CND BRIEFING

Nuclear power and nuclear weapons

Nuclear weapons and nuclear power share several common features. The long list of links includes their histories, similar technologies, skills, health and safety aspects, regulatory issues and radiological research and development. For example, the process of enriching uranium to make it into fuel for nuclear power stations is also used to make nuclear weapons. Plutonium is a by-product of the nuclear fuel cycle and is still used by some countries to make nuclear weapons.

THERE is a danger that more nuclear power stations in the world could mean more nuclear weapons. Because countries like the UK are promoting the expansion of nuclear power, other countries are beginning to plan for their own nuclear power programmes too. But there is always the danger that countries acquiring nuclear power technology may subvert its use to develop a nuclear weapons programme. After all, the UK's first nuclear power stations were built primarily to provide fissile material for nuclear weapons during the Cold War. Nuclear materials may also get into the wrong hands and be used to make a crude nuclear device or a so-called 'dirty bomb'.

The facts

Some radioactive materials (such as plutonium-239 and uranium-235) spontaneously fission in the right configuration. That is, their nuclei split apart giving off very large amounts of energy. Inside a warhead, trillions of such fissions occur inside a small space within a fraction of a second, resulting in a massive explosion. Inside a nuclear reactor, the fissions are slower and more spread out, and the resulting heat is used to boil water, to make steam, to turn turbines which generate electricity.

However, the prime use of plutonium-239 and uranium-235, and the reason they were produced in the first place, is to make nuclear weapons.

Nuclear reactors are initially fuelled by uranium (usually in the form of metal-clad rods). Uranium is a naturally-occurring element like silver or iron and is mined from the earth. Plutonium is an artificial element created by the process of neutron activation in a reactor.

Nuclear secrecy

The connections between nuclear power and nuclear weapons have always been very close and are largely kept secret. Most governments take great pains to keep their connections well hidden.

The civil nuclear power industry grew out of the atomic bomb programme in the 1940s and the 1950s. In Britain, the civil nuclear power programme was deliberately used as a cover for military activities.

Military nuclear activities have always been kept secret, so the nuclear power industry's habit of hiding things from the public was established right at its beginning, due to its close connections with military weapons. For example, the atomic weapons facilities at Aldermaston and Burghfield in Berkshire, where British nuclear weapons are built and serviced, are still deleted from Ordnance Survey maps, leaving blank spaces.

It was under the misleading slogan of 'Atoms for Peace', that the Queen ceremonially opened what was officially described as Britain's first nuclear power station, at Calder Hall in Cumbria, in 1956. The newsreel commentary described how it would produce cheap and clean nuclear energy for everyone.

This was untrue. Calder Hall was not a civil power station. It was built primarily to produce plutonium for nuclear weapons. The electricity it produced was a by-product to power the rest of the site.

In 1957, a major fire occurred at Windscale reactor at Calder Hall (what is now known as Sellafield). The Windscale fire was hushed up at the time but it is now recognised as one of the world's worst nuclear accidents. An official statement in 1957 said: 'There was not a large amount of radiation released. The amount was not hazardous and in fact it was carried

out to sea by the wind.' The truth, kept hidden for over thirty years, was that a large quantity of hazardous radioactivity was blown east and south east, across most of England.

After years of accidents and leaks, several of them serious, and regular cover-up attempts by both the management and government, it was decided to change the plant's name in 1981 to Sellafield, presumably in the hope that the public would forget about Windscale and the accident.

When, in 1983, Greenpeace divers discovered highly radioactive waste being discharged into the sea through a pipeline at Sellafield and tried to block it, British Nuclear Fuels Ltd (BNFL), who then operated the site, repeatedly took Greenpeace to the High Court to try to stop them and to sequestrate its assets. The first generation of British Magnox nuclear power stations were all secretly designed with the dual purpose of plutonium and electricity production in mind.

Some people think that because plutonium is no longer needed by the UK to make weapons as it already has huge stocks of weapons grade plutonium, there no longer is any connection between nuclear weapons and nuclear energy. This is incorrect: they remain inextricably linked. For example:

- All the processes at the front of the nuclear fuel cycle, i.e. uranium ore mining, uranium ore milling, uranium ore refining, and U-235 enrichment are still used for both power and military purposes.
- The UK factory at Capenhurst that makes nuclear fuel for reactors also makes nuclear fuel for nuclear (Trident and hunter-killer) submarines.
- Nuclear reactors are used to create tritium (the radioactive isotope of hydrogen) necessary for nuclear weapons.

Subsidising the arms industry

The development of both the nuclear weapons and nuclear power industries is mutually beneficial. Scientists from Sussex University confirmed this once again in 2017, stating that the government is using the Hinkley Point C nuclear power station to subsidise Trident, Britain's nuclear weapons system.

As part of a Parliamentary investigation into the Hinkley project, it emerged that without the billions of pounds ear-marked for building this new power station in Somerset, Trident would be 'unsupportable'. Professor Andy Stirling and Dr Phil Johnstone argued that the nuclear power station will 'maintain a large-scale national base of nuclear-specific skills' essential for maintaining Britain's military nuclear capability.

This could explain why Prime Minister Theresa May continues to support subsidising a project which looks set to cost the taxpayer billions. Subsidies which go to an industry which still can't support itself sixty years after it was first launched. What to do with the radioactive waste?

Radioactive nuclear waste is produced by all nuclear activities. For example, uranium mining produces a great deal of waste in the form of ore spoil like all mining. Since uranium is radioactive, so are its ore wastes. So also are all the processes of refining the ore, enriching the uranium, turning it into fuel for reactors, transportation, burning it in nuclear power stations, processing the used fuel, and its handling and storage. They all create more nuclear waste.

The reason is that everything that comes into contact with radioactive materials, including the containers in which they are stored or moved and even the buildings in which they are handled, become contaminated with radioactivity or are activated by radiation.

All radioactive waste is dangerous to human life as exposure to it can cause leukaemia and other cancers. It is usually categorised as low, intermediate or high-level waste. As the radioactivity level increases, so does the danger. Extremely high levels of radioactivity can kill anyone coming into contact with it – or just getting too close to it – within a matter of days or weeks.

Radioactive materials slowly lose their radioactivity and so can become in theory safe to handle but in most cases this is a very slow process. Plutonium-239, for instance, has a half-life of over 24,000 years which means it will remain lethal for over 240,000 years. Other radio-isotopes remain radioactive for millions or even billions of years.

The safe, long-term storage of nuclear waste is a problem that is reaching crisis point for both the civil nuclear industry and for the military.

During the Cold War years of the 1950s and 1960s, the development of the British atomic bomb was seen as a matter of urgency. Dealing with the mess caused by the production, operating and even testing of nuclear weapons was something to be worried about later, if at all.

For example, the Ministry of Defence does not really have a proper solution for dealing with the highly radioactive hulls of decommissioned nuclear submarines, apart from storing them for many decades. As a result, 19 nuclear-powered retired submarines are still waiting to be dismantled, with more expected each year. Yet Britain goes on building these submarines.

This callous disregard for the future has spilled over to the nuclear power industry. For example, at Dounreay, in the north of Scotland, nuclear waste and scrap from the experimental reactor and reprocessing plants were simply tipped down a disused shaft for over 20 years. No proper records of what was dumped were kept and eventually, in 1977, an explosion showered the area with radioactive debris. In April 1998, it was finally announced that excavation and safe removal of the debris had cost £355 million.

The problems of long term, secure storage of nuclear waste are unsolved and growing more acute year by year. Earlier attempts by the nuclear industry to get rid of it by dumping it in the sea were stopped by environmental direct action, trades union protests and now by law.

All details concerning military nuclear waste are regarded as official secrets. However, large and growing quantities of radioactive waste exist at the Rosyth and Devonport dockyards and in particular at the Aldermaston and Burghfield Atomic Weapons Establishments.

One feature of Aldermaston and Sellafield in particular is that they are old sites, and have grown up in an unplanned, haphazard way. New buildings are fitted in between old, sometimes abandoned, buildings. Some areas and buildings are sealed off and polluted by radioactivity. Local streams, and in the case of Sellafield the sea shore, are polluted. The demolition of old radioactive buildings is a delicate, slow and dangerous process. In the circumstances it is hardly surprising that the amount of nuclear waste can only be estimated.

Civil intermediate level solid waste is mainly stored at Sellafield awaiting a decision on a national storage facility.

Military intermediate level solid waste is stored where it is created: dockyards, AWE plants etc. Both civil and military high level solid waste is generally moved to Sellafield for temporary storage.

The major problems are with the long-term storage of intermediate and in particular high-level wastes. Since these are very dangerous and very long-lived, any storage facility has to be very secure (i.e. well-guarded) and safer over a longer period – some tens of thousands of years – than anything yet designed and built by humanity.

Because of this very long time scale, it can never be sealed up and forgotten. Containers corrode with time. There are earth movements. Water seeps through rocks. The waste will have to be stored in such a form that it cannot be stolen and misused and in such a way that it can be inspected and if necessary retrieved and moved.

Plans to dig a trial deep storage facility under the Sellafield site were thrown out in 1997. Geological evidence suggested that the local rock is too fissured and liable to be affected by water seepage.

This threw all the nuclear industry's plans into confusion. Instead of having a storage site ready by 2010, the date has been put back more or less indefinitely. No alternative site has even been identified.

Apart from the technical, geological problems, few communities seek a huge, long-term nuclear waste storage site in their neighbourhood. Indeed the original choice of Sellafield was as much political as technical. With most local jobs depending on nuclear industry already, there would have been less local opposition than elsewhere.

Nuclear waste is a problem that the nuclear industry has failed to consider seriously for over sixty years but one that can no longer be put off for future generations to cope with.

The effects of any nuclear accidents, such as those at Chernobyl in 1986 and Fukushima in 2011, are also very long-lasting and will affect future generations. The problems of nuclear waste are nowhere near solution. The history of the nuclear industry does not inspire confidence.

Reprocessing

The initial rationale for reprocessing in the 1950s to the 1980s was the Cold War demand for fissile material to make nuclear weapons.

Reprocessing is the name given to the physico-chemical treatment of spent nuclear fuel carried on at Sellafield in Cumbria since the 1950s. This involves the stripping of metal cladding from spent nuclear fuel assemblies, dissolving the inner uranium fuel in boiling concentrated nitric acid, chemically separating out the uranium and plutonium isotopes and storing the remaining dissolved fission products in large storage tanks.

It is a dirty, dangerous, unhealthy, polluting and expensive process which results in workers employed at Sellafield and local people being exposed to high radiation doses.

Terrorism

A major objection to reprocessing is that the plutonium produced has to be carefully guarded in case it is stolen. Four kilos is enough to make a nuclear bomb. Perhaps even more worrying, it does not have to undergo fission to cause havoc: a conventional explosion of a small amount would also cause chaos. A speck of plutonium breathed into the lungs can cause cancer. If plutonium dust were scattered by dynamite, for example, thousands of people could be affected and huge areas might have to be evacuated for decades.

Conclusion

The many connections between nuclear power and nuclear weapons are clear. Nuclear power has obvious dangers and its production must be stopped. We need a safe, genuinely sustainable, global and green solution to our energy needs, not a dangerous diversion like nuclear power. CND will continue to campaign to stop new nuclear power stations from being built, as well as for an end to nuclear weapons.

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