Nuclear Proliferation: How Bad Might It Get?

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Crystal City Gateway Marriott
Arlington, Virginia
January 14, 2020
Questions to be addressed

1. Does nuclear proliferation strengthen or weaken deterrence?
2. How likely is more nuclear proliferation?
3. What should be done?
1. Does nuclear proliferation strengthen or weaken deterrence?
Conventional wisdom: So far, so good
1945-1949: Unipolarity, Pretty Stable
1950-1952: Bipolarity, Pretty Edgy
1960-1964: Additional uncertainties
1998-2005: Even before N. Korea, tricky
Where we’re headed: Do we feel lucky?
A Realist’s take:

“If one imagines a world of tens of nations with nuclear weapons and major powers trying to balance their own deterrent equations, plus the deterrent equations of the subsystems, deterrence calculation would become impossibly complicated. To assume that, in such a world, nuclear catastrophe could be avoided would be unrealistic.”

-Henry Kissinger

How likely is more nuclear proliferation?
With the Next NPT Withdrawal, Pretty Probable
Next up
China’s provocative nuclear growth: A worrisome catalyst
And with what’s technically on tap, future nuclear proliferation won’t be so slow or piddling
Workable weapons designs are now more readily available
A.Q. Khan: AKA, nuclear Johnny Appleseed
Iran’s Bomb Design

Interactive Iranian Nuclear Weapon Schematic:
(with links to reports on key individual components)

An Iranian schematic (with translation), from the Nuclear Archive, of a levitated nuclear weapon design, i.e. one with an air gap and flyer plate to increase compression of the core, based on the use of weapon-grade uranium.

**Iran was planning to make 5 nuclear weapons.** Read our [full report](https://example.com/full-report) on this, or the [summary](https://example.com/summary). “Project 110” under the Amad Plan was in charge of the production of the nuclear weapons (see [organizational chart](https://example.com/organizational-chart)).

* Information on the main charge can also be found in the shock wave generator report.
1956 design, Swedish 2-point ellipsoid
Future thermonuclear tech transfers?
Existing fissile stockpiles make nuclear ramp-ups and break-outs much quicker and larger
Current plutonium stocks: grist for 100s to 1,000s of new warheads
Stockpiles of weapons-grade uranium
East Asian uranium enrichment plans
East Asian reprocessing plants

800 tHM/yr Rokkasho plant: ~1,600 bombs’ worth pu/yr, 2021 planned opening

50 tHM/yr Pilot plant: ~100 bombs worth of plutonium/yr

200 tHM/year plant is now under construction: ~400 bombs worth of pu/yr

Planned 800 tHM/yr EDF plant: ~1600 bombs worth of pu/yr

ROK Experimental Pyroprocessing Facility
China and Japan: Plutonium weapons production competition?

Japan’s stock of separated plutonium could decline slowly — or climb rapidly if Rokkasho Reprocessing Plant operates.

More than 22,000 bombs’ worth of

- 50 tHM cap
- 200 tHM cap
- 800 tHM cap

UK has offered to take title to Japan’s plutonium held there (for a price to be determined)
Chinese heavy water reactors

- Two Candu-6 reactors (600 MWe each) at Qinshan
- Capable now of producing ~650 kilograms of plutonium a year — enough for roughly >150 bombs a year
- China announced it is building two more HWRs. These will produce another ~650 kgs, enough for >150 additional bombs per year
How Much Plutonium Could a 1 GWe LWR Generate/Year?

- PRC has 42.8 GW of power generation
- 4 kg weapons-grade Pu assumed per bomb based on DOE estimate.
- 5.2 kg reactor-grade Pu assumed per bomb based on estimate by Richard L. Garwin (see [http://fas.org/rlg/980826-pu.htm](http://fas.org/rlg/980826-pu.htm))
- 150 kg weapons-grade Pu conservatively assumed per reactor year (see page 64, [http://fsi.stanford.edu/sites/default/files/VAF-June.pdf](http://fsi.stanford.edu/sites/default/files/VAF-June.pdf))
- 250 kg reactor-grade Pu conservatively assumed per reactor year.
Chinese Fast Reactors

China Experimental Fast Reactor, 20 MWe,

China Fast Reactor, 600 Mwe (110 wfpu/year)
What should be done?
1st: Deter more NPT withdrawals

• Clarify *now* what will happen to states that announce their intent to withdraw, e.g.:
  
  • Stipulate now that IAEA safeguards will remain in force on all declared nuclear materials and facilities, even if they do withdraw
  
  • Commit now to block all military assistance and demand suspension of enrichment and reprocessing if the withdrawing state is in noncompliance with its IAEA obligations
2nd: Tailor strategic modernization to deemphasize reliance on nuclear arms

- Enhance C4I, prioritize avoiding strategic lobotomies
- Focus more on increasing aim points, less on increasing warhead numbers
- Emphasize precision guidance in hypersonics, advanced missiles & artillery, etc., to reduce need for high-yields & to force adversaries to spend more on defenses
- Ditto, submersible systems
3rd: Compete to channel, cap, and eliminate deadly strategic contests

- Take the Administration’s Nuclear Posture Review guidance seriously: Leverage future military deployments to produce Track II, INF Treaty-like results:
  - Support French policy to develop space keep out zones and bodyguards?
  - Limit number of intercontinental hypersonics?
  - Call for a moratorium on reprocessing in the Pacific Rim (including the US) and on uranium enrichment expansions?
3\textsuperscript{rd} (continued)

- Consider broad diplomatic arms restraint initiatives that compliment existing US policy:
  - No nuclear targeting of urban centers?
We’ve done this before
Additional slides
N. KOREAN TRITIUM PRODUCTION

Suspected DPRK Li6 production plant

Reactors N. Korea could use to irradiate Li6 to produce Tritium

Suspected DPRK tritium extraction plant
ROK & Japanese Thermonuclear Potential

Wosong Tritium Removal Facility
Tritium (4 kgs) to boost 1,000 weapons