



Verification of treaty compliance and enhancement of the verification of international treaties: Perspectives on the DPRK

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April 3, 2019

Foundation for Defense of Democracies



Generic Safeguards Objectives

- Detect any diversion of declared nuclear material at declared facilities and locations outside facilities (LOFs).
- Detect any undeclared production or processing of nuclear material at declared facilities and LOFs.
- Detect any undeclared nuclear material or activities in the Stat.

All nuclear material and activities in a territory of a state has been placed under the IAEA safeguards (Declarations are correct and complete).

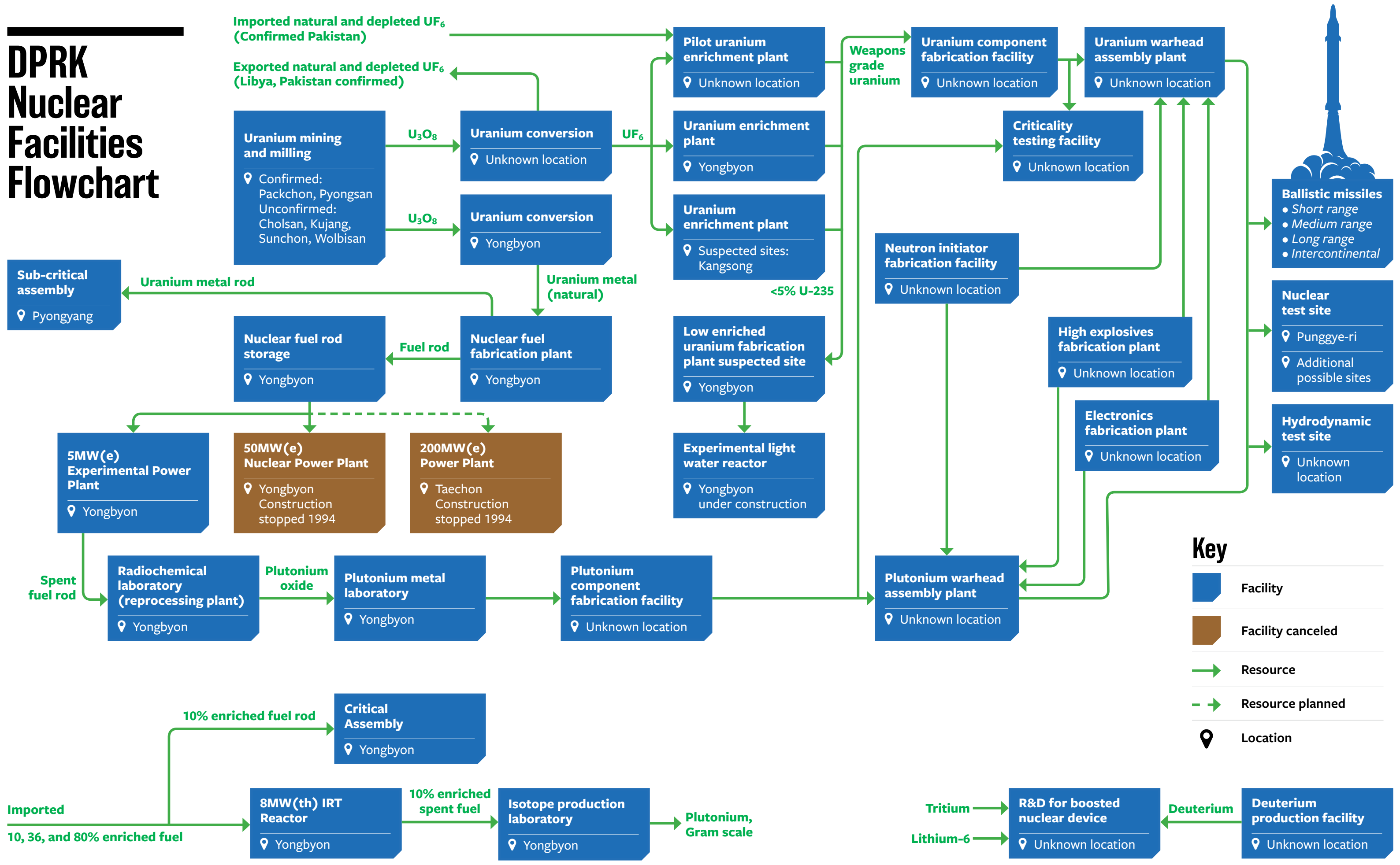


Cornerstones of the IAEA Verification System

- Nuclear material accountancy and verification
- Early provision of design information
- Environmental sampling
- Satellite imagery
- Remote monitoring
- Access to nuclear sites and information
- Additional Protocol
- State level approach



DPRK Nuclear Facilities Flowchart

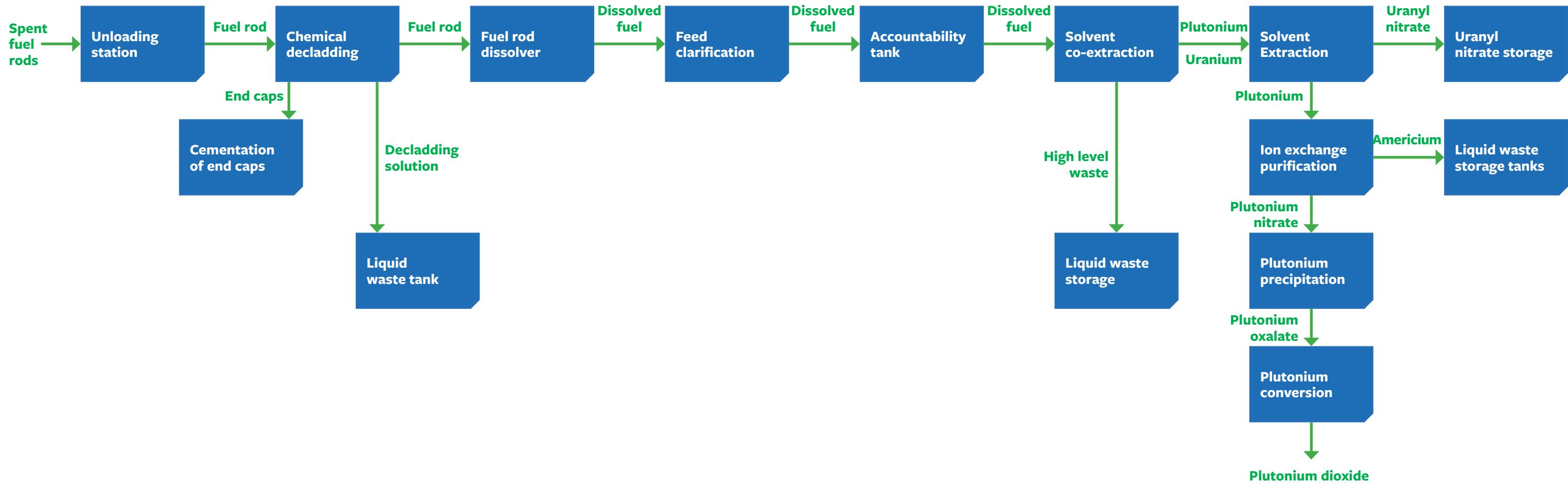
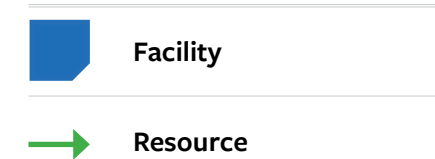




Radiochemical laboratory, Yongbyon

Front end reprocessing scheme in 1992

Key



Timeline

DECEMBER 12, 1985

DPRK accedes to the NPT

DPRK STATEMENT

Processes 89 fuel rods before the safeguards agreement enters into force

APRIL 10, 1992

DPRK ratifies a comprehensive safeguards agreement

MAY 4, 1992

DPRK provides initial declaration

SEPTEMBER, 1992

IAEA inspections find discrepancies in declaration

FEBRUARY 9, 1993

IAEA requests a special inspection



IAEA verification at the Radiochemical laboratory



North Korea's Declaration in May 1992



5 MWe gas-cooled graphite moderated reactor

- Started operation in 1986
- Shut down for 100 days in 1989 to replace damaged fuel rods
- Fuel fabrication plant
- Reprocessing plant
 - » Processed some damaged fuel rods together with fresh fuel in 1990
 - » Ca 60 grams of separated plutonium

- Plutonium product: not consistent with the irradiation history;
- Plutonium product, and the declared irradiation history of the reprocessed fuel were mutually inconsistent with the waste from the single campaign;
- The characteristics of the product batches processed through were not consistent with the data declared by the DPRK; and
- Statement that only irradiated fuel diluted with fresh fuel was reprocessed was not consistent with the results of sample analysis.



Hans Blix: The Gloves Do Not Match



- The Agency had not seen the waste originating from the plutonium product.
- Consequently, the IAEA had seen some nuclear waste, but it was from some other plutonium.
- Hence there must be plutonium, which has not been declared to the Agency.
- The IAEA was not able to conclude whether it is grams or kilograms.

Request for a Special Inspection



- Due to the lack of appropriate explanations, the IAEA asked for a special inspection, to two waste sites in Yongbyon, which could contain relevant information.
- North Korea did not heed to the request, the IAEA Board referred the case to the UN Security Council.



- On September 6, 2007 a gas-cooled graphite-moderated reactor destroyed in an air raid.
- By October 10, 2007 the Syrians had destroyed the remaining structures and emptied the area.

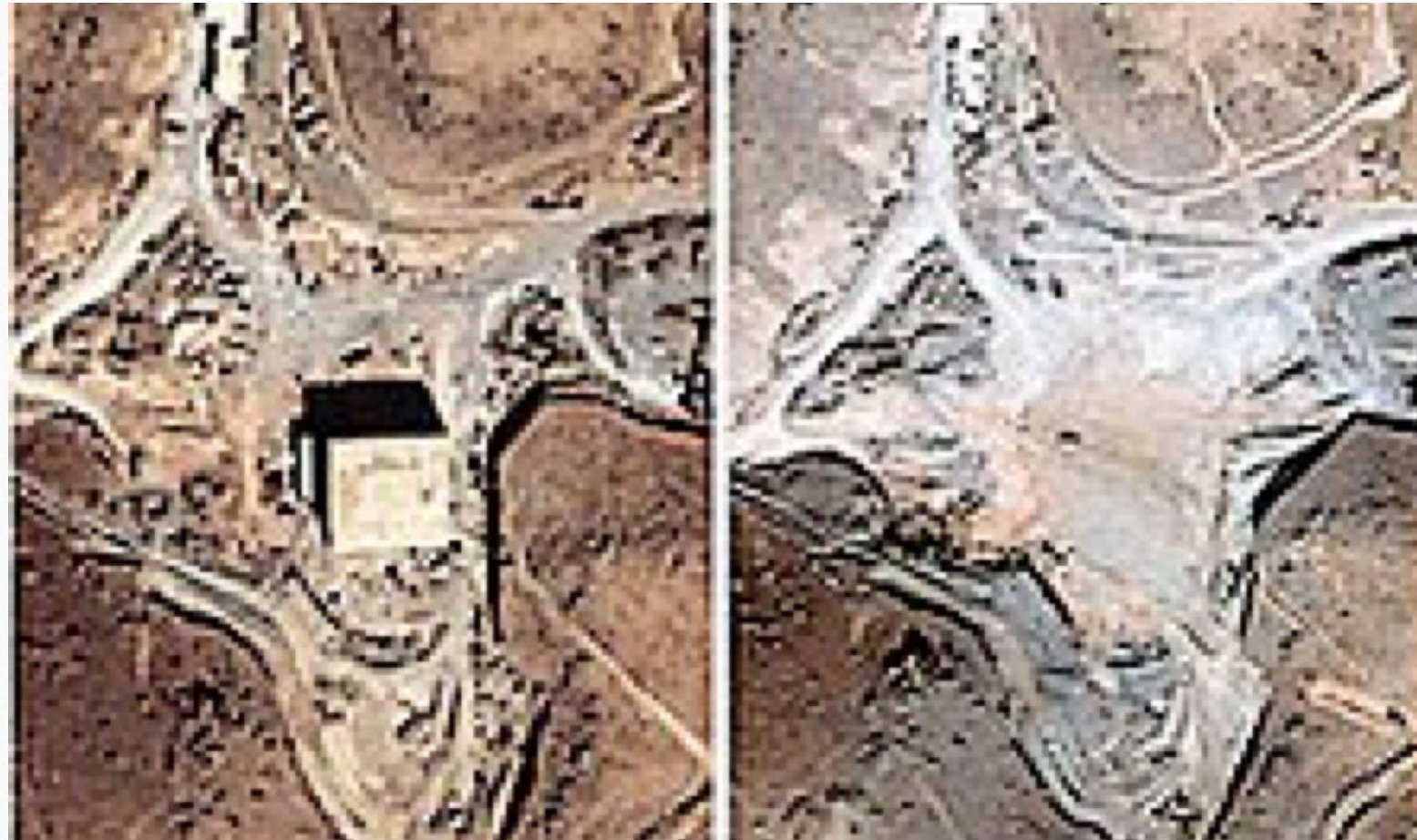


 Image just after bombing





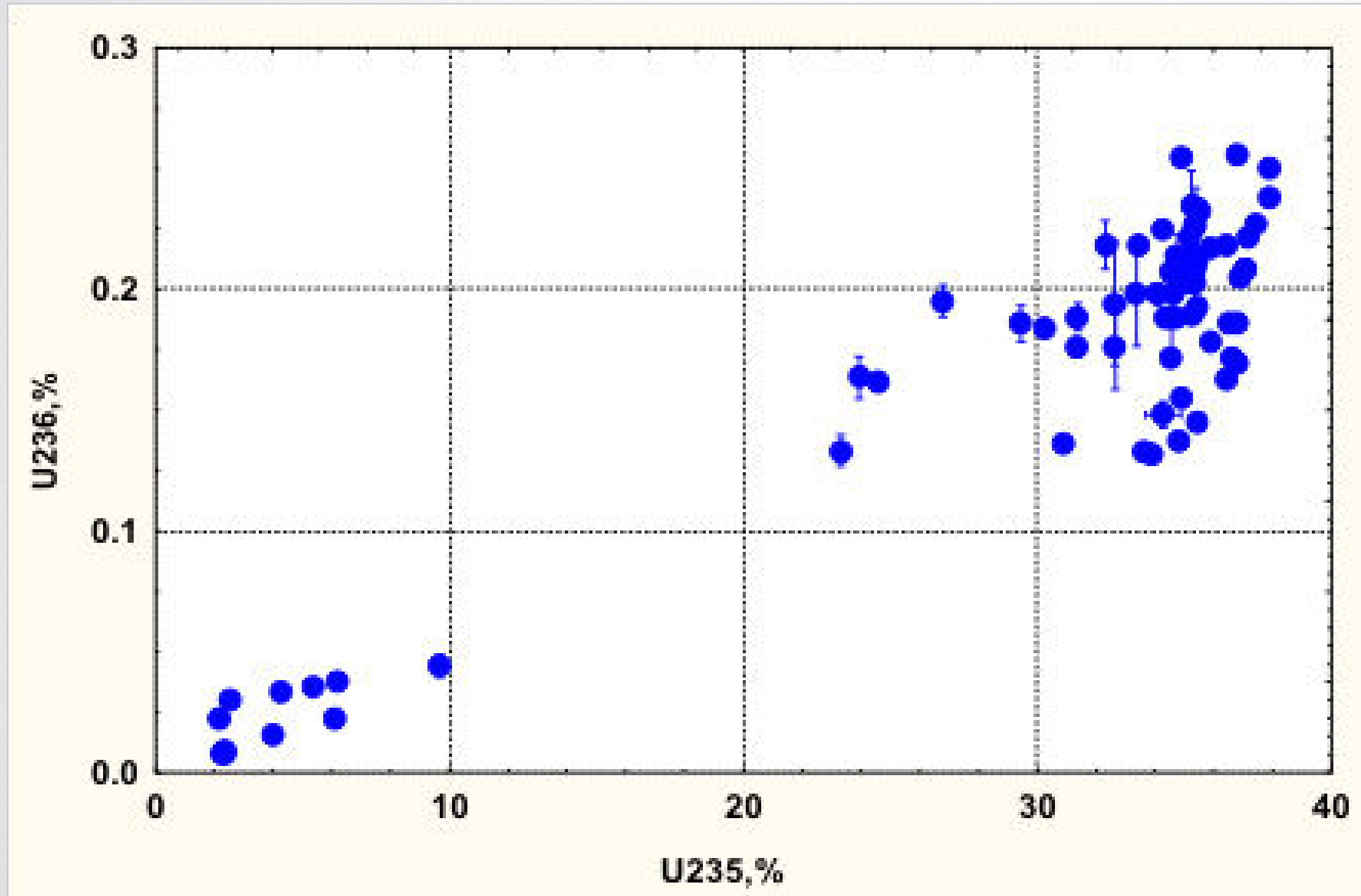
- President Al-Assad dismissed allegations that the site hosted, or was planned to host, a nuclear reactor.
- Syria eventually stated that the building was a non-nuclear military building.

- Anthropogenic natural uranium particles found.
- Isotopic and chemical composition and the morphology of the particles indicate that there is a low probability that the source of the particles were the use of missiles.
- Traces of graphite and steel.

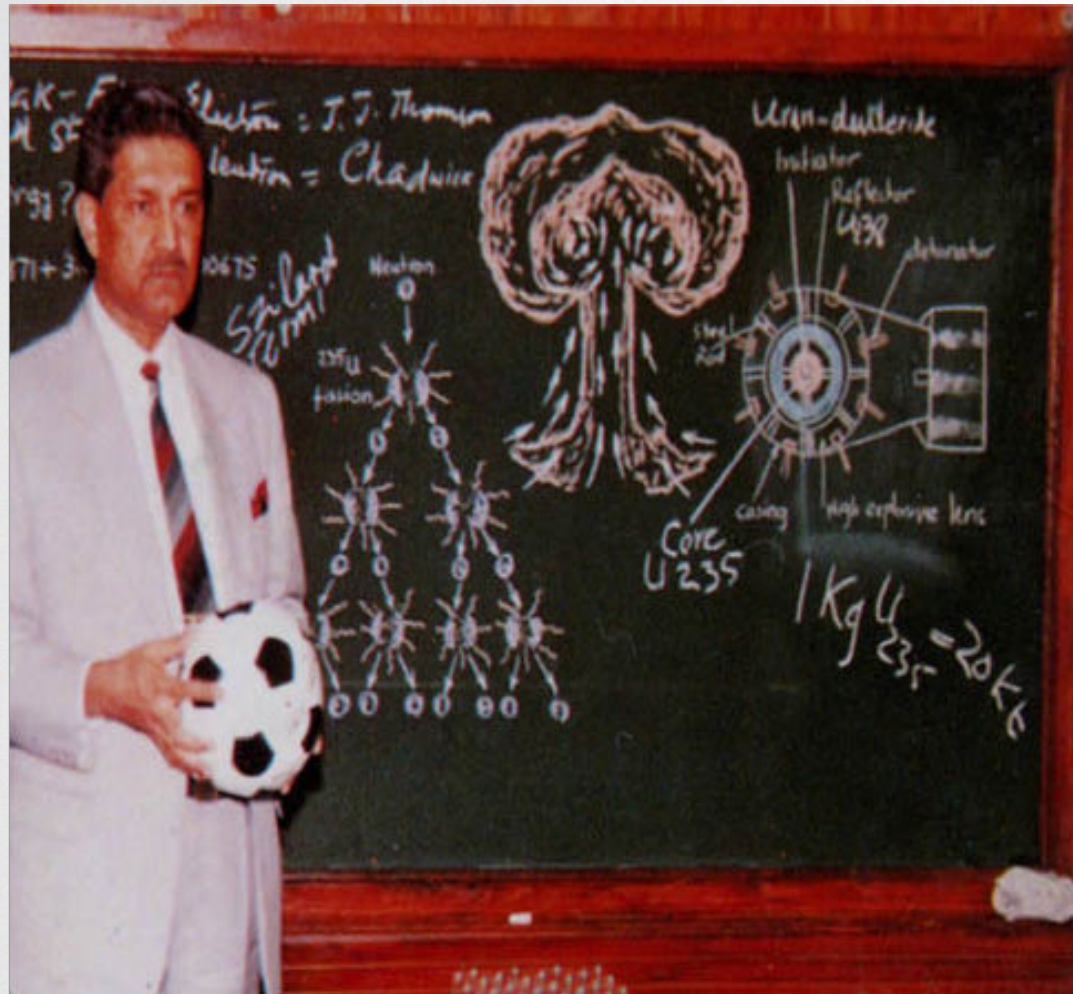


- Notwithstanding the loss of substantial information, after all information available, the IAEA concluded that the destroyed building was very likely a nuclear reactor.
- The IAEA Board found Syria in non-compliance with its safeguards agreement and reported it to the UN Security Council.

What Particle Analysis Tells



- International Atomic Energy Agency, “Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran,” GOV/2004/34, 1 June 2004.
- <https://www.iaea.org/sites/default/files/gov2004-34.pdf>



- High enriched uranium particles found in 2003 at the Kalaye Electric workshop in Tehran lead to a long series of revelations, which brought into day light not only Iran's unreported uranium enrichment activities, but lead also to the busting of the A.Q. Khan network.



Impurities Can Tell About the Origin

- Yellow cake
- Uranium conversion process
- Uranium hexafluoride or Uranium dioxide
- Multielement analysis, patterns



Not Time to Rest

- There is still work for science: we need to develop techniques to analyze chemical composition of nanometer scale uranium and plutonium particles.
- International co-operation: sharing of nuclear “forensics” finger-print information vital in combating against black markets and terrorism.

- Agendas for the meetings agreed in advance.
- Summaries of meetings.
 - » Sent for the comments to the DPRK.
- IAEA activities in the DPRK – [rolling text].
- IAEA information requirements – [rolling text].
- Equipment and methodologies used
 - » Seminars
 - » DPRK attending demonstrations and calibrations

- Transportation and shipments
 - » rented cars
 - » rail
 - » helicopters
 - » commercial airlines
- Equipment and even consumables need to be imported.
- Counterparts
 - » The Permanent Mission of the DPRK
 - » General Department of Atomic Energy
 - > Pyongyang
 - > Officials at the sites
 - » Foreign Ministry
- UNDP and World Food Program
 - » Cash payments in Euro required
- Faxes, letters and at a later stage, emails
 - » Sent often after meetings to confirm the agreement



Thank you for your time

I look forward to answering your questions

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