the military to a civil stock. A potential elimination of nuclear weapons, worldwide, is on a much longer timescale although it is a goal of President Obama and the active program of the "gang of four"—George P. Shultz, Henry A. Kissinger, Sam Nunn, and William J. Perry-- begun 2006 on the 20th anniversary of the official talks between Presidents Reagan and Gorbachev in Reykjavik.

It is important that there be sensible choices, worldwide, including nuclear fuel cycles, including reprocessing and repositories, because nuclear weapons can readily be made from the highly enriched uranium, and most uranium enrichment technologies can move from the 5% level associated with fuel for light-water nuclear reactors to the 90% for weapons with a much smaller investment of resources than was necessary for the reactor fuel. This is even more true for a stock of uranium of 20% U-235 content that is the boundary between low-enriched uranium—LEU-- and highly enriched uranium--HEU.

Aside from HEU, the other approach to nuclear weaponry is a plutonium bomb, like the one that destroyed Nagasaki and that in advanced form is the foundation of the U.S. stockpile. Although it was long stated that so-called "civil plutonium" could not be used to make nuclear explosives, the U.S. Department of Energy has affirmed that it could be so used, by any state, and that knowledgeable actors could have high-performance nuclear weapons from civil plutonium. Unfortunately, all states become more

knowledgeable with time, because of the evolution of technology and of instant information sharing and crowd-sourcing over the Internet.

Thus it is urgent for the United States and others to provide, under IAEA safeguards, low-enriched uranium fuel for nuclear power plants in states that are members of the IAEA in good standing, and to arrange to remove the used fuel from the leasing states, for ultimate disposition into mined geologic repositories, or for reprocessing before disposition.

Finally, support for “peaceful uses of atomic energy” is an obligation that the nuclear weapon states assumed under the NPT and it must be fulfilled, where consistent with nonproliferation and IAEA safeguards obligations. Historically, though, such actions provided the heavy water and uranium fuel that enabled India to begin its plutonium-based nuclear weapons program, so that an additional condition should now be required--the return of the material supplied under the NPT if a nation at some future time abandons the NPT, and the destruction of facilities built with that support.

Keeping Nuclear Weapons and Improvised Nuclear Weapons Out of the Hands of Terrorists-- Individual and Organized

This involves consolidating and guarding and alerting stocks of weapon plutonium and uranium. An active program was begun by the United States, especially at the initiative of Senators Richard Lugar and Sam Nunn. Ashton Carter of Harvard, Frank von Hippel of Princeton and Matt Bunn, now of Harvard, were also important players in this activity. This includes not only the consolidation and guarding of stocks, but also the transfer of Pu and HEU irrevocably to less hazardous forms, as is being done under a soon-to-complete 20-year program for the elimination of 500 tons of Russian (formerly Soviet) HEU by blending it down to the 5% range for use in light-water reactors.

Another approach is minimizing the civil use of HEU in so-called “critical assemblies” and in converting research and medical-isotope production reactors from HEU to LEU fuel.

“Civil Pu” stocks need to be consolidated and guarded, in view of the weapon usability of reactor-grade Pu. In two book-length reports of 1994 and 1995, CISAC established the standard of care for civil Pu as nominally self-protecting under the “Spent Fuel Standard” if the gamma radiation barrier accompanying the Pu was comparable with that for fuel just removed from a power reactor. For the separated civil Pu, it established the “Nuclear Weapons Standard” for its security.

Preventing the Detonation-in-place of Nuclear Weapons--
the Analog of Men, Women, or Children in Suicide Jackets

For many years, the concern about nuclear weapons was largely to keep them safe and to ensure that they were not stolen or destroyed. More recently, with the advent of suicide terrorism and the expansion of attacks on society, greater priority must be accorded (and certainly is in the United States) to preventing the unauthorized detonation of the nuclear weapon in storage, at its deployed location, or in transit. This is an active program between the NNSA part of the Department of Energy, together with the Department of Defense, which share the responsibility for transport of nuclear weapons.

States that claim legitimacy in possession of nuclear weapons have the obligation to protect them, but sharing information about potential threats and technical and organizational possibilities for protection is at best a tricky business. This usually goes by the name of "sharing best practices," which is difficult enough among the formal NWS, but extraordinarily complex when one includes India, Pakistan, North Korea, and Israel.

In its 2005 report, *Monitoring Nuclear Weapons and Nuclear-Explosive Materials:An Assessment of Methods and Capabilities*, CISAC discussed means for maintaining complete records on U.S. nuclear weapons location and status, and perhaps routinely providing those records, in "hashed" form under some potential arms control agreement. Such an approach would give no information until, on request, an original record was

provided for the open, shared hashing operation. If it matched the hashed record long held by the other party to the agreement, then there would be certainty that the record had been provided in a timely, accurate manner.

The Protocol to the US-Russian *New START Treaty* of 2010, signed in Prague April, 2010, devotes many pages to precise specification of the format of data to be exchanged on each treaty-limited item.

Such attention to detail might have helped prevent the incident August 29-30, 2007, in which 6 US Air Force nuclear-armed cruise missiles were mistakenly mounted on a bomber at Minot AFB and flown to Barksdale AFB, where they remained mounted on the aircraft without the mandatory protection accorded US nuclear warheads.

CLEARLY THERE IS MUCH WORK TO BE DONE,
DIFFICULT EVEN WITH COMPETENT, DEDICATED STAFF IN THE GOVERNMENTS CONCERNED