UK nuclear weapons: An introduction to the risks

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Presentation given at public meetings in Preston/ Lancaster (UK) on 30 July/ 22 September 2016, organised by the International Campaign for the Abolition of Nuclear Weapons (ICAN).

Data is from a range of academic, government and NGO sources. Most of these are listed in the 2016 SGR report, UK nuclear weapons: a catastrophe in the making? Links to this report and additional references are listed in the final slide.
• During 1980s, we were known as Scientists Against Nuclear Arms – merged with other organisations in 1992 to form SGR

About SGR

• Scientists for Global Responsibility is:
  – UK organisation of 750 scientists, engineers and others
  – Promotes science, design and technology which contributes to peace, social justice and environmental sustainability

• Published reports, books and articles on threats from nuclear weapons since 1980s
What is a nuclear weapon?

- Nuclear weapons harness forces deep inside atoms to create huge explosions
- Nuclear warheads
  - ‘Critical mass’ of ‘fissile material’ is brought together to create ‘nuclear chain reaction’
  - Critical mass is few kilograms
  - Fissile material is commonly plutonium and/or uranium
- Modern warheads are very sophisticated
UK nuclear weapons system: Trident

• 4 submarines
  – one on patrol constantly
• 1 submarine carries:
  – Up to 8 missiles
  – Up to 40 warheads
UK government plans for Trident

• To replace current fleet of 4 ‘Vanguard class’ submarines with 4 ‘successors’ by early 2030s
  — Parliamentary approval just given
  — Designed to remain operational until 2060s
• To upgrade nuclear warheads
• To work with USA in upgrading nuclear missiles
• Total costs: around £200bn

Cost estimate by CND (2016), compiled from Ministry of Defence data.
How does a nuclear weapon kill?

- Heat
- Blast
- Radioactivity
- Also
  - Blinding flash of light
  - Electromagnetic pulse
  - **Weapon of mass destruction**
• Each warhead has explosive power equivalent to 100,000 tonnes of TNT
• In less than one minute of devastation: approx. 81,000 dead, 212,000 injured – many of the injured would die within a few months
What could 1 Trident submarine do?

- Total explosive power of 40 warheads is equal to:
  - 4,000,000 tonnes of TNT
  - about 300 Hiroshima bombs
  - more than all bombs dropped in World War II
- Would produce enough smoke to cause a ‘nuclear winter’
  - catastrophic climate cooling
<table>
<thead>
<tr>
<th><strong>Main risks of nuclear weapons</strong></th>
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<tr>
<td><strong>Missile launch</strong></td>
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<tr>
<td>• Political/ military confrontation</td>
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<tr>
<td>• Cyber-security (hacking) breach</td>
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<tr>
<td>• Technical failure or human error</td>
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<tr>
<td><strong>Warhead development/ storage</strong></td>
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<td>• Laboratory accident or terrorist attack</td>
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<td><strong>Warhead transportation: road convoys</strong></td>
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<tr>
<td>• Road accident or terrorist attack</td>
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<td><strong>Probability of these events is very low but damage caused could be extremely high</strong></td>
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On cyber-security threat, see also: British American Security Information Council (2016).
Nuclear convoys: some basics

- Transport of warheads by large lorries
- Warheads manufactured at Atomic Weapons Establishment
  - 50 miles west of London
- Warheads loaded onto missiles/submarines at Clyde Naval Base
  - 25 miles west of Glasgow
- For maintenance/dismantling, warheads returned to AWE
Nuclear road convoy risks

• Nuclear warheads transported under guard
  — fully assembled but not ‘armed’
• Road accident or terrorist attack could cause impact damage and/or intense fire
• Possibility of ‘conventional explosion’ and/or wide dispersal of plutonium from warhead
• Plutonium is highly radioactive & toxic
• Nuclear explosion impossible?

• Further details in ICAN-UK (2016) and references therein
• Plutonium is carcinogenic at the milligram scale if (e.g.) inhaled
Key references

Scientists for Global Responsibility (2016). UK nuclear weapons: a catastrophe in the making?
   http://www.sgr.org.uk/resources/uk-nuclear-weapons-catastrophe-making


ILAN-UK (2016). Nukes of hazard: the nuclear bomb convoys on our roads.