GREENPEACE

Nuclear power and radioactive waste
Media briefing

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Radioactive substances are produced at every stage of the nuclear fuel cycle, from uranium mining, to the operation of reactors, to the reprocessing of spent fuel. These include plutonium, caesium, ruthenium, iodine, krypton and strontium. Most will remain hazardous for thousands, and in some cases millions, of years. Despite decades of discussion, the nuclear industry has failed to come up with a safe way of dealing with them. So, as they are released into the environment, building up in the food chain and human bodies, they leave a poisonous legacy to future generations.

Reprocessing is recognised by the government as the largest source of radioactive pollution in the UK[i]. The plant at Sellafield discharges millions of litres of radioactive water into the Irish Sea. It also discharges radioactive gases into the air. And this pollution is detected as far away as the waters of Norway and Greenland.

Sellafield is also known to contribute 87% of the collective radiation dose to EC member states, from discharges into north European waters[ii]. It poses a global health risk and it is estimated that around 200 people will die for every year that it operates.

The OSPAR strategy for radioactive substances aims, "to prevent pollution of the maritime area from ionising radiation through progressive and substantial reductions of discharges, emissions and losses of radioactive substances." This was signed by then UK Deputy Prime Minister John Prescott in 1998.

But documents leaked to Greenpeace and CORE (Cumbrians Opposed to a Radioactive Environment) this summer, reveal that BNFL has no intention of complying with this strategy, and is in fact planning substantial increases in its radioactive nuclear discharges.

Nuclear waste classifications

High-level waste (HLW) comprises most of the heavy elements and fission products from nuclear reactors, along with the products of nuclear reprocessing. This remains radioactive for thousands of years, and therefore must be consigned to some form of long-term storage. At present, most of this waste is stored in liquid form in tanks.

Intermediate-level waste is more active material consisting mainly of metals, organic materials, inorganic sludges, cement, graphite, glass and ceramics. This comes from dismantling and reprocessing spent fuel, and from the general operation of a nuclear plant. It is produced in larger volumes than HLW.

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Solid low-level waste includes contaminated materials such as gloves, overalls and laboratory equipment.

Low-level liquid waste comes from water used in cooling, cleaning and other operational processes.

Low-level gaseous waste arises from nuclear plant operations and ventilation systems.

Plutonium is also a highly radio-toxic element, with a half-life of some 24,000 years.

Health implications

There is no safe dose of radiation. Exposure at any level can increase the risk of developing radiation-linked diseases. And study of Hiroshima and Nagasaki survivors has clearly shown that exposure to ionising radiation increases the risk of cancer.

The incidence of childhood leukaemia and Non-Hodgkin's Lymphoma is about 14 times the national average for the children of Sellafield workers resident in Seascale when the child was born[iii].

Emissions of Krypton-85 can be expected to give rise to between 500 and 1330 skin cancers from one year's discharges at Sellafield.

Inhalation of a single microgram of plutonium, smaller than a speck of dust, can cause fatal lung cancer. Once inside the human body, plutonium will remain there longer than the average lifetime, exposing it to damaging alpha radiation. This can lead to genetic damage, causing cancer or other health problems such as birth defects in offspring.

Direct exposure

We are exposed to radiation from Sellafield in various ways:

- Eating fish and shellfish
- Eating fruits or vegetables, or drinking milk produced near the site
- Inhaling radioactive particles carried on the wind, seaspray or house dust
- Swallowing polluted seawater while swimming
- Spending time on contaminated beaches or land

Creatures living in the Irish Sea – the most radioactively contaminated sea in the world – are directly exposed to pollution from Sellafield's nuclear waste discharge pipe. Official government monitoring has found radioactive substances in everything from lobsters to cod. Sellafield's pollution is therefore spread around the world, to wherever this fish is sold.

New ‘pathways’ for exposure are always being discovered. Pigeons roosting in disused buildings at Sellafield, and being fed by local people, were found by BNFL in 1997 to be radioactive. Even the area where they had been fed had to be removed and classified as radioactive waste.

Storage

Sellafield’s stock of acidic, liquid high-level waste (HLW) is one of the world’s most dangerous concentrations of long-lived radioactive material. It contains 2,100 kilograms of caesium-137. That is equal to 70 times the amount released from the Chernobyl reactor core in 1986.

This waste is stored in 21 stainless steel tanks, which must be cooled and ventilated constantly. The eight oldest tanks were built in 1955. There have been cooling system leaks in the 13 newer tanks. These tanks are also at serious risk from fire and explosions, not to mention the possibilities of war, terrorism, sabotage and earthquakes.

A release from these tanks could be in the form of liquid draining to the Irish Sea, or an atmospheric plume travelling downwind. If the caesium-137 in one tank were uniformly deposited over the Irish land mass, occupants would receive up to 20 times the normal background radiation dose. Cancer fatalities would rise by an estimated 50 per cent[iv].

Until 1982, the UK was dumping radioactive waste into the ocean. In 1993 an international dumping ban was imposed.

Transport

Radioactive material is carried around the world in containers that the nuclear industry claims are safe. None of these containers have ever been tested under realistic accident scenarios.

Spent fuel containers only have to withstand an impact from a height of nine metres, and a fire at 800°C for 30 minutes - and yet the average fire on a ship burns for 23 hours, at much higher temperatures.

Even ‘safe’ containers emit radiation. In 1998, transports in Europe were stopped, because radiation leaking from Castor casks exceeded the legal limit. And yet highly radioactive waste is transported secretly, without the consent of the communities or countries en-route.

Many of the economies of coastal and island states along nuclear transport routes are heavily dependent on agriculture, fisheries and tourism, and are extremely vulnerable to the possibility of a nuclear transport accident. The Federated States of Micronesia (FSM), for example, would lose more than half of its total annual income from exports, tourism and fishing fees, in the event of an accident in the shipping of high-level waste from France to Japan[v]. And yet there are no adequate international arrangements in place to ensure compensation for any damage caused in the event of such an accident.

Greenpeace campaigns for the end of reprocessing – a dangerous, expensive and polluting process. Greenpeace also campaigns for the closure of nuclear power stations, and therefore the end of spent nuclear fuel production. But spent fuel that already exists has to be dealt with, and our priority is to ensure that we adopt the least environmentally damaging option way of doing so.

The spent nuclear fuel that already exists should therefore be stored above ground, in dry conditions – so that it can be monitored and, if necessary, retrieved. The volume of waste and nuclear discharges would be a fraction of those created by reprocessing. Storage is a cheaper option than reprocessing. And plutonium would remain locked and inaccessible in the spent fuel, reducing the threat to world security.

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[i] MAFF/SEPA, 'Radioactivity in food and the environment', 1998, RIFE-4, September 1999, ISSN 1365-6414.
[ii] D Charles, M Jones and JR Cooper, 'Report of working group IV of CEC Project Marina'. NRPB-M172.
[iii] HSE, 'Investigation of leukaemia and other cancers in the children of male workers at Sellafield,' 1993.
[iv] IRSS, 'High level radioactive liquid waste at Sellafield: risks, alternative options and lesons for policy,' June 1998.
[v] 'Transportation accident of ship carrying high-level radioactive waste – part 1: impact on the Federated States of Micronesia,' Radioactive Waste Management Associates, New York, July 1997.

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