Nuclear Security

British American Security Information Council
www.basicint.org

A briefing by BASIC

November 2015

What is Nuclear Security?

The International Atomic Energy Agency (IAEA) defines nuclear security as "***the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities.***" [1]

The US National Nuclear Security Administration describes nuclear security as an initiative to upgrade security measures, including physical protection, material control and accounting, at nuclear material sites around the world to prevent loss or theft of such material.[2]

Why is Nuclear Security Important?

World leaders have identified the illicit transfer or proliferation of fissile material as a global threat. Known terrorist groups, such as Al-Qaeda, have expressed interest in acquiring the materials and the know-how to build nuclear weapons and use them. Though there are many substantial challenges in the path of any group seeking to acquire and use a nuclear weapon, some analysts believe that with the widespread existence of fissile material around the world – 2000 tons dispersed throughout 25 countries – it is only a matter of time before they succeed.[3] In light of this seeming threat, nuclear security initiatives can reduce proliferation risks posed by both, state and non-state actors.

Glossary

Weapons-usable or Fissile Material - Material that can cause a nuclear explosion including highly enriched uranium (HEU) and sparated plutonium.

Nuclear Terrorism - The use of nuclear weapons or dirty bombs against civilian populations. It might also entail conducting attacks on nuclear power plants.

"Dirty Bombs" - Conventional explosives packaged in radioactive materials.

Nuclear Security Goals

- To prevent the illegal possession, use or transfer of nuclear or radioactive material, technology and expertise.[4]
- To secure, or remove and eliminate, stocks of fissile material.[5]
- To eliminate or reduce the risk of insider threat.[6]
- To minimize the use of highly enriched uranium (HEU) in civilian applications.
- To establish "security by design." This term refers to strengthening the infrastructure of nuclear facilities and implementing interior segregation designs in order to make facilities better able to withstand an outside attack and to minimize personnel access to fissile material.[7]

1 IAEA, Concepts and terms, www-ns.iaea.org/standards/concepts-terms.asp

2 "Nuclear Security 101." *National Nuclear Security Administration.* 23 Mar 2012. http://nnsa.energy.gov/mediaroom/factsheets/nucsec101

3 *Nuclear Materials Security Index.* 2nd edition. Nuclear Threat Initiative, 2014. Pg. 3.

4 "Nuclear Security 101." *National Nuclear Security Administration...*

5 *Ibid*

6 "Security by Design Fact Sheet." *National Nuclear Security Administration.* 23 Mar 2012. http://nnsa.energy.gov/mediaroom/factsheets/securitybydesign

7 *Ibid*

Significant Incidents

2015 - Nuclear smugglers in **Moldova** attempted to sell deadly radioactive materials (mainly Cesium) to the Islamic State - enough to contaminate several city blocks.[8]

2014 - Islamic State Jihadists seized approximately 40kg of Uranium from Mosul University in **Iraq**.[9]

2013 - A truck carrying a 3000-curie source of radioactive material was stolen in **Mexico**.[10]

2012 - An 82-year old nun and two companions broke into the HEU storage facility at the Y-12 National Security Complex in Oak Ridge, Tennessee, **USA**.[11]

2011 - Alexandr Agheenco, leader of an organized crime group, arranged the sale of bomb-grade Uranium 235 to a **Sudanese** 'islamic' buyer, hoping to annihilate the U.S.[12]

2010 - Two Armenians were caught in **Georgia** after attempting to sell 18 grams of HEU.[13]

2007 - Armed men evaded a 10,000-volt security fence and intrusion detectors as they broke into the Pelindaba nuclear facility in **South Africa**. They spent 45 minutes within the facility's perimeter without being spotted by security guards.[14]

2006 - Russian citizen, Oleg Khinsagov, was caught in **Georgia** carrying 100 grams of HEU. Khinsagov was bound to sell the material for $1 million.[15]

2001 - Russian authorities reported two incidents in which non-state actors breached their security systems to locate and conduct surveillance on **Russian** nuclear weapons sites.[16]

1998 - The **Russian** Federal Security Service (FSB) thwarted a planned insider theft operation, which had "quite sufficient material to produce an atomic bomb."[17]

1995 - Chechen separatists placed a dynamite-cesium-137 dirty bomb in **Moscow**'s Ismailovsky Park. They opted to alert a national television station of its location, rather than to detonate it.[18]

1995 - Aum Shinrikyo, a group founded by Shoko Asahara in 1987, carried a chemical attack using sarin nerve agent in the **Tokyo** subway. The group, undetected by US intelligence agencies, managed to produce VX, phosgene, sodium cyanide and biological weapons, including anthrax and botulism, and showed interest in developing a nuclear arsenal.[19]

1994 - **Czech** police recovered over 8 pounds of HEU from the backseat of a parked car.[20]

1993 - **Russian** Navy captain Alexei Tikhmirov intended to sell 10 pounds of stolen HEU at $50,000.[21]

1992 - Osama bin Laden attempted to obtain HEU from **South Africa**.[22]

1992 - Yuri Smirnov stole 3 pounds of HEU from the Luch Scientific Production plant and attempted to sell it to a buyer in **Moscow**.[23]

1987 - Caesium-137 stolen from an abandoned hospital at Goiânia, **Brazil** led to 4 deaths, and more than 100,000 given radiological screening.[24]

1972 - Three **Americans** threatened to crash Southern Airways Flight 49 onto a nuclear reactor unless ransom was paid.[25]

8 Roland Oliphant, 'Russian Gangs Trying To Sell Radioactive Material To Isil Terrorists In Moldova', *The Telegraph,* 2015, http://www.telegraph.co.uk/news/worldnews/islamic-state/11916040/Criminal-gangs-attempting-to-sell-nuclear-material-to-Islamic-State.html.

9 Ruth Sherlock, 'Iraq Jihadists Seize 'Nuclear Material', Says Ambassador To UN', *The Telegraph,* 2014, http://www.telegraph.co.uk/news/worldnews/middleeast/iraq/10958388/Iraq-jihadists-seize-nuclear-material-says-ambassador-to-UN.html.

10 Tom Bielefeld, "Mexico's Stolen Radiation Source: It Could Happen Here." *Bulletin of the Atomic Scientists,* January 2014 http://thebulletin.org/mexico%E2%80%99s-stolen-radiation-source-it-could-happen-here

11 Nuclear Materials Security Index. 2nd edition. Nuclear Threat Initiative, 2014.

12 Desmond Butler and Vadim Ghirda, 'Nuclear Smugglers Tried Selling Radioactive Materials To ISIS', *Huffington Post*, 2015, http://www.huffingtonpost.com/entry/nuclear-smugglers-shopped-radioactive-material-to-isis-terrorists_561470c1e4b021e856d2cfa0.

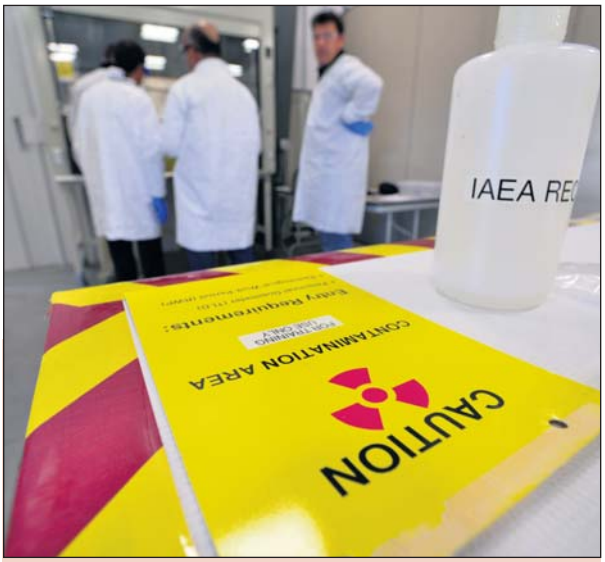
13 Julian Borger. "Nuclear bomb material found for sale on Georgia black market." *The Guardian.* Nov. 7, 2010. http://www.theguardian.com/world/2010/nov/07/nuclear-material-black-market-georgia

2000 incidents in 20 years

Between 1993 and 2013 about 2,300 'Nuclear Security Incidents' were reported by the Incident and Tracking database (ITDB). "Unauthorized possession" describes incidents of illegal possession, and attempts to trade in or use nuclear material or radioactive sources. Unauthorized activities include the unauthorized disposal of radioactive materials or discovery of uncontrolled sources.[26] Of these 2,300 incidents, there have been at least 18 documented cases of theft or loss of highly enriched uranium or plutonium.[27]

Nuclear Security Techniques & Methods

- Deploying radiation detection systems at key border crossings, airports and seaports, and providing training and sustainability support, at high-risk land, sea and air border crossings to be able to detect and seize stolen nuclear material.[28]
- Disposing of excess nuclear and radiological materials.[29]
- Converting research and commercial reactors from the use of HEU to low enriched uranium (LEU).[30]
- Downblending HEU to LEU.[31]
- Improving accounting systems to eliminate inventory uncertainties.



You Only Get One Chance Nuclear Forensics in Action

The IAEA's Incident and Trafficking Database (ITDB) has received reports of nearly 2400 incidents of illicit trafficking and other unauthorized activities involving nuclear and other radioactive material since 1995. This underscores the vulnerabilities that persist, and that States require effective tools to combat future incidents. Nuclear forensics enables States to connect the dots by providing quantitative information helping to link people, places, things and events.
Photo Credit: Dean Calma / IAEA

14 Michael Wines, "Break-In at Nuclear Site Baffles South Africa." *New York Times.* 15 Nov. 2007 http://www.nytimes.com/2007/11/15/world/africa/15joburg.html?_r=0

15 Lawrence Scott Sheets and William J. Broad. "Smuggler's Plot Highlights Fear Over Uranium." *New York Times.* 25 Jan. 2007 http://www.nytimes.com/2007/01/25/world/europe/25nuke.html?pagewanted=all&_r=0

16 Vladimir Bogdanov. "A Pass to Warheads Found on a Terrorist," *Rossiiskaya Gazeta,* 1 Nov. 2002

17 Graham Allison. *Nuclear Terrorism: The Ultimate Preventable Catastrophe.* First. New York: Henry Holt and Company, LLC, 2004. Pg. 72. Print.

18 Simon Saradzhyan,. "Russia: Grasping Reality of Nuclear Terror," *Kennedy School of Government.* March 2003. http://belfercenter.hks.harvard.edu/files/russia-grasping-reality-nuclear-terror-eng.pdf

19 Graham Allison. *Nuclear Terrorism: The Ultimate Preventable Catastrophe.* First. New York: Henry Holt and Company, LLC, 2004. 40-42.

20 *Ibid* pg. 72.

21 Oleg Bukharin and William Potter, "Potatoes Were Guarded Better," *Bulletin of American Scientists* (May-June 1995).

22 Jeffrey Kluger, "Osama's Nuclear Quest: How Long Will It Take Before Al-Qaeda Gets Hold of the Most Dangerous of Weapons?" *Time*, 12 Nov. 2001

23 Graham Allison. *Nuclear Terrorism: The Ultimate Preventable Catastrophe.* First. New York: Henry Holt and Company, LLC, 2004. 64-65.

24 Yukiya Amano, 'Time To Better Secure Radioactive Materials', *The Washington Post,* 2012, https://www.washingtonpost.com/opinions/time-to-better-secure-radioactive-materials/2012/03/23/gIQAn5deaS_story.html.

25 *Ibid*

26 "Incident and Trafficking Database (ITDB)." *International Atomic Energy Agency.* 20 Aug 2013. http://www-ns.iaea.org/security/itdb.asp.

27 "Key Facts on the 2012 Seoul Nuclear Security Summit." *U.S. State Department.* 28 Mar 2012. http://www.state.gov/t/isn/rls/fs/187208.htm

28 "About NNSA." *National Nuclear Security Administration.* 2 Mar 2010 http://nnsa.energy.gov/mediaroom/factsheets/aboutnnsa

29 *Ibid*

30 *Nuclear Materials Security Index.* 2nd edition. Nuclear Threat Initiative, 2014. pg. 12.

31 *Ibid*

Main Accomplishments

- Since 1992, 26 countries and Taiwan have eliminated all or most of their fissile materials.[32]
- Three Nuclear Security Summits have been convened (Washington DC, 2010, Seoul, 2012, The Hague, 2014). One more is scheduled (Washington DC, 2016).
- The UN Security Council (UNSC) passed resolutions 1540 and 1887 in 2004 and 2009, respectively, calling on all states to boost nuclear security standards.[33]
- The National Nuclear Security Agency, NNSA, established the Global Threat Reduction Initiative (GTRI) in 2004. GTRI has removed 5,050 kilograms of HEU from 27 countries, enough for more than 200 nuclear weapons.[34] It also supported the first successful large-scale production of medical isotope molybdenum-99 (Mo-99) using LEU targets.[35]
- The IAEA, via training schemes in nuclear security and detection, has succeeded in retaining 950kg of HEU to countries of origin by 2014. In addition to supplying over 1000 radiation detection systems throughout the world.[36]
- As hospitals are a chief source of radioactive material -and hence primary subjects of theft, the IAEA has aided in installing physical security systems in countries such as Ghana. Meanwhile, in Moldova, where nuclear smugglers became a growing problem, the IAEA has committed to helping the police authorities seize HEU from smugglers.[37]

Nuclear Security Summits

2009 - President Obama's Prague Speech where he pledged to make nuclear security a priority

2010 - Nuclear Security Summit in Washington DC
- The leaders of 47 countries attended
- 32 countries made 70+ commitments all of which were achieved

2012 - Nuclear Security Summit in Seoul, Korea
- 53 countries attended
- over 100 new commitments were made

2014 - Nuclear Security Summit in The Hague, Netherlands
- 53 countries and 4 international organizations attended

2016 - Nuclear Security Summit in Washington DC, US
The next scheduled summit will run March 31 - April 1 2016

Remaining Challenges

- Lack of a governing institution with the mandate and resources to provide common international standards, and verification or punitive mechanisms to hold states accountable.[38]
- Not enough states, including the United States, have become parties to the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM), so it is not in effect.[39] The amendment expands the convention's scope to include material in use, in storage, and in domestic as well as international transit.[40]
- All international efforts in the nuclear security context—IAEA safeguards, the nuclear security summits and the guidelines of the CPPNM and its 2005 Amendment—deal with fissile materials used in civilian programs. This represents only 15% of all fissile material with the remaining 85% pertaining to military programs.[41]

32 *Nuclear Materials Security Index*. 2nd edition. Nuclear Threat Initiative, 2014. Pg. 12.

33 Mathew Bunn, *et. al.* "Advancing Nuclear Security: Evaluating Progress and Setting New Goals." *Harvard Kennedy School: Belfer Center*. (2014), pg. 54 http://belfercenter.ksg.harvard.edu/files/advancingnuclearsecurity.pdf

34 *Ibid*

35 "GTRI's Convert Program: Minimizing the Use of Highly Enriched Uranium." *National Nuclear Security Administration*. 12 Apr 2013 http://nnsa.energy.gov/mediaroom/factsheets/gtri-convert

36 Iaea.org, 'IAEA Director General Yukiya Amano Addresses The Hague's Nuclear Security Summit 2014', 2015, https://www.iaea.org/newscenter/news/iaea-director-general-yukiya-amano-addresses-hagues-nuclear-security-summit-2014.

37 *Ibid.*

38 *Nuclear Materials Security Index*. 2nd edition. Nuclear Threat Initiative, 2014. Pg. 7.

39 *Ibid*

40 *Ibid* Pg. 8.

41 *Ibid* pg. 10.