

Executive Summary

THE UNBEARABLE RISK

Proliferation, terrorist threats and the plutonium industry

Yves MARIGNAC¹, Xavier COEYTAUX²

August 2003

The necessary immobilization of plutonium surplus from military stocks in USA and Russia should be developed in the most secure way. The interests of the European plutonium industry, hit by a severe crisis and in search of perspectives for the long term, converge with those of the two countries to propose a single strategy. It focuses on the utilization of the plutonium in MOX fuel in commercial reactors, rejecting more direct and cost-effective options of disposition of the plutonium as waste.

The European Union, and some of the Member States through the G8, are pressed to contribute the implementation and funding of this programme. This needs to be challenged in view of its real achievements for global security.

The 9/11 events and their consequences on international relations have made the problems of proliferation and terrorist threats even more serious than they were before. The management of plutonium stocks through the proposed MOX strategy, as compared to more direct alternatives for immobilization, results in longer delays; it increases the quantities of separate nuclear material in storage and the number of transports of highly dangerous material. Furthermore, the so-called MOX-option is a decisive support to the construction, development, and survival of a civilian plutonium industry respectively in the United States, Russia and the European Union.

The proposed MOX strategy for the management of plutonium, as compared to alternatives of direct immobilization, is an unbearable risk for the safety and security of Europe and the World.

¹ Director, ² Research Associate, WISE-Paris.

Created in 1983, WISE-Paris is an independant agency providing information, studies and consulting services on energy and environment.

WISE-Paris is fully independant of any other organisation bearing the name of "WISE". It provides a plutonium dedicated information service on the web, Plutonium Investigation: www.wise-paris.org



The Greens | European Free Alliance
in the European Parliament

Report commissioned by the following members: **Nuala Ahern** (The Green Party - IRL),
Hiltrud Breyer (Bündnis 90/Die Grünen - GER),
Marie-Anne Isler-Beguín (Les Verts - FRA),
Paul Lannoye (Ecolo - BEL),
Inger Schoerling (Miljöpartiet De Gröna - SWE),
Claude Turmes (Déi Gréng - LUX).

The failure of the civilian plutonium economy

More than three decades after the launching of a “civilian” plutonium industry on the grounds of its first military developments, the project of a sustainable plutonium economy has incontestably turned into a complete failure.

- The plutonium “chain”, as a management option for the spent fuel arising from nuclear reactors, has failed to meet its supposed goals, although they evolved with time.
 - The shut-down of the French reactor Superphénix, in 1998, marked the end of the energetic *perpetuum mobile* myth, leaving the nuclear industry with the option of using plutonium (mixed with uranium in MOX fuel) in the existing fleet of light water reactors. This solution, as proven by the extensive French experience, is extremely inefficient, saving not more than 10% in natural uranium needs.
 - As a consequence of the technical obstacles and high costs of the reprocessing plus MOX option, the plutonium stocks of France and UK, in spite of the claim of their energetic potential, are given a nil value in the respective registers of assets of EDF and the Britannic nation.
 - Moreover, the justification has shifted from valorization of an energy resource to the disposal of an unwanted waste. There again, a comprehensive evaluation of the French practice concludes in its low efficiency but high cost. France is actually spending about 150 million euros for each ton of plutonium less in the inventory of final waste to achieve a reduction by only 15%.
- The plutonium economy does not take into account the externalisation of a higher and contested burden on human health and the environment.
 - In spite of the commitments under the OSPAR Convention, radioactive discharges of the French and British reprocessing plants in La Hague and Sellafield are still thousands of times those of a nuclear power plant. This notably results in important pollutions of coastal areas of other countries, such as Ireland and Norway.
 - The reprocessing industry also produces quantities of various secondary long-lived waste, resulting in higher volumes and a more complicated, hazardous and expensive management than direct disposal of spent fuel.

The survival strategy of the plutonium industry

There should be no plutonium market. The “civilian” plutonium economy has not greatly developed outside the European Union, where it benefitted support or passivity from a majority of Member States. But the plutonium industry players, BNFL and COGEMA, used this situation to create a “fait accompli” that allows for the prolongation of their activities.

- The European plutonium industry represents some 3.3 billions Euros of annual turnover. But there is no long term perspective for the French, British and Belgian plutonium plants (reprocessing and MOX fabrication facilities), as there is no provision for new contracts beyond the existing ones.
 - The major part of the reprocessing contracts with European and overseas clients are either completed or in way of completion. The existing MOX contracts will be completed after a few years interval.
 - There is currently no prospect in any of the past or present client countries, apart from the “domestic” contracts with the utilities EDF and British Energy, for new contracts to be signed.
- However, the operators of those plants have developed stocks, capacity and time frame set for their survival. This was also allowed by important delays, or even giving up, in implementation of plutonium use in client countries.
 - In France, the development of MOX loading in reactors coincided with the rise of the plutonium stock, from almost zero to 47 tonnes (end of 2001). In the UK, where there is not even MOX use, the plutonium stock reaches 65.3 tonnes (end of 2001).
 - In addition, the two countries hold 50.6 tonnes of foreign separated plutonium (33.5 tonnes in France and 17.1 tonnes in the UK, as of the end of 2001) mostly coming from European

countries (6 Member States – Belgium, Germany, Italy, Netherlands, Spain, Sweden – plus Switzerland and, outside Europe, only Japan – and a very small quantity from Australia). Most of the client countries have obligingly delayed implementation of the return of their plutonium, even though some have decided the phase-out of nuclear energy.

- These stocks, in turn, have been used by COGEMA and BNFL as a justification for the recent increase of capacity of MOX fabrication. Recent or current extensions bring the total capacity from less than 200 up to 300-400 tHM (tonnes of heavy metal) by year – some 100-150 tHM more than currently needed.

The interest of the plutonium providers in disarmament

Now the interest of the European plutonium industry to create a new perspective converges with the strategies of the two other great producers of separated plutonium – for military purpose –, the USA and Russia, to achieve their political commitment to dispose of part of their stocks.

- After they have agreed in 2000 on the immobilization of 34 tonnes each of “surplus” plutonium, the USA and Russia have both resolutely turned to the sole re-use of plutonium in reactors, ruling out alternative options of direct disposal.

- Russia has made it clear that it would not regard plutonium as a waste, but as the resource for a new programme of fast breeder reactors. In the meantime, they could fund this through being paid to produce MOX fuel to be used either in their light water reactors, or sold to Western utilities.

- The USA, that had first developed a “dual-track” strategy, including the direct immobilization of 9 tonnes of plutonium, have given it up to prefer the sole MOX option. Although they officially justified it in other ways, they explicitly made that choice to satisfy Russia.

- This choice is contrary to most of the evaluations, which show the direct immobilization options (vitrification, ceramic, bad MOX) are safer, more practicable and less expensive than the use of the plutonium as MOX in reactors.

- The US Administration is only driven by concern about the immobilization of Russian plutonium. It must be noted that, in the meantime, the US have restarted production of plutonium pits (i.e. the fabrication of nuclear bombs) and are studying the possibility to develop a new kind of small nuclear bombs.

- The US and Russia need European support for the technical implementation and funding of their disposal strategy.

- The European plutonium industry has a unique experience in fabrication and use of MOX fuel. COGEMA is part of the consortium, DCS, to build the US MOX plant in Savannah River Site. It is based on the design of the French MELOX plant, as should be the MOX plant the Russians plan to build in Seversk.

- The US, before their MOX plant is ready, developed a plan to accelerate the process of MOX fuel qualification in their reactors by having the Lead Test Assemblies (LTAs) fabricated in Europe. Two options are discussed: the fabrication in Belgium (P0 in Dessel), where the Government blocked the process in August 2002, or in France, where it could take place in the old ATPu plant in Cadarache, even though it has to stop commercial operation by July 2003 for safety reasons.

- Moreover, the plan needs financial support. According to the US, the required budget to start the plan is over 4 billion dollars for the US part, and nearly 2 billion dollars in Russia, which are to be funded by the international community.

- This could be achieved by direct support, through the G8, which the US recently announced it will have gathered 1 billion dollars, or half the needed support, by the end of 2003. The European Union and some Members States are pushed to contribute.

- Another form of financial support could come from direct contracts between Russia and European countries. The Russians already offer spent fuel management services to foreign countries, under attracting conditions that appear very vague on the eventual return of waste to client countries. They also consider to develop services providing MOX fuel using their plutonium surplus.

The insecurity of the post 9/11 world

In face of the post 9/11 world, the combined strategy of the European plutonium industry, the US and Russia to dispose of 68 tonnes of surplus plutonium under the form of MOX fuel for commercial nuclear reactors needs to be really challenged, as they appear to increase the risks related to proliferation and terrorist attacks.

- While the proliferation risk has always been a concern, the recent undermining of the international safeguards system under the responsibility of the International Atomic Energy Agency, and the new threat that terrorist groups could also try to develop some nuclear device, enforces the need to limit the potential sources of proliferation. On the contrary, the plutonium disposal strategy is raising tremendous risks.
 - The MOX strategy, in comparison with options of direct immobilization, implies more delays, storage, transports and manipulation of so-called “weapon-grade” plutonium that undoubtedly increase the risks of proliferation through diversion of some material. About 1/10,000th of the 68 tonnes that will circulate under the US-Russian plan is enough for the fabrication of a nuclear device.
 - Moreover, this strategy is a support to the pursuit of the activities of the reprocessing industry, including the management of its separated plutonium stocks through the MOX option, which also increases the proliferation risk by circulating so-called “reactor-grade” plutonium.
 - Contrary to declarations from the plutonium industry, there is no discussion that this plutonium, although less suitable, is still perfectly usable for the making of bombs. The daily output of a reprocessing plant like La Hague or Sellafield is enough plutonium to make a bomb.
- The attack of the World Trade Centre created a new terrorist threat to the world, which raises unthinkable risks for the nuclear industry. Because they tend to extend storage and transports of highly dangerous materials, the reprocessing and MOX industry are particularly exposed to this new threat.
 - Since the 9/11 events, the probabilistic approach has been severely challenged with the demonstration that unthinkable events, ignored by the probabilistic method because they fell under the probabilistic threshold, had now to be taken into account as voluntarily provoked.
 - In that perspective, the reprocessing industry is of particular importance. On one hand, the structure and organization of the plutonium industry makes it highly vulnerable, while on the other hand the nature of the materials involved makes the risk more sensible, i.e. there can be severe consequences in the event of an attack.
 - The first concern is the voluntary crash of a large plane on the storage facilities of the reprocessing plants – both Sellafield or La Hague store probably more radioactivity than is stored in total in other nuclear facilities in their countries. Independent studies conducted after 9/11 have concluded that a plane crash on facilities such as one spent fuel in La Hague or the high level liquid waste storage in Sellafield could result in consequences tens of times that of the Chernobyl accident.
 - The second concern is the potential use of plutonium transports as a radiological bomb in urban areas, through a rocket attack against such a transport. Trucks carrying plutonium powder circulate across France every week, under such bad security conditions that Greenpeace protesters were able, in February 2003, to stop one of them. Scenarios of attack conclude to a potential impact on zones covering about 250 km², or more than 100,000 people in urban areas, with possible hundreds of fatalities.