

Q&A on Nuclear Security

(1) Reactor containment buildings are extremely robust, aren't they? They are designed to be impervious to all sorts of catastrophes, not just airplane crashes. The barriers in a typical plant include: a large steel pressure vessel with walls up to 30 cm thick with everything enclosed inside a robust reinforced concrete containment structure with walls at least one metre thick.

<http://www.world-nuclear.org/info/inf06.html>

David Kyd, a spokesman for the International Atomic Energy Agency (IAEA) has said that:

"Most nuclear power plants were built during the 1960s and 1970s, and like the World Trade Center, they were designed to withstand only accidental impacts from the smaller aircraft widely used at the time. If you postulate the risk of a jumbo jet full of fuel, it is clear that their design was not conceived to withstand such an impact." [1]

A confidential German Government document, leaked in 2004, showed that no single nuclear reactor in Germany is safe from a terrorist attack and that older reactors would most probably be uncontrollable after a plane crash. Wolfram König, head of the German Radiation Protection Agency (BfS) said that five out of eighteen operational reactors should be closed down 'prematurely' because they posed the greatest safety threat. [2]

(2) Nuclear plants often have armed security guards, and in the US they have to carry out exercises to train for the possibility of attack by a well-trained paramilitary force intent on forcing its way into a nuclear power plant to commit sabotage. Background checks will be made on potential new employees to guard against plant personal aiding a terrorist attack. They have pretty well thought of everything haven't they?

After two Greenpeace incursions into the Sizewell B nuclear power station site in the UK, the Government's Office of Civil Nuclear Security (OCNS), noted that the measures taken to enhance security "...*would not prove effective against armed terrorists, for which other measures are taken.*" [3] OCNS reported 39 lapses in security against terrorism in the year up to March 2006, including laptop thefts, internet misuse, and a power cut. OCNS has warned of "complacency" on leaks of sensitive nuclear information. [4]

In the US the Energy Policy Act of 2005 requires the Nuclear Regulatory Commission to conduct "force on force" security exercises at nuclear power plants at least once every three years. However nearly half of the plants tested in NRC-monitored mock attacks before 9/11 failed to repel even small forces, according to critics, although the industry denies this. Clearly there needs to be more openness and transparency about the effectiveness of these exercises, and the experience communicated to nuclear operators in the rest of the world. [5]

Nuclear exercises conducted in the UK, are regularly assessed by the Government's Nuclear Emergency Planning Liaison Group (NEPLG). Its 2005 report highlights 48 "areas for improvement", prompted by more than 20 exercises at nuclear sites over the previous five years. The exercises involve the emergency services, nuclear operators, local authorities and regulatory agencies. Critics say the NEPLG report details an astonishing catalogue of fundamental and recurring failures - agencies still can't get even the basics right after years of practising. Failures include inadequate radiation monitoring, communication breakdowns, poor planning and a chronic shortage of basic facilities. [6]

(3) The World Nuclear Association says that most high-level wastes are stored as stable ceramic solids or in vitrified glass. Surely this means they would be very difficult to disperse by terrorist action?
<http://www.world-nuclear.org/info/inf103.html>

Reprocessing produces a high-level liquid, heat-generating, waste which has to be stored in tanks which are constantly cooled. The aim is to turn this into a solid waste product but this takes time. At Sellafield in the UK, for example, the high-level liquid waste is not expected to be reduced to a so-called “buffer” stock until around 2015. [7]

(4) Spent fuel ponds are robust structures constructed of very thick concrete walls with stainless steel liners. The US Nuclear Regulatory Commission (NRC) says they are neither easily reached nor easily breached. Doesn't this mean spent fuel isn't vulnerable to terrorist action? <http://www.world-nuclear.org/info/inf103.html>

Nuclear power plants harbour radioactive materials in spent fuel ponds, which may be in buildings even more vulnerable to attack than the reactors themselves. The Union of Concerned Scientists calls spent fuel ponds “Kmart's without neon” for terrorists. [8] In most cases spent fuel is stored in ponds on reactor sites, rather than being transported to a reprocessing plant. Fuel for the world's commonest reactor type – the Pressurised Water Reactor - is clad in flammable zirconium. In worst-case scenarios, a successful attack could result in the loss of water from spent fuel storage ponds, leading to ignition of the fuel. [9] Many spent-fuel ponds are located above ground level or above empty cavities. Such ponds could drain completely if their bottoms were punctured or partially if their sides were punctured.

Concerns that a crashing high-speed fighter jet or an act of war might penetrate the wall of a spent-fuel storage pond and cause a loss of coolant led Germany in the 1970s to require that such ponds be sited with their associated reactors inside thick-walled containment buildings. When Germany decided to establish large away-from-reactor spent-fuel storage facilities, it rejected large spent-fuel storage ponds and decided instead on dry storage in thick-walled cast-iron casks cooled on the outside by convectively circulating air. The casks are stored inside reinforced-concrete buildings that provide some protection from missiles.

Today larger, slower-moving passenger and freight aircraft are also of concern. The NRC has decided that it is prudent to assume that a large aircraft engine could penetrate and drain a spent-fuel-storage pond. It says penetration cannot be ruled out for a high-speed crash but seems unlikely for a low-speed crash. [10]

[1] “Nuclear stations 'remain vulnerable”, Ananova 17th September 2001.

[2] Federal Ministry for the Environment, Nature Conservation and Nuclear Safety Summary of GRS study - Protection of German nuclear power plants against the background of the terrorist attacks in the USA on 11 September 2001at: German report:

http://www.greenpeace.org/multimedia/download/1/423085/0/GRS_risk_crash_on_npp-german_version.pdf

English version: <http://www.greenpeace.org/raw/content/international/press/reports/protection-of-german-nuclear-p-2.pdf>

[3]The State Of Security In The Civil Nuclear Industry and The Effectiveness Of Security Regulation April 2003 – March 2004, OCNS, 2004

<http://www.dti.gov.uk/files/file23300.pdf?pubpdfload=04%2F418>

[4] Rob Edwards, Revealed: Nuclear security rules broken 39 times in past year, Sunday Herald 13th August 2006

http://www.robedwards.com/2006/08/revealed_nuclea.html

[5] “Nuclear Power Plants: Vulnerability to Terrorist Attack” by Carl Behrens and Mark Holt, CRS report for Congress updated 9th August 2005.

<http://www.ncsonline.org/NLE/CRSreports/05aug/RS21131.pdf>

[6] Rob Edwards “Nuclear accident planning plagued by ‘recurring failures’” Sunday Herald, 21st August 2005,

http://www.robedwards.com/2005/08/nuclear_acciden.html

[7] Progress on BNFL's Response to Three Reports issued by HSE on 18th February 2000, HSE, Feb 2001

<http://www.hse.gov.uk/nuclear/bnflprog01.pdf>

[8] Graham Allison, Nuclear Terrorism, Constable 2006, page 55

<http://www.no2nuclearpower.org.uk/reviews/proliferation.php>

[9] Alvarez et al., Reducing the hazards from stored spent power reactor fuel in the United States, Science and Global Security, 11:1–51, 2003.

<http://www.ips-dc.org/projects/nuclear/alvarez%20spent%20fuel.pdf>

[10] ibid page 15.