

What is plutonium MOX fuel? The fantasies and the reality...



MOX is made from a mixture of plutonium and uranium oxides and is used in nuclear reactors in Japan, Switzerland, Germany, Belgium, and France.

Nuclear reactors normally burn enriched uranium fuel. When MOX is used, around 30% of the enriched uranium is replaced by the MOX fuel.

The reason for the manufacture of MOX was a political one - the countries involved like Japan had to be seen to be doing something about their useless stockpiles of plutonium, produced by reprocessing spent nuclear fuel.

To understand the history and rationale behind British Nuclear Fuel's (BNFL) production of plutonium Mixed Oxide Fuel (MOX) is one of the best ways to understand an industry living in a nuclear fantasy world, out of control, and oblivious to the reality of the deadly business they are involved in.

- **Fantasy: producing MOX fuel to burn in nuclear reactors will use up our growing stocks of plutonium.**

Reality: To eliminate the plutonium, MOX fuel must be reprocessed and re-used many times. This is expensive because each time the MOX is used and reprocessed, the quality of the plutonium is degraded, making it increasingly difficult to re-use. Also, the share of MOX in a reactor core is around 30%. The other 70% of the core contains enriched uranium fuel, in which new plutonium is formed. The result: a net increase of plutonium.

- **Fantasy: recycling nuclear fuel is a good thing.**

Reality: separating out plutonium at the Sellafield THORP plant creates 180 times the volume of waste that you start with. The highly radioactive by-products are held in inadequate storage facilities and discharges have made the Irish Sea the most radioactive in the world.

- **Fantasy: producing MOX will save nuclear waste storage costs.**

Reality: Spent MOX fuel is much more radioactive because it contains on average five times more plutonium than spent uranium oxide fuel. After 10 years, the heat generation from spent MOX fuel is twice as high as that of spent uranium fuel. After 100 years, it is

three times higher. Given the very long half-life of Pu-242 (380,000 years), and Neptunium-237 (2.14 million years), it is much more complicated to store MOX than normal spent fuel. Instead of partially solving our high level waste problem, MOX creates even bigger waste problems: it needs more and longer cooling; it has to be stored much longer; it is more dangerous; and the costs are therefore higher.

- **Fantasy: it will be cheaper to produce Mox fuel than enriched uranium suitable for nuclear reactors.**

Reality: recent studies in Germany show that MOX fuel is four to five times more expensive. And that's before considering the reprocessing costs of separating the plutonium in the first place.

- **Fantasy: no additional safety concerns over MOX fuel.**

Reality: MOX in a reactor is more unsafe because plutonium is more reactive and this hotter fuel can cause increased localised melting of fuel in the reactor. Nuclear reactors have to be adapted and re-licensed. About 30% of the uranium fuel is replaced with MOX. Wrong size pellets can also vibrate or expand, rupturing the fuel pins and causing a meltdown.

- **Fantasy: the Sellafield MOX plant will be an economic benefit for the UK.**

Reality: The operation of the Sellafield MOX plant was forecast to make £200m profit. But the cost of building it was over £460m.

- **Fantasy: plutonium MOX is no threat to non-proliferation because, even if it was reprocessed, it would not be weapons-grade material.**

Reality: In June 1994, U.S. Energy Secretary Hazel O'Leary declassified further details of a 1962 test of a nuclear device using reactor-grade plutonium, which successfully produced a nuclear yield. The British Government itself has recognised this test, as it used British reactor-grade plutonium from Sellafield.

- **So how are BNFL doing so far?**

The first shipment of MOX from Europe to Japan in 1999 ended in an international nuclear scandal. Crucial safety data of the MOX had been deliberately falsified by BNFL. The total cost of this episode to the taxpayer will be around £100 million.

Article tagged as: mox fuel, nuclear power, plutonium