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Nuclear reprocessing at Sellafield

Media Briefing

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What is nuclear reprocessing?

Nuclear reprocessing involves chopping up the 'spent' nuclear fuel from a nuclear reactor, then dissolving it in nitric acid. The process was designed to separate out plutonium from the other radioactive products in waste fuel - for the production of nuclear weapons and for use in (now abandoned) fast-breeder reactors.

There are two reprocessing plants in the UK, both located at Sellafield in Cumbria. One, known as Building 205 (B205) treats waste fuel from the UK's aged Magnox reactors. The other, known as THORP, treats fuel from UK AGR reactors and reactors from abroad. Both are owned and operated by British Nuclear Fuels Ltd (BNFL), a government owned company. The only other commercial operating plant is at La Hague in France.

Reprocessing is recognised by the government as the largest source of radioactive pollution in the UK[i]. Sellafield is also known to contribute 87% of the collective radiation dose to EC member states, from discharges into north European waters[ii].

Continued operation of the reprocessing plants will make the UK into the biggest nuclear dustbin in the world. Containing massive stockpiles of nuclear weapons-usable plutonium, they are effectively bomb factories and highly vulnerable to terrorist attack.

The problems

1. **Reprocessing creates up to 180 times more radioactive waste than the amount contained in the original spent fuel.**

   A large amount of this is liquid 'high-level waste' (HLW) - a product that requires constant cooling, is a major accident hazard, and is still as radioactive as the original spent fuel. A massive backlog of HLW has built up at Sellafield, constituting, "one of the world's most dangerous concentrations of long-lived radioactive material," according to the US Institute for Resource and Security Studies [iii].

   Every single day, Sellafield also releases eight million litres of low-level liquid wastes into the sea via pipelines, and a deadly cocktail of radioactive gases into the air, through chimneys. As a direct result, the Irish Sea has become the most radioactively contaminated in the world. And Sellafield's pollution can be detected as far away as the Arctic.

2. This waste is responsible for an estimated 200 fatal cancers and up to 1300 skin cancers per year[iv].

3. **Sellafield has an appalling safety record.**

The world's first reported major nuclear accident – the 'Windscale fire' – happened at Sellafield in 1957. Since then there has been an explosion in 1973 and a series of serious radioactive leaks - in 1975, 1979 and 1981. The hazardous storage of liquid high-level waste in tanks was condemned, by the Nuclear Installations Inspectorate (NII) of the UK Health and Safety Executive (HSE), for not meeting safety standards, in February 2000.

4. **The UK is becoming the nuclear dustbin of the world.**

BNFL imports spent fuel from Japan, Germany, Switzerland, Spain, Italy, Sweden and the Netherlands, for reprocessing at Sellafield. Some of the contracts, signed before 1976, allow these countries to leave their reprocessed waste to be dumped in the UK. There is currently a stockpile of over 30,000 kilograms of Japanese plutonium sitting at Sellafield and La Hague.

5. **Reprocessing waste costs at least twice as much as storing it**[v].

Even British Energy – BNFL's biggest reprocessing customer – has declared reprocessing to be 'economic nonsense' and is desperately trying to cancel its contracts.

6. **Returning this reprocessed waste involves dangerous shipments of liquid high-level waste and plutonium around the world.**

This is the option that the government ordered in 1976. In the last 15 years, 2,100 kilograms of weapons-usable plutonium has been shipped from Europe to Japan, causing massive global protest.

7. **Radioactive waste is constantly being transported around the UK.**

One cask of highly radioactive spent fuel elements contains approximately as much radiation as was released in the Chernobyl accident.

8. Huge stockpiles of the most dangerous radioactive waste of all – nuclear weapons-useable plutonium – are produced.

As little as 4kg plutonium is sufficient to make a nuclear bomb. Every year, Sellafield produces enough plutonium to make 1000 nuclear bombs - posing a global security problem.

This stockpiled plutonium is also a major health hazard: inhalation of a single microgram, smaller than a speck of dust, can cause fatal lung cancer.

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So why was Sellafield built?

The original assumptions were that:

- Plutonium – which does not occur naturally in the environment – would be a hugely valuable asset for the production of nuclear weapons.
- Plutonium-fuelled fast-breeder nuclear reactors would be developed.
- Uranium would become an expensive and scarce commodity.
- Reprocessing was the most sensible waste management option for spent nuclear fuel.

Fifty years on, all of these assumptions have proven false:

- Plutonium now has no accounting value, and a House of Lords Select Committee has recommended that it be classified as waste.
- Apart from the atomic bomb, there is no viable use for plutonium. Fast-breeder reactors that could use plutonium as fuel have proved a technical and safety nightmare and attempts to develop them have been abandoned.
- New, uncontaminated uranium is relatively cheap and plentiful.
- Storage of spent nuclear fuel is both less environmentally damaging, and less expensive, than reprocessing.

There is no longer a single justification for the continued operation of reprocessing at Sellafield.

Why does reprocessing continue?

Reprocessing has been globally rejected as a viable solution for dealing with nuclear waste. The US decided to stop reprocessing in 1977, Germany built a facility but cancelled it before it operated, and Japan is unlikely ever to complete its plan to build a plant. Only the UK and France now operate major commercial reprocessing plants.

Denmark, Belgium, Finland, Germany, Norway, the Netherlands, Switzerland, Portugal, Spain, Sweden, Iceland and Ireland all voted in favour of a ban on nuclear reprocessing in France and the UK, at the 2000 OSPAR convention in Copenhagen.

The only forces that sustain the industry are contracts between BNFL and its customers, and political inertia. Politicians seem to find it easier to continue supporting BNFL blindly than to undertake a realistic and impartial assessment of reprocessing's implications for health and the environment.

In 1998, the German government tried to renegotiate contracts with Sellafield – to stop reprocessing. Despite offering to pay BNFL more to stop reprocessing German spent fuel than was originally agreed, the German proposal was rejected by the UK government, under pressure from BNFL.

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The solution

Greenpeace campaigns for the end of reprocessing – a process that provides no benefits and many dangers to human life.

The spent nuclear fuel that already exists should 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. The plutonium would remain locked and inaccessible in the spent fuel, reducing the threat to world security. And storage is a cheaper option than reprocessing.

Greenpeace argues that BNFL should redirect its business towards nuclear waste management and decommissioning. The company itself estimates that this market is worth £100's billions world-wide. Using its expertise to clean up nuclear waste rather than to create more would make good business sense for BNFL, ensure job security at Sellafield, and be far less environmentally damaging.

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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] IRSS, 'High level radioactive liquid waste at Sellafield: risks, alternative options and lessons for policy,' June 1998.
[iv] Sumner D, 'Comments of draft authorisation by HMIP for disposal of gaseous and liquid waste from Sellafield,' November 1992.
[v] This is according to the pro-nuclear NEA (Nuclear Energy Agency of the OECD).

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