Practical Measures to Reduce Nuclear Risks from Fissile Material –
Origin of INFCIRC/549

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Viewpoints expressed here are those of the author, and not necessary those of his affiliations
INFCIRC/549 (Status up to 2016)

<table>
<thead>
<tr>
<th>Stock, t</th>
<th>1996</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>20.1</td>
<td>47.0</td>
</tr>
<tr>
<td>France</td>
<td>22.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Germany</td>
<td>2.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Japan</td>
<td>0.05</td>
<td>0.0</td>
</tr>
<tr>
<td>Switzerland</td>
<td>35.6</td>
<td>65.3</td>
</tr>
<tr>
<td>US</td>
<td>4.65*</td>
<td>49.45</td>
</tr>
<tr>
<td>China</td>
<td>0.0</td>
<td>0.04</td>
</tr>
<tr>
<td>Russia</td>
<td>51.9</td>
<td>110.3</td>
</tr>
<tr>
<td>UK</td>
<td>28.1</td>
<td>57.5</td>
</tr>
<tr>
<td>Total</td>
<td>165.6*</td>
<td>332.5</td>
</tr>
</tbody>
</table>

* Excess weapons Pu not included. If included, the total for US and 9 countries would be 45 t and 206 t, respectively.
Reducing Plutonium Risks

• **Soft Landing** – Belgium, Switzerland, Germany
  ➢ No more separated civil Pu in Belgium and Switzerland.
  ➢ Germany too, when it phases-out nuclear power in 2023.

• **Prolonged Landing** – Japan, w/RRP and JMOX
  ➢ With no new NPP, operating the Rokkasho Reprocessing Plant (RRP) and JMOX fabrication facility to produce MOX fuel on partial capacity would be very expensive),
  ➢ Japan would accumulate more plutonium if operate RRP at full capacity.

• **Alternate Landing** – US
  ➢ US cancelled plan to moxify 34 t weapons-grade plutonium (W-Pu) which could have been used in 5 reactors in 17 y.
  ➢ It opted for a “dilute-and-dispose” option, e.g., dilute in 170,000 55-gal drums and dispose of at WIPP in ~4 y.

* Pu turned into spent MOX fuel
Reducing Plutonium Risks

• **Diverging Cruise Control** – France
  Aim to balance its Pu stock with reprocessing in La Hague, MOX fuel fabrication in Melox, and recycling MOX in PWRs (with a “just-in-time” inventory policy).

• **From No Landing to Cooperative Landing** – UK (w/ France)*
  - UK has no reactor to use its 110 t Pu.
  - If UK Pu moxified at Melox and used in 13 French PWRs, gone* in ~20 y.
  - Electricity supplied to UK through the Channel and underwater cables.
  - UK pays for MOX and use-in-reactor service, and takes back spent MOX.

• **Awaiting Take-Off** – Russia, China and perhaps, ROK
  - Russia aims to moxify Mayak Pu for fast reactor (FR) BN800/1200.
  - China’s 50-t pilot Rep plant, 1/2-t MOX line and CEFR are in early stage.
  - KAERI’s Pyro-processing (w/USDOE) aims to make metal fuel for FR.

* Suggestion only.
Transparency of Plutonium Risks in Other Countries

- What to do with DPRK’s **denuclearized Pu** (if happens)?
  - Verifiably sent out to China, Russia or other P5?
  - To show good faith, DPRK could declare its plutonium stock “Excess” and include it into the INFCIRC/549 Declaration – just like what the US did in 1996?

- Would India, Pakistan and Israel be interested in joining the INFCIRC/549 and declare its inventory of “civil” plutonium?
  - Since India signed its CSA754 with the IAEA in 2014, it is under the obligation to use its civil plutonium stock for “peaceful purposes”, declaring that amount to INFCIRC/549 should be straightforward???
  - Pakistan could join INFCIRC/549 and declare its civil plutonium stock “zero”, just like China (from 1996 – 2009),
  - Israel may have to evaluate the pros and cons of joining INFCIRC/549.