Nuclear Regulatory Practices in Security of Radioactive Sources

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National Nuclear Safety Administration
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Regulatory Framework
- Regulatory Body & Responsibility
- Categorization & Hierarchical Regulation
- Legislation System

Important Regulatory Practices for Security of Radioactive Sources
- National Register of Radioactive Sources
- Preventative Measures
- Response Measures

International & Bilateral Cooperation on Security

Challenges & Future Plans
Regulatory Body & Responsibility

**MEP/NNSA: Unified Regulatory Body**

**MEP/NNSA**
Ministry of Environmental Protection
National Nuclear Safety Administration

- Unified Supervision on radioactive sources safety & security
  - Issuance of license
  - Approval for import and export of radioactive sources
  - Supervision and inspection
  - Emergency response in radiological accidents
  - Etc.

**MPS**
Ministry of Public Security

- Security guard of radioactive materials
- Regulation on transportation safety
- Investigation on the loss and theft of radioactive sources in radiological accidents

**MOT**
Ministry of Transport

- Qualifications on organizations for radioactive material transportation.

**MOC & Custom**
Ministry of Commerce, Customs

- Other procedures for import and export of sources

**CAEA**
China Atomic Energy Agency

- International information notification in radiological accidents.

**NHFPC**
National Health and Family Planning Commission

- License for diagnostic and therapeutic technique with radioactive sources
- Medical emergency in radiological accidents
## Categorization & Hierarchical Regulation

<table>
<thead>
<tr>
<th>Category</th>
<th>License issued by</th>
<th>Accident level if a source is miss/stolen/lost control</th>
<th>Emergency Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>MEP</td>
<td>Exceptional Serious Accident ; Major Accident</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Provincial EPB</td>
<td>Serious Accident</td>
<td>Local EPB (provincial or below provincial)</td>
</tr>
<tr>
<td>III</td>
<td>Provincial EPB</td>
<td>Serious Accident</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Provincial EPB (usually entrusted to municipal level)</td>
<td>Ordinary Accident</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td></td>
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</table>

China uses the same Categorization method with IAEA’s RS-G-1.9
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)

Regulations on the Control of Nuclear Materials (HAF 501)
Preventative Measures-Sources in Use

- National Radiation Safety Management System (NRSMS)
  - 2010, MEP established NRSMS
  - 2017, upgrading progress completed
- Cover Category I - V Sources
  More than 10,000 licensees
  More than 130,000 sources
- Including all information of sources
- Source information transferred automatically from the seller to the user, after register
- Can query historical information of sources
Preventative Measures - Sources in Use

- To avoid the Loss and Theft of sources in use is an important means to prevent the occurrence of radioactive sources out of the regulatory control.
- Strengthening the Nuclear Security in the workplace.
- The organization that produces and imports category I - III radioactive sources should sign the waste source recovery agreement.
- Radioactive Sources those are unable to be returned to manufacturers, should be sent to qualified organizations for centralized storage.
- Annual Accidental Rate of Rad-Source decreased from 2.5 per 10,000 in 2010's to approximate 1 per 10,000 in 2016.

Put an effective control on the transfer and non-local use of Radioactive Sources
State Council Decree No. 449

1. Both Parties shall register with the authorized EPB
2. Receiving party shall file an Application and prove the Validity of Transfer Activity
3. Transfer Activity must be carried out in the form of a Valid Written Agreement
Preventative Measures
- Import & Export of Sources

**Import**

1. Application
2. MEP
3. MOC
4. Customs
5. Import

Consent Request (For Category I)

**Export**

1. Application
2. MEP
3. Customs
4. Export

Consent Request (For Category I)
Preventative Measures - Disused Sources

- The leading cause of radioactive sources out of regulatory control
- Radioactive sources out of regulatory control could be recovered through Nationwide Campaign for Safety and Security Inspection of Radioactive Sources regularly

- In 2012, 1,261 sources left over from history
- In 2015, 119 sources
- In 2017, 1,005 sources (including 935 left over from history)
31 Provincial repositories, 1 National repository. Since April 2017, Collection and Storage of Disused Sources are free of charge for users.
Responsive Measures-Regulation and Training

- Strengthen the Monitoring of Metal Recycling & Smelting, Customs and other Places
  - Radiation Monitoring Devices are Installed at most Ports
  - Large metallurgical facilities are required to be equipped with Radioactivity Monitoring Device

- Technical Training Courses on the detection of Radioactive Sources out of regulatory control
Responsive Measures - Technical Research

- Research and Development of High Risk Mobile Radioactive Source Monitoring Technology
Responsive Measures-Emergency Plan

- Consistent with Regulation Principle

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<th>Accident level if a source is lost/stolen/out of control</th>
<th>Emergency Response</th>
<th>Emergency Plan</th>
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<tr>
<td>I</td>
<td>Exceptional Serious Accident ; Major Accident</td>
<td>Local EPB (Provincial or Below Provincial)</td>
<td>(Provincial or Below Provincial) Emergency Plan and Implementation Procedure</td>
</tr>
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<td>II</td>
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International cooperation on Safety & Security

Cooperation with IAEA
- IAEA IRRS in 2010
- IRRS Follow-up in 2016
- International Physical Protection Advisory Service (IPPAS) in 2017
PUNT (Peaceful Use of Nuclear Technology) between China and US

- MEP&US DOE (Working Group V)
- Disused Sources Recovery
  - 36 Nuclear technology utilization enterprises
  - 796 disused radioactive sources
  - Total activity, around 196,000 Curie
- Secure Transportation Vehicle & Radioactive Detectors Used Underwater
Bilateral cooperation on Safety & Security

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

- Repository Security System Upgrade
  - 31 Nuclear technology utilization enterprises
- Technical Manual for Security Equipment
- Training Courses & Workshops
  - More than 600 technicians
Challenges & Future Plans

• Safety and Security of Long-term Repository
  – A large amount of disused sources in storage currently
  – Research on final disposal of disused sources
  – Recycling and Reuse

• To Meet the Requirements of Counter-Terrorism Law of PRC
  – GPS-enabled electronic tags for radioactive sources

• To Establish National Detection Strategy and Response Plan
Thanks!