

Nuclear Safety and Security: not just front-end issues

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Comments Presented on 20 August 2016

"International Seminar on Planetary Emergencies"

Erice, Italy



Pre-requisites for a Nuclear Future

1. Safe and secure nuclear power plants
2. Economic nuclear electricity
3. Safe and secure waste management
4. Public recognition that 1 – 3 are OK!!

What are the security risks associated with waste management?

- ◆ **Clandestine reprocessing of spent fuel to produce weapons materials – every tonne of spent fuel contains 10kg of Pu!**
- ◆ **Disruption of spent fuel or waste storage facilities in acts of terrorism or war**
- ◆ **Diversion of radioactive wastes with the intention of dispersion and contamination (“dirty bombs”)**

Disruption of waste storage facilities in acts of terrorism or war

- ◆ Should consider not only Spent Fuel stores
 - Unvitrified HLW stores; LILW warehouses
- ◆ Surface stores are generally robust
 - but not against concerted or sustained attack
 - some stores are relatively vulnerable to impact by large objects (aircraft, weaponry)
- ◆ Underground storage is better - but new systems for doing so are expensive (e.g. HI-STORM)
- ◆ Large numbers of dispersed surface stores enhance the risks
- ◆ Protracted surface storage (as an alternative to geological disposal) prolongs the risks

Diversion of radioactive wastes for dispersion and contamination: 'dirty bomb' scenario

- ◆ **In a populated area, water supply or transport system**
 - massive social and economic impacts, even if actual health hazards might be relatively low
- ◆ **Psychological effect of radioactive contamination**
 - even small quantities of low activity wastes could create havoc in a community or region
- ◆ **Transport may represent highest security risks**
 - Risks from relatively few highly active sources largest
 - Frequency of low level transports much higher

What are the solutions to these risks?

- ◆ Disposal of plutonium (or MOX)
- ◆ Disposal of spent fuel
- ◆ Disposal of HLW
- ◆ More physically secure storage
- ◆ Centralised storage
- ◆ Reduced transport requirements (borehole disposal?)

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- ◆ **Uncertainty about future nuclear energy prevents wide-scale use of MOX**
- ◆ **Centralised storage blocked in many countries (e.g. USA, South Korea)**
- ◆ **Absence of geological repositories means no deep disposal**
 - **Advanced programmes have societal blocks**
 - **Developing programmes have financial problems**
 - **New programmes have to accumulate inventories**
- ◆ **Borehole disposal not mature; not accepted**

How can multinational solutions help?

- ◆ Limited numbers of facilities to be secured
- ◆ Earlier underground disposal for smaller nations
- ◆ Enhanced engineered and institutional security measures
- ◆ Enhanced levels of international oversight
- ◆ Improved financing arrangements