Resourcing FM(C)T Inspections

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Informal Consultative Meeting on the work of the High Level Expert Preparatory Group
on a treaty banning the production of fissile material for nuclear weapons
or other nuclear explosive devices (pursuant to A/RES/71/259)
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FM(C)T: Three cost studies over 20 years

Three studies of resource (cost) requirements for FM(C)T verification

- All based on IAEA safeguards approaches and assume that the IAEA would verify the FM(C)T rather a new verification agency.
- *A Cut-Off Treaty and Associated Costs: An IAEA Secretariat Working Paper on Different Alternatives for the Verification of a Fissile Material Production Cut-Off Treaty and Preliminary Cost Estimates Required for the Verification of these Alternatives*, International Atomic Energy Agency, 1995
- *Routine Inspection Effort Required for Verification of a Nuclear Material Production Cutoff Convention* – D. Dougherty, A. Fainberg, J. Sanborn, J. Ailentuck, and C. Sun, US Brookhaven National Laboratory, 1996
- *Global Fissile Material Report 2008: Scope and Verification of a Fissile Material (Cutoff) Treaty*, International Panel on Fissile Materials, 2008

IAEA 1995: Cost estimates and conclusions

Cost estimates based on a country by country data base of 995 facilities

- including decommissioned and shut-down facilities and those under construction) in Britain, China, France, India, Israel, Pakistan, Russia, and United States.
- Total verification costs of a comprehensive verification system of a cut-off treaty should be in the range of $140 million.
- “alternatives are more limited in scope, and therefore less costly, but it is worth mentioning at the outset that the level of assurance provided by these less resource demanding alternatives would no doubt be significantly lower than the one given by the implementation of safeguards in NNWSs pursuant to comprehensive safeguards agreements”
- “technically a comprehensive system of verification under a cut-off would appear to be the best alternative”

Update of IAEA 1995 estimate in 2010

FMCT: Verification options – Bruno Pellaud, 2010

- former IAEA Deputy Director General and Head of Safeguards in 1990s

- Comprehensive verification (995 facilities) – $140 million (€150 million)
- Limited verification: Enrichment and reprocessing facilities, facilities containing separated fissile materials, all large nuclear plants and reactors and all irradiated spent fuel (645 facilities) – $120 million (€130 million)
- Minimal verification: Enrichment and reprocessing facilities, and facilities containing separated fissile materials (195 facilities) – $90 million (€90 million)

Comparable to IAEA safeguards budget

Brookhaven National Laboratory, 1996

Cost estimates based on a country by country data base of about 875 facilities in in Britain, China, France, India, Israel, Pakistan, Russia, and United States.

- No suggestion that FMCT could not be verified.
- Three options - costs ranging from $80 million to $280 million
- Comparable to cost of IAEA safeguards to several times safeguards costs
- 60-75% of the inspection effort for each option is due to the 19 large-scale reprocessing plants assumed to be in operation in the eight nuclear-armed states
- Many reprocessing and enrichment plants and plutonium-production reactors in the nuclear-armed states have been shut down.
- Verifying an FM(C)T has become easier and less expensive as military fissile-material production facilities are shutdown and dismantled.

International Panel on Fissile Material, 2008

No detailed facility by facility database

- Based on ideas for
  - reducing costs of verification at reprocessing plants
  - special challenge inspections in nuclear armed states for excess fissile materials in classified forms, HEU-fueled military reactors and military nuclear facilities
- FM(C)T verification costs could be less than IAEA safeguards budget ($100 million).
- Safeguards budget (as of 2016) was $110 million – about one quarter of total IAEA budget (including extra-budgetary funds).
- Over time, the verification/safeguards regimes for the different categories of states should converge, since it will be important to reduce the inequality in safeguards commitments in different classes of states because the goal is a world in which all states are non-weapon states.

Conclusion

- FM(C)T verification cost studies are now 10–20 years old
- No open database of what facilities and material could be monitored in FM(C)T
- Multiple options for FM(C)T definitions, scope and requirements
- Need up to date technical studies for verification options and costs, and to assess means to reduce costs using new technologies and approaches
- Need studies for how FM(C)T verification and costs may evolve over time
- Precedent: Scientists from different countries conducted joint research into monitoring technologies and data analysis methods for the verification of a nuclear weapons test ban from 1976 for two decades before Comprehensive Test Ban Treaty was agreed.