

Reducing the Potential for Weapons Proliferation in a World of Expanded Nuclear Power

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31 March 2008

Paris

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The Bottom Line

- ✦ No reactor fuel cycle can be made proliferation proof on technical grounds alone.
- ✦ The same technology that enriches uranium for reactor fuel can produce HEU for weapons.
- ✦ The same technology that reprocesses spent fuel to produce MOX can separate plutonium for weapons.
- ✦ Only binding international agreements with **Incentives, Effective Inspections, and Sanctions** can work.

Fuel-Cycle Issues

(1-GWe power plant as reference)

Front End:

- * 20,000 Kg of 4.5% enriched fuel per year.
- * 200,000 Kg of natural uranium as input.
- * 100,000 Pakistan P-1 centrifuges
(35,000 IR-2, 4000 URENCO T-12).
- * **ONLY** about **1000** more P-1 (400 IR-2, 50 T-12) to make 1 uranium weapon per year from enriched feed stock.

Fuel-Cycle Issues (cont.)

(1-GWe power plant as reference)

Back End:

- * 20,000 Kg of spent fuel contains 200 Kg of plutonium.
- * 200 Kg Pu is enough for about 20 weapons.

Solution:

- * Internationalize both ends (different issue, front end is easier).

Front End

- * Incentive is money saving (enormously expensive to build your own enrichment if you are new to nuclear or have small program).
- * Issue is security of supply
Enrichment: 4 sources. Enough?
Fuel Fabrication: 15 countries. Enough.
- * 2 proposals under discussion:
IAEA (includes fuel bank)
GNEP (fuel leasing and take back).
- * Nuclear “Haves” are talking to nuclear “Haves”.
Need to include “Have-nots”.

Back End

- * Weapons-grade vs. reactor-grade plutonium. Proliferation potential needs review.
- * Spent fuel MUST stay in cooling pool at site for about 4 years.
- * Breakout risk: 200 Kg/yr of plutonium from 1 GWe implies 80 weapons worth in pool. Even small reactors have a proliferation potential.
- * Internationalize reprocessing centers to limit spread of technology.

Richter's World

- ✧ China starts commercial enrichment (political diversity).
- ✧ Internationally owned & operated enrichment plants start up in Australia, Canada & Mongolia (commercial diversity).
- ✧ IAEA maintains an enriched uranium fuel bank.
- ✧ Internationally owned & operated reprocessing plants and MOX plants come into existence if MOX use becomes wide spread.
- ✧ Fuel leasing and take back programs like GNEP are developed.