TRANSPORT OF RADIOACTIVE MATERIAL IN SPAIN

Fernando Zamora
Area of Transport and Nuclear Fuel Fabrication
Nuclear Safety Council (CSN)
Where is Spain?
3 Nuclear and Radioactive Facilities in Spain

- 361 Medical radioactive facilities
- 839 Industrial radioactive facilities
- 188 Research radioactive facilities

- 6 Nuclear Power Plant
- 2 NPP in Decommissioning
- 1 Nuclear Fuel Fabrication
- 1 Waste Temporal storage

Locations:
- Almaraz
- Juzbado
- Trillo
- Sª Mª Garoña
- Cofrentes
- Almaraz
- El Cabrill
- Ascó
- Vandellós 1
- Vandellós 2
Regulatory Framework - Transport

- **ADR**
  - European Agreement concerning the international carriage of dangerous goods by road

- **IMDG Code**
  - International Maritime Dangerous Goods Code

- **ICAO TI**
  - Technical Instructions for the safe transport of dangerous goods by air of the International Civil Aviation Organization (ICAO)

- **RID**
  - Regulation on the international transport of dangerous goods by rail
5 Regulatory Framework – Additional Applicable Regulations

- **Basic Nuclear Regulations**
  - Law 25/1964, on Nuclear Energy
  - Law 15/1980, on the creation of the Spanish Nuclear Safety Council

- **Licensing**
  - Decree 2860/1972, Regulation on Nuclear and Radioactive Facilities

- **Radiation Protection**
  - Royal Decree 783/2001 Regulation on the Protection of Health against Ionizing Radiations

- **Nuclear Liability**
  - Law 25/1964, on Nuclear Energy
  - Royal Decree 2177/1967 Regulation on the Coverage of Nuclear Risks

- **Physical Protection (Security)**
  - Royal Decree 1308/2011 on the physical protection of nuclear facilities and materials and radioactive sources

- **Radioactive waste Shipments**
  - Royal Decree 243/2009 on the surveillance and control of shipments of radioactive waste and spent nuclear fuel between Member States or transferred from or to countries outside the European Union
6 Competent Authorities in Transport

Ministry of Industry, Energy and Tourism
- Issues the approvals of radioactive packages and shipments
- Issues Transport security approvals
- Carriers Registration (Safety and Security)
- Issues sanctions (nuclear scope)

Nuclear Safety Council (CSN)
- Safety report to the M. Industry on package and shipments approvals
- Inspection on transport of radioactive material (Safety and Security)
- Formulate proposals for Enforcement actions
- Support the Ministry of Transport in regulations on class 7
- Support the Ministry of Internal Affairs in Radiological Emergencies
- Security reports to the M. Industry
- Advice on nuclear safety and radiation protection to other authorities

Ministry of Transport
- Prepare Regulations on transport of Dangerous Goods (class 7 included)
- Coordination of Competent Authorities on the transport of DG

Ministry of Internal Affairs
- Security reports to the M. Industry
- Security arrangements and inspections
- Transport Emergency Leadership
CSN was created by Law 15/1980

- Sole competent authority in nuclear safety and radiological protection matters.

- Independent from the Government.

- Assets and legal status of its own, financed fundamentally by fees.

- Accountable only to Parliament
Nuclear Safety Council (CSN) - Organization

Chairman's Staff Office

- Commissioner
- Vice Chairman
- Chairman
- Commissioner
- Commissioner

Secretary General

- Technical Directorate for Nuclear Safety (120)
- Technical Directorate for Radiation Protection (124)
- Chairman's staff Office (44)
- Secretary General (161)

- Human resources
- Technical Directorate for Radiation Protection
- Secretary General

- R&D Unit
- Inspection Unit
- Planning and quality management Unit
- Centralized Storage Facility (ATC)

- Nuclear facilities
- Engineering
- Nuclear Technology

- Transport and Nuclear Fuel Fabrication
- Operational radiation protection
- Emergencies and Physical protection
- Information Technologies
- Enviromental radiation protection
- Operational radiation protection
- Legal Services
Transport Unit in the CSN

- Nuclear facilities
  - Transport and Nuclear Fuel Fabrication
    - Transport
    - Juzbado Project
  - Nuclear Engineering
  - Mechanical / Thermal
  - Radiation Protection
  - Physical Protection
  - Emergencies
  - Quality Assurance
## Summary of transports in Spain

<table>
<thead>
<tr>
<th>Type of Package</th>
<th>Radioactive material use</th>
<th>Consignments /year</th>
<th>Modes of transport</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excepted and Type A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry (Moisture Gauges)</td>
<td>o Medicine, Research, Industry</td>
<td>&gt; 40.000</td>
<td>Air/road</td>
</tr>
<tr>
<td></td>
<td>o Industry (Moisture Gauges)</td>
<td>Hundreds</td>
<td>Road</td>
</tr>
<tr>
<td><strong>Industrial</strong></td>
<td>o Radioactive wastes</td>
<td>~ 300</td>
<td>Road / Maritime</td>
</tr>
<tr>
<td></td>
<td>o Contaminated objects</td>
<td>~ 100</td>
<td>Road</td>
</tr>
<tr>
<td></td>
<td>o Uranium concentrates</td>
<td>~ 10</td>
<td>Maritime (Transits)</td>
</tr>
<tr>
<td><strong>Type B</strong></td>
<td>o Industrial gammagrahphy</td>
<td>Hundreds</td>
<td>Road</td>
</tr>
<tr>
<td></td>
<td>o Teletherapy and Industrial  irradiators</td>
<td>~ 5</td>
<td>Air / Road/Maritime</td>
</tr>
<tr>
<td><strong>Fissile</strong></td>
<td>o Uranium Oxide</td>
<td>~ 70</td>
<td>Road/Maritime</td>
</tr>
<tr>
<td></td>
<td>o Fresh Fuel Assemblies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Transport of Radiopharmaceuticals

- Madrid
- Bilbao
- Barcelona
- Baleares
- Sevilla
- Valencia
- Santiago

Transportation routes to Reino Unido, Holanda, Bélgica, Francia y Alemania.
Transport from Radiopharmacies and Ciclotrons (F-18)
Maritime transits
100 % imported

Maritime – road
Transport in the Nuclear Fuel Cycle: Fresh Fuel Assemblies

~ 30% of transports towards Spanish NPP

80% of transports by road
20% Road - maritime
At present only sporadic transports of irradiated rods for research projects
Spent Fuel Management

- **Operating forecast**: 2015
  - Sª Mª Garoña NPP
- **Operating since**: 2002
  - Capacity: 80 casks
  - SF Assemblies stored: 525 (25 casks)
- **Operating since**: 2009
  - Capacity: 12 SF casks + 4 RW casks
  - SF Assemblies stored: 377 (12 casks)
- **Operating since**: 2013
  - Capacity: 32 casks
  - SF Assemblies stored: 160 (5 casks)
- **Operating forecast**: 2018
  - Centralised Storage Facility

- ~14000 SF Assemblies are just stored in SF pools
- 1062 SF Assemblies in Dry Casks
Transport of spent fuel to the centralized storage

Transports of SF would start at 2018 - 2019
Summary of Transport Licensing and Inspections

- Packages approvals/validations: About 6 per year (14 designs just approved)
- Shipment approvals: about 2 per year (special arrangements)
- Physical protection authorisations: about 3 per year
- Carriers by road registration: about 2 per year (50 just registered)

Inspections:

- About 80 inspections (specific on transport): to consignors, carriers, consignees and shipments.
- Compliance checking of transport requirements included in general inspection to radioactive facilities activities (mobile gammagraphy, mobile gauges, suppliers of radioactive material).
## Transport Events (1997-2013)

<table>
<thead>
<tr>
<th>Event Type</th>
<th>1997-2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Packaging deviations</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Inappropriate contents</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Packaging contamination</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Events in airport terminals</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>31</td>
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<tr>
<td>Road accidents</td>
<td>15</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>28</td>
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<tr>
<td>Thefts from vehicles</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Lost packages</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>62</strong></td>
<td><strong>8</strong></td>
<td><strong>5</strong></td>
<td><strong>5</strong></td>
<td><strong>2</strong></td>
<td><strong>1</strong></td>
<td><strong>5</strong></td>
<td><strong>88</strong></td>
</tr>
</tbody>
</table>
The CSN Safety Instructions (IS) are binding regulations which try to complement the transport regulations.

<table>
<thead>
<tr>
<th>Nº</th>
<th>Subject</th>
<th>Publication date</th>
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</thead>
<tbody>
<tr>
<td>IS-34</td>
<td>Radiation protection, non compliances, emergency availability</td>
<td>2012 (S/E)</td>
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<tr>
<td>IS-35</td>
<td>Modification of package designs</td>
<td>2014 (S/E)</td>
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<tr>
<td>IS-XX</td>
<td>Control of packaging manufactures</td>
<td>Expected in 2014</td>
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<tr>
<td>IS-XX</td>
<td>Training of workers involved in transport operations</td>
<td>Expected in 2014</td>
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<tr>
<td>IS-XX</td>
<td>Notification of transport events to the CSN</td>
<td>Expected in 2015</td>
</tr>
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</table>

S/E: in Spanish and English
The CSN Guides are non binding documents which try to help for complying with regulations. The series number ‘6’ is dedicated to transport subjects.

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<thead>
<tr>
<th>Nº</th>
<th>Subject</th>
<th>IAEA Equivalent</th>
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<tbody>
<tr>
<td>6.1</td>
<td>Quality Assurance Programmes in transport</td>
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<tr>
<td>6.2</td>
<td>Radiation Protection Programmes</td>
<td>TS-G-1.3</td>
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<tr>
<td>6.3</td>
<td>Emergency Instructions</td>
<td>TS-G-1.2 (partially)</td>
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<tr>
<td>6.4</td>
<td>Application of package and shipments approvals (S/E)</td>
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<tr>
<td>6.5</td>
<td>Assistance for the application of transport regulations</td>
<td>TS-G-1.6</td>
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<tr>
<td>6.6</td>
<td>Compliance Documentation for Non Approval packages (in elaboration / publication expected: 2015)</td>
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</tbody>
</table>

S/E: in Spanish and English
The CSN produces brochures, documents and videos for information of the public and for helping in the training of workers involved in transport of radioactive material. This material is accessible directly from the CSN web site or may be obtained free of charge through the CSN Publication Department.

CSN web site: www.csn.es

  - Transport of radioactive material
  - Transport: requirements
  - Transport: Standards
  - Summary of regulatory requirements
  - Clarification of regulatory requirements
  - List of transport packages approved in Spain
  - Denials and Delays on transport of radioactive material
  - Other matters of interest
Present and short terms challenges

- Reduce doses of radiopharmaceutical carriers
- Reduce events in radiopharmaceutical transports
- Improve the training of workers involved in transport activities
- Improve the control on the fabrication of packages
- Licensing of new package designs for Spent Fuel
- Future shipments of Spent Fuel towards the Centralised Storage Facility
Thank you
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