Verification of Non-Proliferation Commitments

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Mission of SONS Non-Pro Dept.

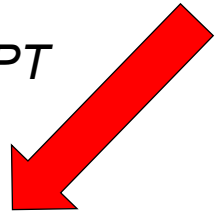
- SG implementation on national level
- Supporting IAEA on international level (CZSP)
- Cooperation with IAEA and Euratom on national inspections
- Maintaining the SSAC
- Licensing of nuclear items (export/import)
- Technical support to Czech MFA in political aspects of non-proliferation
- Management of operation of CTBT seismic station

Czech Nuclear Profile

Fundamental obligations for NNWS under the NPT

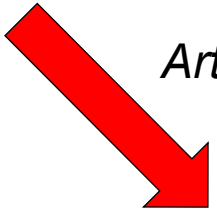
Nuclear Non-Proliferation Treaty (NPT)

Article 3.1 of NPT



Implementation of Safeguards

Article 3.2 of NPT



Export Control

Fundamental obligations for NWS under the NPT

Nuclear Non-Proliferation Treaty (NPT)

Article 1 of NPT

Article 6 of NPT

Article 1 of NPT

Protection of proliferation sensitive information

No transfers and assistance in NW programmes

Commitment to disarm (very vague)

Verification of compliance with NPT = Safeguards (SG)

- The objective of SG is to deter the spread of NW through early detection of misuse of NM or nuclear technology
- Strong focus on verification of declared information

- But who is responsible for the verification???

Legal Basis for Safeguards Verificaton

Mission of the IAEA under NPT

„To independently verify a State's legal commitment not to divert nuclear material (…) to nuclear weapons or other nuclear explosive devices"

through

a Comprehensive Safeguards Agreement negotiated between each State and the IAEA

(but there are also different types)

IAEA
International Atomic Energy Agency

But SGs (CSA) used to have a serious loophole

Under CSA only declared facilities were inspected and it didn‘t cover the whole NFC

Therefore an Additional Protocol to CSA was developed (in 1997)

Now R&D and export of T-L items are covered, also CA, samples, etc…

Image of Tuwaitha site with marked clandestine facilities:

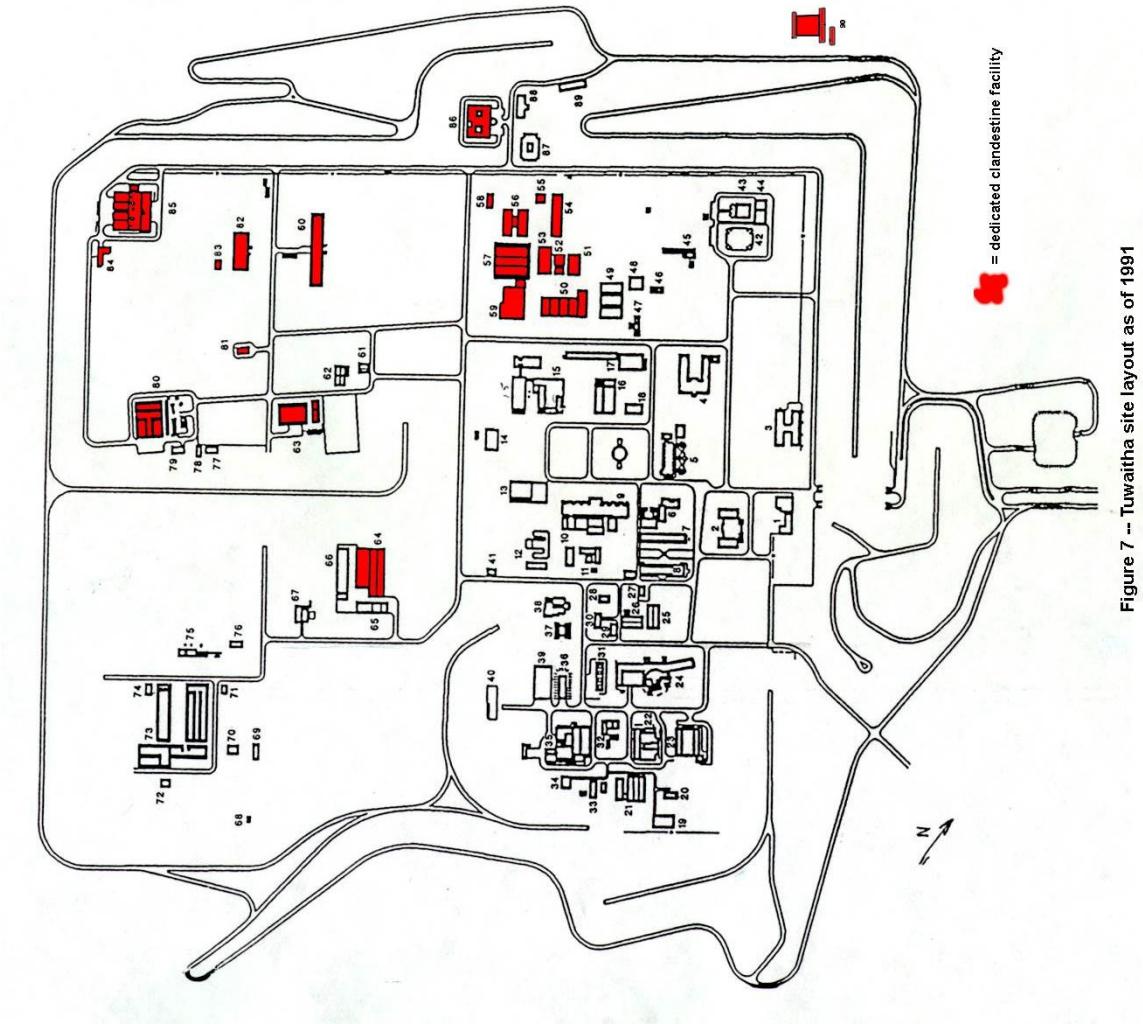


Figure 7 -- Tuwaitha site layout as of 1991

Source: ISIS Online, http://isis-online.org/uploads/isis-reports/images/figure7.JPG

Key Safeguards Facts

- Safeguards focus on NM, nuclear facilities, technology and R&D
- Analytical work focused on detection of underclared information and possible diversion
- Categories of NM:

  U (D,N,L,H), Pu and Th
- Different proliferation risk for each NM category
- Significant quantity (SQ) = key concept in SG

IAEA SQ for different NM categories

Table 1: IAEA's Estimated Values for Significant Quantities

Direct-Use Material	**SQ**
Plutonium (containing < 80% ^{238}Pu)	8 kg Pu
Uranium-233	8 kg ^{233}U
Highly Enriched Uranium (^{235}U ≥ 20%)	25 kg ^{235}U
Indirect-Use Material	**SQ**
Uranium (^{235}U < 20%)[a]	75 kg ^{235}U (or 10 t natural U or 20 t depleted U)
Thorium	20 t Th

a. Including low enriched, natural and depleted uranium.

Data Source: *IAEA Safeguards Glossary*, 2001 Edition, International Nuclear Verification Series No. 3 (Vienna, Austria: IAEA, June 2003), sec. 3, para. 13, table II.

Big difference between categories, only very little HeU and Pu is needed for a NW = biggest SG and non-pro concern

Acquisition Path Analysis (APA)

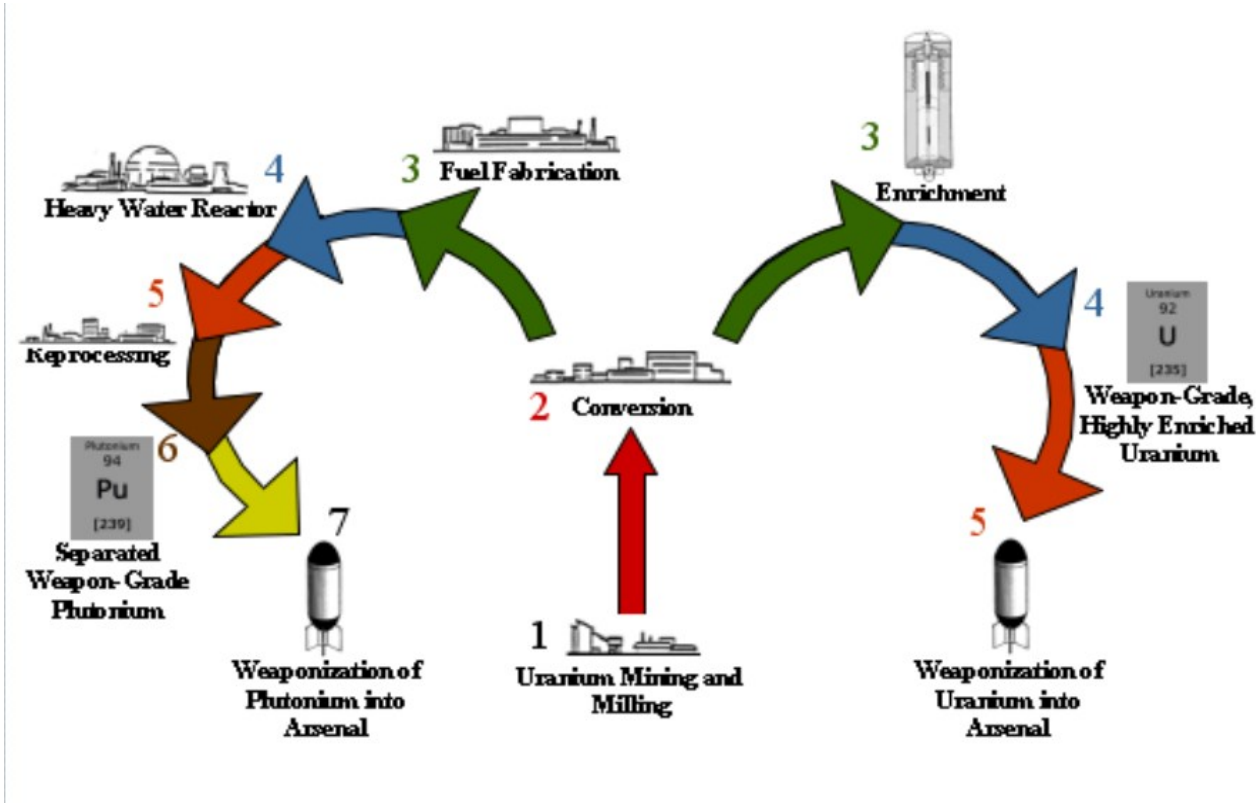
- Determines most probable way to develop a NW in each state
- Establishes a time window (breakout time) for each state
- APA considers many factors:

1. Methods of diversion and acquisition
2. Concealment Methods
3. Nuclear infrastructure, capabilities and R&D

Acquisition Path Analysis II

- APA always assumes perfect scenario (methods tested, proceses developed)
- Result of APA is a tailored safeguards approach that guarantees detection long before completion of all proliferation steps
- Therefore verification is conducted differently in each state but has the same goal

Two typical proliferation cycles

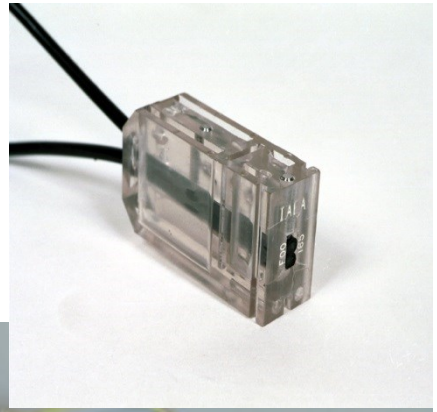


HeU is easier to acquire, but Pu more useful for NW purposes

Verification Methods

- Application of seals (electronic, metallic, optical)
- Use of cameras (with uplink to IAEA HQ)
- Use of RDT (especially in EF and RF)
- Verification of declarations through
- On-site inspections (various kinds – PIV, DIV, CA)
- Short notice, random inspections.

Verification Methods



Verification Methods

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Any questions?

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