Radiation Safety Regulation
Of Nuclear Technology Utilization in China

Ministry of Ecology and Environmental, P. R. China
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By the end of 2018, there were about 73,000 nuclear technology utilization units in China, including 11,000 source units and 62,000 radiation-emitting devices units.
The development of application units

Units number of utilizations on nuclear technology in China

- 2013: 62,270
- 2014: 65,266
- 2015: 65,531
- 2016: 67,430
- 2017: 68,249
- 2018: 73,070
The number of the radioactive sources and radiation-emitting devices is increasing every year.
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MEE shall implement unified safety supervision over national nuclear technology utilization

- Issuance of license
- Approval for Environmental Impact Assessment
- Approval for import, export and transfer of radioactive sources
- Supervision and inspection
- Emergency response in radiological accidents
Laws

Regulations of the State Council

Department Rules

Law on the Prevention and Control of Radioactive Pollution (Decree No. 6 by the Chairman, 2003)

Regulations on Safety and Protection of Radioisotopes and Radiation-emitting Devices (State Council Decree No. 449)

Rules on the Licenses for the Safety of Radioisotopes and Radiation-emitting Devices (MEP Order No. 3, 2006)

Rules on Safety and Protection of Radioisotopes and Radiation-emitting Devices (MEP Order No. 18, 2011)

National Standards
- Basic standards for protection against ionizing radiation and for the safety of radiation sources
- Regulations for design construction and use of gamma irradiation facilities
- Etc...

Nuclear Safety Guidelines
- Decommission of Gamma Irradiation Facilities
- Requirements for the Security System for Urban Radioactive Waste Repository
- Etc...
## Categorization & Hierarchical Regulation

<table>
<thead>
<tr>
<th>Category</th>
<th>License issued by</th>
<th>Accident level if miss/stolen/lost control</th>
<th>Emergency Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>MEE</td>
<td>Exceptional Serious Accident (cause large scale pollution); Major Accident (no large scale pollution)</td>
<td>MEE</td>
</tr>
<tr>
<td>II</td>
<td>Provincial Ecology and Environment Bureaus (EEB)</td>
<td>Serious</td>
<td>local EEB (provincial or below provincial)</td>
</tr>
<tr>
<td>III</td>
<td>Provincial EEB (usually entrusted to municipal level)</td>
<td>Ordinary</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>Ordinary</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>Ordinary</td>
<td></td>
</tr>
</tbody>
</table>

China use the same Categorization method with IAEA’s RS-G-1.9
Categorization & Hierarchical Regulation

<table>
<thead>
<tr>
<th>Category (radiation-emitting devices)</th>
<th>License issued by</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>MEE</td>
</tr>
<tr>
<td>II</td>
<td>Provincial EEB</td>
</tr>
<tr>
<td>III</td>
<td></td>
</tr>
</tbody>
</table>

- Safety and protection requirements
- The degree of radiation damage caused by accidental exposure

High risk activities (Cat I)

- unprotected beam X-Ray generators, accelerators, etc.
- enclosed X-Ray appliance and conveyors;
- most of X-Ray medical diagnosis equipment;
- most of X-Ray veterinary diagnosis equipment;

Low risk activities (Cat III)
National register of radioactive sources

• Code Management for Sources
  – Each source has a unique identification number
  – Will not change in the whole lifetime
  – Record the main information of sources
  – fixed to the container/device and be transferred together with the source in the whole process from manufacture to the disposal
National register of radioactive sources

• **National Radiation Safety Management System**
  – Application Module (on Internet), for licensees
  – Regulation Module (By VPN), for regulatory body

• **Source ledger in the system**
  – Each licensee has its own ledger
  – Including all information of sources
  – Source information transferred automatically from the seller to the user, after register
  – can query historical information of sources

• **About the System**
  – 2004, MEP began to use IAEA’s RAIS
  – 2010, MEE established this system
  – 2017, In upgrading progress
Import & Export of Sources

**Import**
- Application → MEE → MOC → Customs → Import
- Consent Request (For Category 1)

**Export**
- Application → MEE → Customs → Export
- Consent Request (For Category 1)
Sources at the end of lifetimes

- **Imported Sources**
  - Repatriated to original country
  - Repositories

- **Domestic Sources**
  - Repositories
  - Return to the manufacturer
  - Recycle (Partly)
Radioactive Waste Repositories

A Sample of Provincial repository

Pits and Covering Slab

Semi-underground

31 Provincial repositories
1 National repository
Security Improvement Action

- Upgrading security measures of radioactive waste repository
Security Improvement Action

• Developed high-risk mobile source online monitoring system

  Real-Time Event Monitoring
  Improved Inherent Safety

  Ir-192: Radiography (industrial imaging)

that would cause a significant national security concern if used in an RDD or RED
Radiation Safety and Protection Training

- professional knowledge
- classic cases
- radiation science
- common problems

Online training (free)

- Item bank of radiation safety and protection

Online examination
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Bilateral cooperation on Safety & Security

PUNT (Peaceful Use of Nuclear Technology) between China and US

• Disused sources recovery
• Repository Security System Upgrade
• Cooperation on Security-by-Design for Gamma Irradiator Facilities
• Training Courses & Workshops
• etc.
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Challenges & Future Plans

• **Final disposal of disused sources**
  – Technical route and strategic planning is not determined
  – Technology of conditioning and disposal is not mature
  – Cost of collection and long-term storage is fairly high
  – Classification management and recycle technology need to be studied

• **Work in the technologies of recycling and conditioning**
  – Long-term storage facilities for Cobalt-60 irradiation source
  – Support domestic units in carrying out relevant research and exploration and project construction
Thank you!