

Terrorism and New Nuclear Power Stations

Introduction

- 1.1 The terrorist attacks of 11th September 2001, alerted the world to the possibility of a terrorist attack on a nuclear facility. The UN's International Atomic Energy Agency (IAEA) said it was now "far more likely" terrorists could target nuclear facilities, nuclear material and radioactive sources worldwide. [1]
- 1.2 Concern over the growing threat of nuclear terrorism has led to increased security at nuclear facilities, including the wider use of armed police. In addition the withholding of information on nuclear facilities for security reasons is likely to prevent public scrutiny of safety assessments for new nuclear facilities. [2] New proposals under discussion will require anyone, such as local authority planning officers, with access to nuclear information which might be deemed sensitive, to be vetted (or approved) by the Secretary of State as 'being of suitable character and integrity'. [3]
- 1.3 It is not clear how these new regulations will impact on the ability of local officials to report back to elected representatives or answer inquiries from the public on proposals for new nuclear facilities. But it is clear that official responses to the risk of terrorism are impacting negatively on civil liberties. It must, therefore, be increasingly questionable whether nuclear power is compatible with a modern, open, transparent and democratic society.

How likely is a terrorist attack?

- 2.1 After 9/11, the US Nuclear Regulatory Commission sent a confidential memo to all US nuclear power plants in January 2002 warning of plans for a terrorist attack in which hijackers "*fly a commercial aircraft into a nuclear power plant.*" [4] A taped interview shown on Al-Jazeera TV on September 10th 2002, contained a statement that Al Qaeda initially planned to include a nuclear plant in its 2001 attack sites. [5]
- 2.2 Several recent events have pointed to the possibility of an attack on a nuclear facility somewhere in the world sooner or later. National newspapers have reported that detailed plans of Britain's most sensitive nuclear sites, including Sizewell, were found in a car linked to one of the London terror suspects. Photographs, slides, maps and detailed information about types of radioactive materials and where they are stored were found in a raid after the July 2005 bombing campaign. The Metropolitan Police told one nuclear expert that sensitive material, which appeared to come from lectures and talks he gave in 2002, had been found in the car of a woman connected to the July atrocities. [6]
- 2.3 The Lucas Heights nuclear research reactor - Australia's only nuclear reactor - and its spent nuclear fuel store (situated 25 miles south west of central Sydney) may have been a target of suspected terrorists. [7] Three of eight Sydney men currently facing terrorism charges in Australia were stopped by police near the nuclear facility in December 2004. When interviewed separately by police all three gave different versions of the day's events. Police inquiries revealed the access lock for a gate to a reservoir at the reactor had recently been cut. This was not the first time the Australian reactor had been the subject of a suspected terrorist plot (see below).

- 2.4 Somewhat more dramatically, a foiled Chechen rebel assault on the Russian city of Nalchik in October was reported to have involved an attempt to hijack five planes that could be flown into various targets, including a nuclear power station. [8]
- 2.5 So great is the risk of a terrorist attack on nuclear facilities that the highly respected Oxford Research Group has told the House of Commons Environmental Audit Committee, that nuclear power should not be part of the UK's energy supply - precisely because it presents a major threat to our national and international security and increasing the risk of nuclear terrorism, by creating opportunities for terrorist organisations [9]

Nuclear Terrorism and the Energy Review

- 3.1 Nuclear terrorism could potentially cause large numbers of deaths. The risk of a successful attack will obviously increase if more nuclear power stations and stores for highly radioactive spent fuel are built. Indeed there appears to be a growing disconnection between the justifiable national and international concern over security threats posed by nuclear facilities, and the promotion of an expanded nuclear sector by the very international authorities warning of the risk. [10]

Would an attack be successful?

- 4.1 Although it is not automatic that any attack would result in a release of radioactivity, facilities at nuclear sites in the UK have not been designed to withstand a deliberate crash by a jumbo jet full of fuel or many other types of attack. The designs which might be considered for replacement reactors, such as the French European Pressurised Water Reactor (EPR) and the Westinghouse AP1000, have yet to have anti-terrorist measures specifically designed in.
- 4.2 According to the Sustainable Development Commission's (SDC) report on Safety and Security [11] modern reactor designs have substantial containment buildings which are considered unlikely to be breached even by a crashing airliner, and the reactor fuel is protected against impact and fire by other structures.
- 4.3 In a report commissioned for SDC, the nuclear company, AMEC-NNC, suggests that the new so-called passively design of the AP1000 would mean the reactor would simply close down following any reasonably foreseeable terrorist action. This reasoning results in the conclusion that any *reasonably foreseeable* terrorist act would not result in radiological consequences greater than those arising out of any of the design-basis accident scenarios for which the plant is protected against. [12]

Defence-in-depth or passive safety?

- 5.1 In the present generation of reactors one of the most important safety principles is the defence-in-depth concept which relies upon layers of redundancy and diversity – this is where, say, two valves are fitted instead of one (redundancy) or where the function may be achieved by one of two entirely different means (diversity). Redundancy safeguards against single component failure and diversity bypasses common mode failure. A third concept - segregation - reduces the possibility of a common hazard, such as fire, damaging more than one system.

- 5.2 In contrast the passive safety concept does not adhere to the redundancy and diversity principles. Instead it relies on gravity and convection, or so-called “passive” safety systems. This is supposed to achieve a reduction in the number of valves and components that could go wrong by simplifying the design.
- 5.3 Compared with the original PWR, the AP1000 design has many of the safety systems stripped out, both to save money, and avoid reliance on operators and power during an emergency situation. The design aims to achieve a reduction in the number of valves and components that could go wrong by simplification of the design. The AP1000 has 50 percent fewer valves, 83 percent less piping, 87 percent less control cable, 35 percent fewer pumps and 50 percent less seismic building volume than a similarly sized conventional plant. These reductions in equipment and bulk quantities lead to major savings in plant costs and construction schedules. [13]
- 5.4 The main differences between the original Pressurised Water Reactor (PWR) and new AP1000 design concern the emergency safety systems, particularly the emergency core cooling systems. In the present design of PWRs there are a series of valves and pipes designed to supply an “emergency core cooling system”. The AP1000 design relies upon natural means, including gravity fed water from tanks, to transfer heat from the fuel. This means that the AP1000 relies heavily on the assumption that these alternative emergency response mechanisms will work. [14]
- 5.5 The mode of terrorist attack cannot be accurately predicted – it would not necessarily involve crashing an airplane into the plant. Therefore there cannot be complete confidence that an attack would not lead to significantly adverse consequences. Intentional (malevolent) events are very different from accidents. A terrorist act is likely to seek out the vulnerabilities of the target plant and even disrupt any post-event emergency actions and countermeasures put in place to mitigate the consequence.
- 5.6 In the United States a number of regulations specifically considered means to avert acts of radiological sabotage, with these developing into licensing requirements in the form of *Design Basis Threats* (DBTs) as defined by the Nuclear Regulatory Commission (NRC). The NRC requires nuclear plant operators to submit to simulations of a range of intentional malicious actions perpetrated by various groups and individuals known as *Operational Safeguards Response Evaluation* (OSRE) tests. When subject to OSREs, about 45% of the tested nuclear plants failed.

Consequences of an Attack

- 6.1 A successful attack could have widespread and catastrophic consequences for both the environment and public health. The extent of damage caused will depend on the type of nuclear facility, the nature of the attack, weather conditions and the success of mitigation measures put in place.
- 6.2 The consequences of a successful attack on a nuclear facility would depend on a wide range of variables, such as the extent of the damage and the size of any radiation release; weather conditions; the efficiency of countermeasures. A report by the Parliamentary Office of Science and Technology (POST) looks at various studies which examine the consequences of an attack [15] An attack on the High-Level Waste (HLW) tanks at Sellafield in West Cumbria, for example could result in the need to evacuate population centres as far away as Glasgow and Liverpool. POST says the scale of the impact of such

a release will vary enormously, but hundreds of thousands of people could be affected. [16]

- 6.3 POST also looked at a study by the National Radiological Protection Board (NRPB) of a release from the Sizewell B reactor. This suggested over a thousand fatal cancers from a larger release and said that crop restrictions might be necessary over 1,000km². In addition to the reactors themselves, nuclear power plants harbour radioactive materials in spent fuel ponds which may be in buildings even more vulnerable to attack than the reactor. In most cases spent fuel is transported to Sellafield after a period of cooling; and spent fuel from most of British Energy's reactors is clad in stainless steel, but at Sizewell B, the spent fuel is stored in ponds on site and 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. [17] According to a US nuclear security specialist, this could result in large releases of radioactivity only 100 miles from London. POST cites a US Nuclear Regulatory Commission study which suggests an accidental fire in a cooling pond might result in 3,500 to 15,000 cancer deaths.

Previous Incidents

- 7.1 To date, it is known there have been six direct attacks on nuclear power plants in France, South Africa, Switzerland, the Philippines, and Spain (there may have been others which have not been made public knowledge). Fortunately, all of the reactors were in the early stages of construction and were not operational. The International Policy Institute for Counter-terrorism (ICT) database includes some 167 terrorist incidents involving a nuclear target for the period 1970 – 1999. Between 1966 and 1977 there were 10 terrorist incidents against European nuclear installations (reactors plus other types of nuclear facility). Between 1969 and 1975 there were 240 bombing threats against US nuclear facilities, and 14 actual and attempted bombings. According to a Russian intelligence official, during the years 1995-1997 there were 50 instances of nuclear blackmail in Russia. Most of them were hoaxes. The most dangerous trend in these years, according to this source, is the so-called motiveless acts of terror, in which the criminals put forward no political or financial demands. In such cases there is nothing to negotiate. [18]
- a) **3rd May 1975** An attack by the Meinhof-Puig-Antich Group with dynamite at the construction site of the Fessenheim Nuclear Power reactor station, 45 miles south of Strasbourg, France. No nuclear material was in stock or service at the site. A Le Monde correspondent at Strasbourg reported that the perpetrators of the bombing seemed to know the site and understand the features of a nuclear power station. Two bombs had been placed in the centre of the plant next to a nuclear reactor. [19]
 - b) **December 1977** Four Basque separatists detonated bombs on the construction site of the Lemoniz reactor in Spain. The reactor pressure vessel and a steam generator were damaged and two workers killed. [20]
 - c) **6th April 1979** Saboteurs entered an atomic equipment plant at La Seyne-sur-Mer, three miles southwest of Toulon, France and set off 5 explosions which destroyed the core of an advanced 70-megawatt Osiris nuclear reactor and a second one- megawatt research reactor. The materials were destined for delivery to Iraq on 9th April. The identity of the saboteurs is unknown but it is speculated that they were Israeli intelligence agents aided perhaps by French officials. There were no injuries and no radioactive material was

- involved, but the nuclear equipment was 60% destroyed - damage was estimated at \$23 million. The saboteurs had detailed information of the plant and security measures. [21]
- d) **November 1979.** A bomb damaged a transformer at the Goesgen reactor in Switzerland just after it had gone into operation. [22]
 - e) **In 1982** five rockets were fired into the French Creys-Malville nuclear facility, but the damage was minor. [23]
 - f) **22nd December 1982** The African National Congress (ANC) bombed South Africa's Koeberg-1 reactor in retaliation for a South African Defence Force raid on Maseru, Lesotho, in which 42 ANC members and Lesotho citizens were killed. The damage caused by a series of four explosions to the R1.8 billion complex was reportedly extensive. [24]
 - g) **June 1985.** An act of sabotage carried out against the first Philippine nuclear power plant by Communist guerrilla fighters who exploded 26 electricity pylons in two weeks. [25]
 - h) **In March 2000** police in New Zealand uncovered a possible plot to blow up a nuclear reactor in Sydney during the Olympic Games. In the course of an investigation into organized crime syndicates the Auckland police conducted a series of house raids in the city and found evidence suggesting a plan to attack the Lucas Heights nuclear reactor near Sydney, Australia. [26]

Contingency Planning

- 8.1 If the worst did happen then the results of emergency planning exercises give little cause for comfort. According to confidential reports obtained by New Scientist, and the Sunday Herald, UK authorities are not fully prepared to protect people from being exposed to radioactivity.
- 8.2 Regular assessments of the problems thrown up by civilian nuclear exercises are conducted by the government's Nuclear Emergency Planning Liaison Group (NEPLG). Its latest report highlights 48 "areas for improvement", prompted by more than 20 exercises at nuclear sites over the last 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. [27]

Increasing Secrecy

- 9.1 The threat of nuclear terrorism means that the openness and transparency gradually introduced since 1997 because it was considered essential to decision-making on nuclear waste management issues is now being reversed. Information on nuclear reactors and plans for managing radioactive waste is now likely to be withheld for security reasons. Such moves would serve to prevent public scrutiny of safety assessments for new reactors and radioactive waste facilities.

- 9.2 Amendments to planning legislation in England would allow objectors to be prevented from seeing detailed plans of nuclear plants at planning inquiries. Instead, the attorney general would select an "appointed representative" to argue the case on their behalf, in secret, (at the objectors expense). The Office of Civil Nuclear Security has issued guidelines on access to information which mean that planning officers, faced with a planning application for a new nuclear facility, will not be able to seek adequate information about the application unless this is to be handled in secrecy. Should the officers disclose the information they could face prosecution under the Anti-terrorism, Crime and Security Act with a maximum prison sentence of seven years. Seventy categories of information listed in the guidelines, more than two-thirds of the total, are "not release-able". [28] Local officials are unlikely to be able to report back to elected representatives or answer inquiries from the public on proposals for new nuclear facilities under these circumstances.
- 9.3 The Draft Nuclear Industries Security (Amendment) Regulations would extend the obligations to protect sensitive nuclear information to cover any person in the UK who has information about nuclear sites. In other words, anyone who may have access to sensitive nuclear information, because of, for example, their work with a local authority planning department, would be have to be vetted (approved) by the Secretary of State as 'being of suitable character and integrity'. [29]

Civil Liberties

- 10.1 Armed police now patrol civil nuclear sites, including those run by the privatised nuclear operator, British Energy. But increased security is beginning to provoke a debate about the impact it will have on civil liberties. Visitors to the beach near Sizewell have been made uneasy by armed officers patrolling outside of the perimeter fence. The Civil Nuclear Constabulary has also refused to say whether it has a "shoot to kill" policy. Local Town Councillor, Colin Ginger said "as long as Sizewell A and Sizewell B are there, they'll be focal points" and potential terrorist targets. [30]
- 10.2 There must now surely be a question-mark over whether nuclear power is compatible with a modern democratic society. In 1976 Patricia Hewitt, when she was General Secretary of the National Council for Civil Liberties, said "*The implications of nuclear development for individual and political liberty have not previously received enough public attention.*" [31]
- 10.3 The same is true today, 30 years later. It is vital for the future of society that these issues are at least openly debated.

Date: 11 April 2006

Contact: Cathy Birrell
Chief Executives Dept.
Glasgow City Council
City Chambers
George Square
Glasgow G2 1DU

Tel: 0141 287 7872

Fax: 0141 287 7071

Email: cathy.birrell@ced.glasgow.gov.uk

References

- [1] IAEA press release 1st November 2001 Calculating the New Global Nuclear Terrorism Threat
http://www.iaea.org/NewsCenter/PressReleases/2001/nt_pressrelease.shtml
- [2] Terror fears draw veil over nuclear plants, by Richard Norton-Taylor, Guardian May 2005.
<http://www.guardian.co.uk/news/story/0,3604,1477455,00.html>
- “Finding a Balance: Guidance on the Sensitivity of Nuclear and Related Information and its Disclosure”, Office of Civil Nuclear Security, DTI, April 2005.
http://www.dti.gov.uk/energy/nuclear/safety/disclosure_guidance.pdf
- [3] The Draft Nuclear Industries Security (Amendment) Regulations. DTI December 2005
http://www.dti.gov.uk/energy/consultations/nisr_2005.pdf
- [4] Nuclear Power Plants Possible Terror Targets Memo warns, CNN 1st February 2003
<http://www.nci.org/02NCI/02/cnn-02.htm>
- [5] Nuclear Power Plants: Vulnerability to Terrorist Attack by Carl Behrens and Mark Holt, Congressional Research Service, 9th August 2005.
<http://www.ncseonline.org/NLE/CRSreports/05aug/RS21131.pdf>
- [6] “Nuke Bomb Plot” by Alan Rimmer, Sunday Mirror, 16th October 2005
http://www.sundaymirror.co.uk/news/tm_objectid=16254342&method=full&siteid=62484&headline=nuke-bomb--plot--name_page.html
- [7] “Nuclear Link to Terror Suspects”, BBC 14th November 2005
<http://news.bbc.co.uk/1/hi/world/asia-pacific/4434270.stm>
- [8] “Chechen attack was grandiose attempt to copy September 11” by Andrew Osborn, Independent 29th October 2005.
<http://news.independent.co.uk/europe/article323186.ece>
- [9] Secure Energy: Options for A Safer World. Oxford Research Group.
<http://www.oxfordresearchgroup.org.uk/programmes/nuclearissues/secureenergy.htm>
- [10] See for example:- International Conference on Nuclear Security, Global Directions for the Future, London 16-18 March 2005 Findings of the President of the Conference. <http://www.iaea.org/NewsCenter/News/PDF/conffindings0305.pdf> - This should be contrasted with “Rising Expectations for Nuclear Electricity Production”, IAEA Press Release 1st March 2005.
http://www.iaea.org/NewsCenter/News/2005/electricity_production.html
- [11] Nuclear Paper No.6, Safety and Security, Sustainable Development Commission, March 2006.
<http://www.sd-commission.org.uk/publications.php?id=341>
- [12] Sustainable Development Commission, Peer Review of the AMEC-NNC Report, *Role of Nuclear Power in the Low Carbon Economy - Safety and Security*, Large Associates, November 2005
<http://www.largeassociates.com/3141%20Sustainable%20Development%20Commission/R3141-3.pdf>
- [13] <http://www.ap1000.westinghousenuclear.com/>
- [14] US Department of Energy (2001), Nuclear Energy Research Advisory Committee, “A Roadmap to Deploy New Nuclear Power Plants in the United States by 2010”, 31 October 2001
- [15] “Assessing the risk of terrorist attacks on nuclear facilities” Parliament Office of Science and Technology Report 222, July 2004
<http://www.parliament.uk/documents/upload/POSTpr222.pdf>
- [16] “Attack on Nuclear Plant could kill 3.5m” by Geoffrey Lean, Independent on Sunday 16th February 2003.
<http://news.independent.co.uk/environment/article119173.ece>
- [17] “Nuclear analyst highlights risks of terror attack at power plants”, Nuclear Free Local Authorities Press Release 7th March 2005
http://www.nuclearpolicy.info/Latest_News/Pr05/050307.htm
- [18] Olympic Bomb Plot to Blow up Sydney Nuclear Reactor Foiled: How Serious the Threat? By Dr. Ely Karmon, Institute for Counter Terrorism.
http://www.ict.org.il/articles/nuclear_reactor_threat.htm
- [19] The National Memorial Institute for the Prevention of Terrorism (MIPT) Terrorism Knowledge Base.
<http://www.tkb.org/Home.jsp>
- [20] “War and Nuclear Power Plants” by Gordon Thompson, Institute for Resource and Security Studies, Greenpeace International March 1996.
<http://www10.antenna.nl/wise/index.html?http://www10.antenna.nl/wise/terrorism/031996war.html>
- [21] as [19] MIPT
- [22] as [20] “War and Nuclear Power Plants”
- [23] as [18] Institute for Counter Terrorism
- [24] Nuclear Threat Initiative website http://www.nti.org/e_research/profiles/SAfrica/Nuclear/2149_3275.html
- [25] as [20] “War and Nuclear Power Plants”
- [26] as [18] Institute for Counter Terrorism
- [27] “Nuclear accident planning plagued by ‘recurring failures’” by Rob Edwards, Sunday Herald, 21st August 2005,
<http://www.sundayherald.com/51386>
- [28] Terror fears draw veil over nuclear plants, by Richard Norton-Taylor, Guardian May 2005.
<http://www.guardian.co.uk/news/story/0,3604,1477455,00.html>
- “Finding a Balance: Guidance on the Sensitivity of Nuclear and Related Information and its Disclosure”, Office of Civil Nuclear Security, DTI, April 2005.
http://www.dti.gov.uk/energy/nuclear/safety/disclosure_guidance.pdf
- [29] The Draft Nuclear Industries Security (Amendment) Regulations. DTI December 2005
http://www.dti.gov.uk/energy/consultations/nisr_2005.pdf
- [30] East Anglian Daily Times 14th, 17th & 18th October 2005
- [31] “Nuclear Prospects: A comment on the individual, the state and nuclear power” by Michael Flood and Robin Grove-White, FoE, CPRE, NCCL, 1976.