EURATOM approach to Regional System of Accounting for and Control of Nuclear Material (RSAC)

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European Commission
DG ENERGY– E5
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Directorate General of Energy
Directorate E – Euratom safeguards

Unit E5 - Nuclear accountancy and international obligations

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Outline

EURATOM approach to Regional System of Accounting for and Control of Nuclear Material

- **Overview of Euratom safeguards**: Context, legal framework, Euratom organisation and activities
- **Safeguards reporting within the EU**: Reporting requirements, data collection and processing
- **NMA reporting to the IAEA**
- **Perspectives and challenges** *(in the field of safeguards reporting)*
Overview of Euratom safeguards
Nuclear industry in the European Union (EU)

- 28 member states (2 NWS: UK, FR) sharing European institutions and European policies
- 128 nuclear power reactors in operation in 14 states. 857 TWh produced in 2015 (26.5% of EU electricity).
- Activities cover all the fuel cycle, including mining, conversion, enrichment (4 facilities), fuel fabrication (LEU, HEU, MOX) and...
- Reprocessing: 2 sites (Sellafield –UK, La Hague -France)
Institutional framework of EURATOM safeguards

- Euratom treaty / Chapter 7 (Safeguards)
  - Treaty signed in March 1957. Creates a European Atomic Energy Community (Euratom). Euratom community includes all member states of the European Union (EU) and shares institutions with the EU.
  - Safeguards apply to uranium, plutonium, thorium.
  - Art 77: the European Commission (EC) to ascertain that, in the territories of Member States:
    
    a) Nuclear materials are not diverted from their declared use
    
    b) Safeguarding obligations assumed by the Community under an (international) agreement are complied with
Scope of international safeguards in the EU

- 3 multilateral safeguards agreements with IAEA
  - INFCIRC 193: 26 European NNWS, Euratom, IAEA
  - INFCIRC 263: UK, Euratom, IAEA
  - INFCIRC 290: France, Euratom, IAEA
- Bilateral agreements in force between Euratom and: USA, Canada, Australia, Japan, Kazakhstan, Uzbekistan, Ukraine
Euratom safeguards in practice

- Safeguards activities assigned to the European Commission based on Chapter 7 of the Euratom treaty are implemented in Euratom Safeguards Directorate of Directorate General for Energy
  - 21 nuclear accountants (verification of accountancy reports).
  - 130 inspectors involved in physical verifications on site in year 2016. 27 technicians providing support in using safeguards equipment.
  - Independent safeguards conclusions (yearly for each MBA).

- Integrated Management System (IMS)
  - Partnership approach with the IAEA
    - Coordination, Liaison Committees (HLLC, LLLC), Working Groups
    - 1 person–1 job principle. Tasks, results, training, equipment are shared. > 50 % of inspections were performed with the IAEA in 2016.

- NMA reporting to IAEA (as per INFCIRC agreements) is ensured by the EC based on reports received from nuclear operators.
## Euratom inspections (year 2016)

<table>
<thead>
<tr>
<th>Installation type</th>
<th>Inspection effort (person x days)</th>
<th>Number of on-site inspections</th>
<th>Number of joint EURATOM /IAEA inspections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reprocessing</td>
<td>1 146</td>
<td>146</td>
<td>19</td>
</tr>
<tr>
<td>Enrichment, fuel fabrication</td>
<td>2 039</td>
<td>302</td>
<td>172</td>
</tr>
<tr>
<td>Power reactors</td>
<td>545</td>
<td>406</td>
<td>230</td>
</tr>
<tr>
<td>Storage, research, ...</td>
<td>875</td>
<td>313</td>
<td>210</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>4 605</strong></td>
<td><strong>1 167</strong></td>
<td><strong>631</strong></td>
</tr>
</tbody>
</table>
Organisation of Euratom Safeguards Directorate

- Directorate General for Energy. Director General: Dominique RISTORI
  - Deputy Director General: Gerassimos THOMAS
- Directorate E. Euratom Safeguards. Director: Stephan LECHNER
  - **E1**: Quality assurance and technology
    Paul MEYLEMANS
  - **E2**: Inspections: reprocessing plants
    Sotiris SYNETOS
  - **E3**: Inspections: fuel fabrication and enrichment plants
    Peter BEUSELING
  - **E4**: Inspections: reactors, geological repositories and other installations.
    Pavel JIRSA
  - **E5**: Nuclear accountancy and international obligations
    Stefano CICCARELLO
Role and missions of Unit E5

**Accountancy:**
- CMF3 database
- Receipt & verification of accounting reports
- Transit Matching
- Generation and transmission of NMA reports to IAEA
- Support to inspection units

**Additional protocol:**
- Management of AP declarations and Complementary Accesses

**Notification of imports/exports:**
- Receipt and verification
- Transmission to IAEA & Third States

**International agreements:**
- Negotiations and establishment of administrative arrangements
- Implementation (balances, flag swaps)

**Evaluation**
- Assessment of material balances and MUF (processing facilities)
Safeguards reporting within the EU
Reporting requirements, data collection and processing
Regulatory framework of Euratom safeguards

Regulation Euratom n°302/2005

- Directly applies to persons/undertakings holding nuclear material

- Defines safeguards requirements, especially regarding accountancy and control systems (NMAC) to be implemented by nuclear material holders

- Defines the requirements in terms of reporting to the European Commission (Basic Technical Characteristics, NMA reports...)

- Particular Safeguards Provisions (PSP) may introduce additional requirements

- Supplemented with recommendations:
  - Euratom 2006/40: provides guidelines and explanations on technical aspects (e.g. reporting examples)
  - Euratom 2009/120: reference characteristics of NMA systems
# Communications to EC as per Reg. EURATOM n°302/2005

<table>
<thead>
<tr>
<th>Type</th>
<th>Transmission</th>
<th>Type</th>
<th>Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design information (BTC)</strong></td>
<td>≥200 days before first receipt ≤30 days after a change</td>
<td><strong>Programme of activities</strong></td>
<td>Annual ≥40 days before PIT</td>
</tr>
<tr>
<td><strong>Inventory Change (ICR)</strong></td>
<td>Monthly, XML format By 15th of the following month</td>
<td><strong>Advance notifications</strong></td>
<td>Exp.: ≥8 days before packing Imp.: before receipt, &gt;5 days before unpacking XML format</td>
</tr>
<tr>
<td><strong>Physical Inventory Listing (PIL)</strong></td>
<td>≤30 days after PIT, XML format</td>
<td><strong>Conditioned waste</strong></td>
<td>Annual by Jan. 31</td>
</tr>
<tr>
<td><strong>Material Balance (MBR)</strong></td>
<td>≤ 30 days after PIT, XML format</td>
<td><strong>Ore shipment / exports</strong></td>
<td>Annual, by Jan 31</td>
</tr>
<tr>
<td><strong>Special reports</strong></td>
<td>Unusual occurrences (loss, gain, delayed transfer)</td>
<td><strong>AP Art. 2 a (iii) declarations</strong></td>
<td>Annual by April 1</td>
</tr>
</tbody>
</table>
Specificities of accounting reports due under Reg. Euratom 302/2005

- Accounting reports are electronic (*XML format*)
- **MAIN DIFFERENCES COMPARED TO CODE 10**
  - 2 categories for enriched uranium (LEU <20%, HEU >= 20%)
  - Book stocks at the end of the month are reported monthly in ICR
  - 2 dates are reported in ICR (accounting + physical). Balances are established based on accounting dates.
  - Additional fields: safeguarding obligations, reference to advance notification, burn-up...
  - Specific requirements:
    - E.g., shipper and receiver must report the same batch ID (20 characters)
Accounting data received and processed by Euratom Safeguards Directorate (year 2016)

- ~9,500 NMA reports
- 2.2 millions records (lines)
Quality management

- **IMS** (Integrated Management system). Quality driven approach.
- **High Level Process Map** of DG ENER E defines the process structure used by the Nuclear Safeguards Directorate to establish safeguards conclusions.
- "**Treatment and verification of NMA declarations**" is a business process owned by Unit E5. It contributes to the achievement of several core processes and sub processes defined in the High Level Process Map in interaction with inspection activities.
CMF3 data handling and processes in DG ENER E5

- **Operators**
  - ICR
  - PIL
  - MBR

- **3rd states**
  - AN

- **Sites & Member states**
  - AP

**CMF3 (NMA data)**
- Receipt Loading
- Verification of declarations
  - Compliance
  - Consistency
  - Correctness

**ANIA Advance notifications**

**CAPE Additional Protocol**

**Transit Matching**

**Code 10 NMA reports**

**Other INFCIRC reports**

**Inspection process**

**Balances**

**Confirmation of transfers**

**AP declarations**

**3rd states**

**Requests for correction / explanation**

**IAEA**

**Energy**
NMA data routine verifications

Data entry
Receipt, decryption, registration, loading
First verifications [numbering/type of report, nbr of lines, CRC...]

Accountancy verifications
Compliance with requirements (incl. reporting deadlines), Consistency, Balance correctness

Transit Matching
Consistency between shipments and receipts (EU)

- LORE app., warnings generated when pre-loading
- Edition of XML files

- Automatic warnings when loading data
- CMF3 apps: generation of standard reports, editing and querying tools (ABE, NMA, BO)

- Specific tool (TRANSIT)
- Monthly run
NMA reporting to IAEA
Reporting flows (*)

- IAEA (ICR, PIL, MBR) - Code 10 format
  > 1 300 Adv. Notifications

- DG Energy / E5
  ~2.2 M entries/year (ICR, PIL, MBR lines)
  Euratom Format (Reg. 302/2005)
  >4 400 Adv. Notifications

- EU nuclear installations
  (950 MBA, incl. CAM)

- Third states
  Confirmation of transfers
  Notifications

- (*) year 2016

*~2.1 M entries/year IAEA (ICR, PIL, MBR) - Code 10 format
> 1 300 Adv. Notifications

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(* denotes 2016 data)
Reporting to IAEA (1)

- 2 transmissions per month according to fixed schedule.
- Selection from NMA reports submitted by EU operators under regulation Euratom 302/2005 and translation into "labelled code 10".
- Secure program aimed to run after completion of NMA verifications.

<table>
<thead>
<tr>
<th>Month M</th>
<th>Month M+1</th>
<th>Month M+2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission (operator)</td>
<td>Verification (Euratom)</td>
<td>1st transmission</td>
</tr>
</tbody>
</table>

- MBR's are generated based on received ICR's and PIL's
Reporting to IAEA (2)

- EURATOM feedback
  - Comments and requests issued monthly by IAEA after transmission of Euratom reports
  - Issues are followed up by Euratom accountants. When necessary, a request for explanation/correction is sent to operators.
  - Open issues are discussed with IAEA when needed. 2 WGAR meetings /year.
Euratom perspectives and challenges (safeguards reporting)
Perspectives and challenges (1)

- **Technical challenges:**
  - Further generalisation of electronic reporting
  - Protection of data and networks
  - Improvement of IT tools to support verification activities

- **Particular Safeguards Provisions** (review)

- **Safeguards policy challenges:**
  - Cybersecurity
  - Waste, decommissioning activities
  - Small holders
  - Geological repositories
  - ...

- **BREXIT**

Any significant change in safeguards approach or regulation will require approval from EU Council.
Perspectives and challenges (2)

Interactions with IAEA

- **EC is preparing for:**
  - Migration to XML reporting format (instead of labelled text format)
  - Reporting corrections based on "by-difference" principle
  - Reporting additional information (accounting dates)

- **Expectations:**
  - Consistency gain between EC and IAEA systems with reduction of manual procedures
  - Resolution of a number of inherited reporting issues

- **IAEA approach to waste (termination of safeguards), decommissioning activities**

- **Facility Attachments** (review)
Thank you!

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