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Illustrations accompanying a presentation

by

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at a

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titled

SELLAFIELD - A SAFE FUTURE?

held at

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on

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(1) Safety of Civilian Nuclear Facilities

- **Major safety issues are:**

  (a) potential for unplanned release of radioactive material to the environment
  (b) potential for unplanned use of fissile material -- i.e., plutonium (Pu) or highly-enriched uranium (HEU) -- as explosive

- **Unplanned release of radioactive material could occur due to:**

  (a) a design-basis accident (i.e., one foreseen during design and licensing)
  (b) a beyond-design-basis accident such as Windscale (1957) or Chernobyl (1986)
  (c) remobilization of material previously deposited in the environment
  (d) acts of malice or insanity

- **Potential beyond-design-basis accidents have been studied by govt. or industry for some facilities (e.g., Sizewell PWR)**

- **Potential malice-induced releases have been largely ignored by govt. & industry**

(2) Major Activities at Sellafield

- **Site established to generate Pu in reactor fuel and separate Pu from fuel in reprocessing plants, for weapons use**
- **Closure of last operating reactors (Calder Hall) to occur 31 March 2003**
- **Reprocessing continues: B205 & THORP**
- **High-level waste (HLW) held as liquid in B215; eventually vitrified and stored**
- **Storage of separated Pu & manufacture of Pu-containing (MOX) fuel**
- **Storage of spent fuel (Mag, AGR, LWR)**
- **Decommissioning of old facilities**
- **Processing of historic radwaste (sludges, etc.) into solid packages**
- **Storage of intermediate-level and low- level radwaste**
- **Radioactive effluent to air & Irish Sea**

(3) Effects of Unplanned Radioactive Release at Sellafield

- **Radioactive inventory: longer-lived isotopes (e.g., Cs-137 with 30-yr half-life)**

- **Consequences of airborne plume passing over land:**

  (a) contamination of food & water
  (b) inhalation from passing plume
  (c) material deposited on land and buildings irradiates inhabitants
  (d) elevated cancer incidence and/or abandonment of land by inhabitants

- **Consequences of release to Irish Sea:**

  (a) contamination of seafood
  (b) sea-to-land transfer of contamination

- **Consequences of remobilization of material in Irish Sea sediments:**

  (a) contamination of seafood
  (b) sea-to-land transfer of contamination

(4) Potential Release from Liquid HLW Tanks at Sellafield

- **21 steel tanks in above-ground concrete cells at B215, containing self-heating, acidic liquid HLW that requires constant cooling and agitation**

- **Present liquid vol. ca. 1,500 cubic metres, containing ca. 8 million TBq of Cs-137**

- **Accident or attack could cause initial release from 1 or more tanks, followed over days by releases from other tanks to air as tanks dry out from self-heating**

- **Airborne plume containing 4 million TBq of Cs-137 (50% release) passing over land would render ca. 200 thousand sq. km uninhabitable for 30+ years**
  (Area of Belgium = 30 thousand sq. km)

- **Potential modes of attack include:**

  (a) hijacked commercial aircraft
  (b) explosive-laden genl. aviation aircraft
  (c) commando-style attack with demolition capability

(5) Asymmetric Warfare & Civilian Nuclear Facilities

- **In violent conflict, conventional military superiority of 1 party drives opponents to unconventional (asymmetric) response**

- **Nuc. facilities may be attacked because:**

  (a) are large, fixed targets
  (b) can release a large amount of radioactive material
  (c) are symbolic of military-industrial power (esp. nuclear-weapon capability) of attacked country

- **US-UK invasion of Iraq may have increased the potential for attack on US & UK over coming years because:**

  (a) attackers may have high motivation and perceive attack as justified
  (b) effectiveness of counter-terrorism may decline due to wide opposition to US & UK and their undermining of international law

(6) Nuclear Proliferation, International Security & Sellafield

- **Nuclear weapons may be especially desired by weaker parties in asymmetric warfare**

- **Nuclear weapons offer high leverage if used on civilian nuclear facilities (10 kt fission yields 70 TBq of Cs-137 versus 8 million TBq in B215)**

- **US-UK rejection of international law in favour of pre-emption may encourage nuclear-weapon proliferation**

- **Supply of Pu, HEU is the major technical barrier to nuclear-weapon production**

- **Poorly-secured Pu, HEU stocks exist in various countries, especially Russia**

- **Commerce in Pu or HEU (e.g., THORP, B205, MOX at Sellafield) may legitimate technology with military application (e.g., in N. Korea now, perhaps Japan etc. in future)**

(7) Recommended Actions

- **Reprocessing at Sellafield is uneconomic, may promote nuclear proliferation and yields liquid HLW; stop THORP now and B205 soon**
- **Store spent fuel in dry, hardened casks**
- **Abandon MOX and store Pu with spent fuel in dry, hardened casks**
- **Start global regime to secure and reduce all stocks (military & civilian) of Pu, HEU**
- **Implement defence in depth for all civilian nuclear facilities**
- **Recognize potential accident or attack at nuc. facilities as a "common-property" problem because vulnerability is shared**
- **Prepare security-impact statements for all nuc. facilities (incl. La Hague)**
- **European Parliament: Promote above-stated actions and initiate EU process to mandate security-impact statements for all European nuclear facilities**