Safeguards in action: IAEA at Rokkasho, Japan

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OVERVIEW of RRP

• **Location:** Aomori Prefecture, Japan
• **Site Area:** 3,800,000 m²
• **Facilities:** 38 buildings (more than 20 process and storage buildings) with 1700 km of pipes (Main Process 700 km).

• **Capacity:**
  • Maximum Annual Reprocessing: 800 tons of Uranium or 8 tons of Plutonium.
  • Maximum Daily Reprocessing: 4.8 tons of Uranium
  • Storage Capacity for Plutonium: 30 tons
  • Storage Capacity for vitrified packages: 1440
Reprocessing main steps

Mining
Enrichment
Fuel fabrication
Reactors & Services
Spent fuel reprocessing
Recycling:
MOX fuel fabrication
Chemistry
Natural uranium
Enriched uranium
Final waste disposal
Recyclable uranium
Plutonium

Reprocessing operations
(Shearing - dissolution - separation - purification)

Uranium
Plutonium
Process waste

Recyclable materials

Waste from facility operations
Hulls and end-pieces
Vitrified waste
Compacted waste

Receiving
Interim storage
Fuels assemblies
Waste Treatment

Reprocessing operations

IAEA
Safeguards Challenges

• Comprehensive Design Information Examination and Verification

• High throughput requires additional measures to increase the confidence about the absence of diversion and to confirm that the plant is operated as declared:
  • Near Real Time Accountancy (NRTA)
  • Measurement/Monitoring within the MBAs
  • Activities at Other Strategic Points to confirm the Operational Status (random, short notice)

• Limited resources imply to rely on unattended measurement and monitoring systems as well as on automated evaluation software

• The approach needs to rely on independent DA samples and analytical analyses (On Site Laboratory)
Main aspects of Safeguards Approach

- Design information examination / design information verification
- Verification of inventory changes (100% in/out)
- Verification of interim inventory for timeliness
- Verification of physical inventory (annual) including evaluation of MUF/SRD
- Examination of operator records and reports
Efficient Safeguards Approach

- Unattended measurement systems
- Integrated data collection and evaluation software
- On-site laboratory
- Well trained inspectors !!! 😊
RRP Accountancy Structure

- MBA-1: Spent Fuel Receipt and Storage Head-end Area
- MBA-2: Main Process Area, including U Conversion and Laboratories
- MBA-3: Waste Treatment and Storage Area
- MBA-4: MOX Conversion Area
- MBA-5: Product Storage Area
Safeguards Systems

Verification systems

- Integrated Spent Fuel Verification System (ISVS)
- Integrated Head-end Verification system (IHVS)
- Rokkasho Hulls Measurement System (RHMS)
- Solution Measurement & Monitoring System (SMMS)
- Independent Jug Passage Detectors (IJPD)
- Automatic Sample Authentication System (ASAS)
- Waste Crate Assay System (WDAS used HRGS)
- Vitrified Canister Verification System (VCAS)
- Plutonium Inventory Measurement System (PIMS)
- Temporary Canister Verification System (TCVS)
- Improved Plutonium Canister System (iPCAS)
- IPCAS Load Cell (IPLC)
- Directional Canister Passage Detector (DCPD)
- MOX Storage C/S System (MSCS)
- Uranium Bottle Verification System (UBVS)
- Uranium Storage C/S/ System (USCS)
Main Process

Conversion Area

Product Storage Area

Spent Fuel Receipt and Storage

Head End Process

SOLUTION MEASUREMENT AND MONITORING SYSTEM for:
Verification of Inventory Changes (SMMS)
Interim Inventory Verification – IIV (SMMS)
Verification of Flows in the MBA (SMMS)
Physical Inventory Verification - PIV (SMMS)
Sample Taking with Automated Sampling and Authentication System for:

- Verification of Inventory Changes (ASAS)
- Interim Inventory Verification – IIV (ASAS)
- Verification of Flows in the MBA (ASAS)
- Physical Inventory Verification - PIV (ASAS)
Automatic Sampling Bench (RRP)
Specific SG implementation at RRP: an On-Site Laboratory for DA analyses

Operated jointly with State Authority