

Government's doomed £6bn plan to dispose of nuclear waste

By Steve Connor, Science Editor

Monday, 11 April 2011

One month after the Japanese tsunami, the world's biggest reserve of plutonium waste is reaching crisis point. It was meant to be reprocessed and sold – but now no nation will take it. So where is this vast stockpile? Not Fukushima, but Sellafield, Cumbria

The nuclear crisis in Japan threatens a carefully choreographed UK Government plan to tackle the world's biggest mountain of plutonium waste stored at the Sellafield site in Cumbria.

Japanese nervousness about nuclear power following the near-meltdown at the Fukushima plant has led to a freeze in the international trade of reprocessed nuclear fuel that the Government sees as critical to solving Britain's own plutonium problem.

The Government's preferred strategy to eliminate the UK's growing plutonium stockpile centres on a technology that was developed to meet the demands of the Japanese market, yet there are now fears that Japan is about to turn its back on the enterprise.

It was hoped that Japanese contracts with Sellafield to make mixed oxide (Mox) nuclear fuel would underpin the economic and political case to tackle Britain's plutonium stockpile with a second multi-billion-pound Mox fabrication plant on the Cumbrian site.

However, Japanese power companies have told Sellafield that concerns about Fukushima have forced them to indefinitely postpone a shipment of French-made Mox nuclear fuel that would have been transported on British vessels operated from Sellafield.

The postponement is significant because the Mox shipment was not destined for the stricken reactors at Fukushima operated by Tokyo Electric, but for the unaffected Hamaoka reactors operated by Chubu Electric, the same company that was supposed to be one of the first customers of the existing Sellafield Mox Plant (SMP).

Chubu Electric and nine other Japanese power companies have also indicated that because of long-term production problems that have dogged the SMP, they will not now be taking any reprocessed fuel from Britain until at least the end of the decade – nearly 20 years after the plant was opened to serve the Japanese market.

This would mean that the existing Mox plant at Sellafield, which was designed to supply more than 1,000 tons of Mox over 10 years, is likely to produce a tiny fraction of this before it is due to be decommissioned, at enormous cost to the British taxpayer.

The setback is seen as a huge blow to the business of making and selling Mox fuel, touted by the Government as the best way of dealing with Britain's stockpile of civilian plutonium, which is itself the product of nuclear-waste reprocessing at Sellafield.

Government ministers, their officials and advisers are all privately convinced that "recycling" plutonium waste into nuclear fuel that could be "burned" in nuclear reactors represents the safest and least expensive option in dealing with the stockpile.

A Government consultation on the stockpile ends next month but ministers have already made it clear that the "Mox option" is their preferred route, even though it would require a second Mox plant at Sellafield costing £3bn at discounted prices – the actual lifetime cost of the plant is likely to be nearer £6bn.

The existing Sellafield Mox Plant, opened in 2002, has cost more than £1.3bn to date yet has produced just 13.8 tons of Mox fuel in nine years compared to an expected output of 120 tons per year. A leaked cable from the US embassy in London said Sellafield's Mox plant was a white elephant costing about £90m a year and considered, privately, by the UK Government as "[one of] the most embarrassing failures in British industrial history".

Yet, ministers have now agreed they should press on with preparing the public for an even bigger Mox plant to deal with the growing stockpile of British-owned plutonium, expected to reach 109 tons within a few years.

Independent scientists, from Sir David King, the former chief scientist, to fellows of the Royal Society, are supporting a new Mox plant and believe there is no viable alternative.

However, nuclear experts have told The Independent that the existing Sellafield Mox plant is a serious drain on the budget of the Nuclear Decommissioning Authority, which took over the Sellafield site from BNFL in 2005. They said that the authority would like to close the plant, except that to do so would be a PR disaster at a time when the Government is about to propose another one.

In January, before the nuclear crisis at Fukushima, Jonathan Marland, a junior Government minister, told the House of Lords that a new Mox plant at Sellafield would turn the world's biggest plutonium stockpile from a liability into an asset and that a decision on whether to go ahead and build it is likely later this year. Lord Marland admitted that the existing Mox plant is not fit for purpose, which is why the Nuclear Decommissioning Authority has brought in the French nuclear company Areva, which wants to build the second Mox plant based on its own Mox operation at Marcoule in the south of France.

Although the Government has not finished its consultation exercise on the plutonium stockpile, it has already made it clear that the long-term storage and disposal of plutonium would be even more expensive than building a second plant to convert it into Mox fuel.

Q & A: Why has it come to this?

Q: What is Britain's "plutonium mountain"?

A: It is the nation's stockpile of radioactive plutonium, kept as plutonium dioxide powder, packed into special drums stored at Sellafield in Cumbria. A further, smaller amount is stored at the Dounreay nuclear facility in Scotland, the site of the doomed nuclear fast-breeder reactor programme.

Q: Why is the plutonium stockpile so big?

A: This is civilian plutonium, not military. It is largely the result of a decision in the 1960s to extract the plutonium from spent nuclear fuel for use in fast-breeder reactors, which were never built commercially. Britain continued to accumulate civilian plutonium, currently amounting to 84 tonnes, along with foreign-owned plutonium, currently 28 tonnes. The final British-owned plutonium stockpile will be 109 tonnes, once fuel reprocessing from existing nuclear reactors has been completed.

Q: Why do we need to do anything with it?

A: Plutonium remains radioactive for many thousands of years – just how long depends on which isotope. Experts say that doing nothing with the stockpile is not an option – the current methods of storage will eventually become unsafe in decades to come. Plutonium either has to be put into long-term storage, with a view of permanent disposal at some future point in cement or glass blocks, or used in some way that makes it "safer", such as incorporating it into Mox fuel that is used in a reactor.

Q: Is converting plutonium to Mox fuel safe?

A: Plutonium is an extreme health risk if it gets inside the body – it emits alpha particles which are highly dangerous if they penetrate the skin because they damage the DNA of cells and cause cancer. It is also a security risk because of its use in nuclear weapons and "dirty" bombs. By converting it to Mox fuel, and irradiating this fuel in reactors, some experts believe that plutonium will, ironically, become safer because, being more radioactive, it will be more difficult to handle. Opponents argue that manufacturing Mox necessarily increases security risks not least because of the transport of Mox fuel rods, and even plutonium dioxide, which can be subject to terrorist attacks or accidents.

Q: Is it easy to use Mox fuel in nuclear reactors?

A: Some reactors do use Mox, but only as a small percentage (less than 30 per cent) of the total fuel. The rest of the fuel is conventional uranium oxide. Supporters of Mox suggest that the new generation of nuclear reactors to be built in Britain could burn Mox fuel and thereby be used to diminish the plutonium stockpile. However, the new reactors have been licensed to burn uranium-only fuel and none of the reactor designs being considered has been "justified" for Mox, which in any case remains far more expensive than conventional uranium fuel.

Source: <http://www.independent.co.uk/news/science/governments-doomed-6bn-plan-to-dispose-of-nuclear-waste-2266047.html>

How a money-making strategy from the 1960s left behind a toxic legacy

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Monday, 11 April 2011

Instead of producing 120 tonnes of Mox fuel each year, the plant has produced just 13.8 tonnes since 2002

Bad decisions, poor performance and government subsidies have set the nuclear industry apart from any sector in Britain, except perhaps for banking.

The reason Britain has the biggest waste mountain of civilian plutonium in the world is down to a bad decision in the 1960s when the nuclear industry proposed turning nuclear waste from civilian reactors into plutonium for burning in fast-breeder reactors.

Technical problems meant that these reactors were never developed commercially – the project was finally abandoned in 1994 – but the plutonium stockpile kept growing. It currently stands at 112 tonnes, including 28 tonnes from foreign reactors that must at some point be returned to their owners.

The stockpile from British-owned reactors is currently 84 tonnes but will reach 109 tonnes by the time all the British-made spent fuel at Sellafield has been dealt with by the Thermal Oxide Reprocessing Plant (Thorp) – the biggest building on the Cumbrian site.

Plutonium is one of the most deadly substances known to man. Minuscule amounts can kill if ingested. It can also be used to make nuclear weapons, which is why governments around the world are so concerned about where and how it is stored.

In the 1990s, the industry proposed dealing with the growing plutonium stockpile by "recycling" it as mixed oxide (Mox) nuclear fuel for burning in thermal reactors. The idea, like so many in the nuclear industry, looked good on paper. By mixing relatively small amounts of plutonium dioxide with bigger amounts of uranium oxide from spent nuclear fuel, it would be possible to fabricate Mox fuel rods containing about 7 per cent "recycled" plutonium from reprocessed reactor fuel.

The industry was so confident that it proposed dealing not just with Britain's plutonium waste but with the waste of other countries, in particular Japan which relied heavily on nuclear power.

Sellafield, then operated by BNFL, started making Mox fuel rods at a demonstration facility while it built a new £498m Sellafield Mox Plant (SMP), specifically for foreign customers. The SMP was completed in 1996 but was only given a licence to open in 2002 after Helen Liddell, the then energy minister, had visited Japan to secure a "statement of intent" from Japanese customers who had been spooked by a scandal over falsified data at BNFL's Mox demonstration facility.

Before it opened, BNFL said that the SMP would be able to produce some 120 tonnes of Mox fuel a year and confidently predicted that it would earn millions in foreign exchange for Britain. But critics warned that this was "voodoo economics", essentially because conventional uranium fuel mined from the ground was at least 25 per cent cheaper than Mox.

But the problems were even greater than anyone had predicted. The SMP was dogged by technical failures. An independent investigation by consultants Arthur D Little – the company that had originally said that SMP made sense – found that the plant suffered something like 37,000 breakdowns a year.

Instead of producing 120 tonnes of Mox fuel each year, the plant has to date produced just 13.8 tonnes since it was opened in 2002. It has supplied just one Swiss company with one batch of fuel, fabricated another batch for a German customer that has yet to be delivered and, most importantly, has not made a single fuel rod for its main customers in Japan.

The cost of the SMP to the taxpayer ballooned to £1.34bn and now the Nuclear Decommissioning Authority, which took over the Sellafield site from BNFL in 2005, said that no Mox fuel will be made or delivered to the Japanese power companies until at least the end of this decade. Meanwhile, the SMP is costing the authority nearly £100m a year in ongoing costs.

The total failure of the SMP has had serious repercussions. The Nuclear Decommissioning Authority has had to subcontract some of the Mox fabrication to Areva, the French nuclear power company that operates a Mox plant at Marcoule. This subcontracted work has led to the transport of half a tonne of highly dangerous plutonium dioxide powder from Sellafield to France under armed guard. According to leaked cables from the US Embassy in London, the UK Government believes the Sellafield Mox Plant is one of the biggest failures in British industrial history.

Source: <http://www.independent.co.uk/opinion/commentators/steve-connor-how-a-moneymaking-strategy-from-the-1960s-left-behind-a-toxic-legacy-2266046.html>