

# Nuclear Free Local Authorities **RADIOACTIVE WASTE POLICY**

## **Briefing No. 28– Plutonium management consultation**

Prepared for NFLA member authorities, 6<sup>th</sup> May 2011

### NFLA SUBMISSION TO UK GOVERNMENT CONSULTATION ON LONG-TERM PLUTONIUM MANAGEMENT POLICY

#### **1. Introduction and background**

This briefing provides information on the submission of the NFLA to the UK Government's Department of Energy and Climate Change (DECC) consultation on long-term plutonium management policy. It has been prepared by the NFLA Secretary Sean Morris in co-operation with the NFLA Scotland Policy Advisor Pete Roche.

The consultation was initiated by DECC on the 7<sup>th</sup> February and the closing date for submissions is on May 10<sup>th</sup> 2011.

Completed submissions should be sent to:  
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The discussions on what to do with the UK plutonium stockpile has taken place over a number of years. After a series of discussions in the BNFL Stakeholder Dialogue, the successor Nuclear Decommissioning Authority (NDA) developed a 'Credible Options Study'. DECC has taken this forward with a stakeholder dialogue event in Manchester and the publication of two pre-consultation papers. This consultation gives now its preliminary policy view.

The NFLA has taken a full part in all these policy processes and what follows below are the central points of its submission to the February consultation.

#### **2. NFLA's main submission to the DECC plutonium consultation**

##### **a) The Government's three options for plutonium management**

The consultation document sets out three options for long-term plutonium management. The NFLA view of each of them, as it has already set out in its response to the pre-consultation discussion papers is as follows:

- **Reuse.** This is the Government's preferred preliminary option and the conversion of the existing stockpile of UK plutonium to Mixed Oxide (MoX) Fuel would require the

construction of a new MoX fuel fabrication plant. In the NFLA's view, this would **not** be an economic use of resources and there are many other more efficient climate abatement options. Spent MoX fuel would be a much more hazardous waste form to deal with than conventional spent fuel. Furthermore, the use of MoX fuels rather than as a waste product would mean that the UK fails to meet its non-proliferation objectives. It also involves quite unacceptable safety and security risks. The NFLA also perceives a potential threat to civil liberties, as it does not want to see large armed plutonium waste convoys being transported up and down the country between Sellafield and potential new MoX burning reactors. Such transports also lead to inevitable concerns over emergency planning and malicious attack.

The Government concedes in the consultation that development of a new MOX plant for reprocessing plutonium does not have a positive economic benefit. The NFLA agrees with this assessment and feels it is therefore foolhardy to spending at least £500 millions on developing this option. To build such a plant also would require a government subsidy, and the NFLA feels this again breaks the Government's coalition agreement of no public subsidies for nuclear new build facilities, which this effectively would be.

- ***Immobilise and treat as waste.*** This option remains the **NFLA's preferred option**. Unwanted plutonium should be blended down or otherwise immobilised and managed as waste. The material should remain under international safeguards until it can be shown that it would be impossible to reuse it. All immobilisation options mentioned in the Nuclear Decommissioning Authority's (NDA) updated plutonium credible options paper should be investigated further and tested against environmental principles, including in particular proliferation resistance, and other criteria such as cost, dose levels to the workforce and the highest levels of health and safety. The NFLA acknowledges the difficulties for DECC and the NDA in this option, but feel that it is the most sensible, safest and practical choice available.
- ***Indefinite storage.*** The NFLA accepts that there is a need to store plutonium stocks securely in the interim period before it can be treated as waste, and accepts the consultation paper's assessment of the difficulties in doing this. The NFLA though notes that the NDA's credible options paper notes storage of plutonium at the Sellafield site until 2120, which gives adequate time to develop and improve waste treatment strategy. The NFLA believes that indefinite storage is not suitable as a long-term option, and that plutonium stocks should be placed beyond any possible future use, which could potentially include use as a fissile material in the production of nuclear weapons. The NFLA also believes that the creation of further plutonium stocks should be stopped as quickly as possible.

## **b) UK plutonium inventory**

The NFLA notes that the UK plutonium stockpile will grow to around 112 tonnes at the end of the currently planned reprocessing operations – 110 tonnes is at Sellafield and 2 tonnes at Dounreay. This is the largest civil plutonium stockpile anywhere in the world.

Plutonium separation originally began for the purpose of building nuclear weapons. Later because uranium resources were known to be limited, fast reactors, fuelled by plutonium, were thought to be the way forward. These reactors can theoretically, at the same time as generating electricity, convert non-fissile (the useless portion) uranium into more fissile plutonium. However, a string of problems have all come together to stop the development and construction of commercial scale fast reactors.

One major difficulty is that they use liquid metal as a coolant – usually liquid sodium, which explodes on contact with air. Currently, only one commercial fast reactor is operating—the Beloyarsk BN-600 in Russia. India is only intermittently operating its Fast Breeder Test Reactor (FBTR) at Kalpakkam. The UK has closed down its Prototype Fast Reactor at Dounreay. The French closed down their Superphénix Fast Reactor in 1996 after it had achieved an average capacity factor of less than 7% over eleven years' of operation. Japan's fast reactor has been shut since a leak of liquid sodium coolant in 1995 and the Fukushima incident is only likely to put a major question mark over the Japanese nuclear programme. (1)

In the absence of fast reactors, several countries, such as Germany, France and Switzerland, opted to use their plutonium stockpiles in conventional reactors. However this route for making use of the plutonium stockpile was problematic in the UK because of the type of reactors built here. In the absence of the capability to use plutonium in either conventional or fast reactors separated plutonium has accumulated. This huge policy mistake has left the UK with a much greater dilemma than any other nuclear state. The NFLA believes this mistake should not be compounded by making an even greater mistake in building a new reprocessing site.

The NFLA have consistently argued as well that separation of plutonium from spent nuclear waste fuel – known as reprocessing – is completely unnecessary. Only around 5 – 10-% of the world's spent fuel arisings are submitted for reprocessing, the rest is stored. (2)

### **c) The costly failure of reprocessing at Sellafield**

The NFLA finds it quite staggering that the Government has come to the view that a new fuel fabrication plant at Sellafield is the most effective long-term management for the UK's weapons-usable plutonium stock given the shocking failures of the existing reprocessing facilities.

The UK's Sellafield Mixed-Oxide (MOX) Plant is "*one of the most embarrassing failures in British industrial history*," according to a leaked US embassy cable. (3) It was built at a cost of £473 million, and despite repeated warnings that it would be uneconomic and could be a security risk, it has never worked properly. Even though the Government wrote off its capital cost, it is still haemorrhaging money. Though the annual loss is kept secret, the cable – released by WikiLeaks – says it is "*costing taxpayers £90 million a year*".

According to '*The Independent*', the Sellafield MOX plant is due to be kept open until the end of the decade, which means the enterprise will have cost the taxpayer a total of almost £2.5bn. (£900m operating costs so far and another £900m before it closes.) (4)

The THORP facility, which has been a major contributor to the UK's embarrassing plutonium stockpile has not performed much better. THORP reprocessed only 5000 tonnes of spent fuel in its first decade of operation, compared with a target of 7,000. Since 2005 the plant has been plagued with problems. What makes DECC believe we can get it right a third time?

In fact the Government's preferred option is based on the assumption that we don't make the same mistakes with a second MoX fuel fabrication facility, especially if we bring in the French who already have a working Mox plant. But experience in the United States where Areva is building a Mox plant, which is reportedly costing five times as much as anticipated and is hopelessly behind schedule, does not bode well for the future. (5) The American

plant has no customers after Duke Energy withdrew test assemblies from its reactor because of poor performance. (6)

#### **d) Proliferation**

The UK Government argues that expanded access to nuclear power needs to be managed so that it does not risk further proliferation of nuclear weapons. (para 2.1) Yet, if its preferred option for plutonium management does “demonstrate leadership” (para 2.4) as the Government says it wants, it will be demonstrating leadership in plutonium separation and transporting weapons-useable material around the UK.

Before Fukushima over 45 countries were considering embarking on a nuclear programme:

- Power reactors under construction: Iran.
- Contracts signed, legal and regulatory infrastructure well-developed: UAE, Turkey.
- Committed plans, legal and regulatory infrastructure developing: Vietnam, Jordan, Italy.
- Well-developed plans but commitment pending: Thailand, Indonesia, Egypt, Kazakhstan, Poland, Belarus, Lithuania, Chile.
- Developing plans: Saudi Arabia, Israel, Nigeria, Malaysia, Bangladesh, Morocco, Kuwait.
- Discussion as serious policy option: Namibia, Kenya, Mongolia, Philippines, Singapore, Albania, Serbia, Croatia, Estonia & Latvia, Libya, Algeria, Azerbaijan, Sri Lanka, Tunisia, Syria, Qatar, Sudan, Venezuela. (7)

It should be noted that since Fukushima a number of them are understandably reviewing these decisions.

A global expansion of nuclear power will require a proportional expansion of uranium enrichment capacity, and probably lead to an expansion of spent fuel reprocessing too. The diffusion of knowledge and the increase in global trade of the specialized materials and equipment needed to build and operate uranium enrichment facilities and reprocessing plants would make it more difficult to detect clandestine weapons programmes.

At least half a dozen countries have also said that they are specifically planning to conduct enrichment or reprocessing of nuclear fuel, a prospect that could dramatically expand the global supply of weapons-useable plutonium and enriched uranium. (8)

According to ISIS, thirteen of the forty countries are in the Middle East, and may be planning nuclear programmes as a way of countering Iran’s programme, thus raising concerns about a Middle East arms race. (9)

If a new plant is built it will mean removing weapons-useable plutonium from closely guarded stores and transporting it around the country. It is relatively easy to remove plutonium from MoX fuel, so if terrorists or criminals intercepted a shipment, they could use it to make a bomb capable of destroying much of a major city. (10)

#### **e) Waste Disposal**

At the recent Committee on Radioactive Waste Management meeting in Manchester (February 8<sup>th</sup> and 9<sup>th</sup>) the value of deciding now on options for plutonium was questioned. The lack of work on the disposal of spent MoX fuel was highlighted and it was suggested that such spent fuel may require cooling for up to 150 years before it could be disposed of.

Spent MoX fuel could, therefore have a very significant impact on the size of the Geological Disposal Facility footprint. According to 'The Independent' the Massachusetts Institute of Technology has found that spent Mox fuel takes about seven times as much disposal space compared to spent uranium fuel. (11)

Even if much of the UK's stockpile of plutonium is used for MoX fuel, there will still be plutonium that needs to be disposed of. Consequently issues concerning the disposal of plutonium in a deep-waste repository – a concept which the NFLA has deep reservations with - will have to be dealt with.

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.

#### **f) The Fukushima accident in Japan**

The implications of the accident at the Fukushima Daiichi nuclear plant, where MoX fuel had been used in reactor 3, have yet to be analysed. The Convention on Nuclear Safety, to which 72 countries have signed up, will not meet until August 2012 to review the breakdown of safety systems at Fukushima, because the lessons-learned process cannot be completed "*until sufficient additional information is known and fully analyzed.*" (13) It seems foolhardy to the NFLA for the UK Government to be contemplating building such a facility until after such learning points are known – indeed it is a signatory to the Convention, so why is it going against this policy by continuing to developing new nuclear facilities.

#### **g) Submission of the LGA Nuclear Legacy Advisory Forum (NuLeAF)**

Members of the NFLA have been involved in the development of the NuLeAF submission to DECC on this consultation. The NFLA particularly supports their submission of a further condition on the Government for determining its final option for plutonium management. This is that the preferred option be "capable of inspiring public confidence". The Government will note that this was the formulation set in CoRWM's original terms of reference for consideration of long-term management options for higher activity wastes. The NFLA would go further and note that the only way to inspire public confidence would be to choose the option of immobilisation. Determining how public confidence will be judged is also a matter DECC will need to consider carefully with the organising of stakeholder workshops with interested groups and the general public essential.

The NFLA also strongly agrees with the NuLeAF submission that: "Government give closer consideration to the pros and cons of moving forward more promptly with the immobilisation of that proportion of the plutonium stockpile that is unlikely to be reusable as a reactor fuel." (10)

#### **h) OSPAR Commission policy commitments**

The NFLA was present – on behalf of the local authority marine pollution group KIMO – at the recent OSPAR Commission Radiation Substances Committee. At the meeting it was reported that radioactive discharges into the OSPAR area had increased, and these were NFLA Radioactive Waste Briefing 28

due to increases from reprocessing at the Sellafield facility. Such increases were also expected for the next few years, putting seriously at question the UK Government's commitment to reduce such discharges to 'close to zero' by 2020. The NFLA remains concerned that the development of a new MOX fabrication facility at Sellafield would exacerbate this problem and lead to potential disputes with the Irish and Norwegian governments, who remain concerned at new developments at the Sellafield plant.

## **i) Conclusions from the NFLA**

The key elements of this submission by the NFLA are as follows:

- The Government should withdraw this submission until the Weightman nuclear safety review and the full learning points from the Fukushima incident are known.
- In this context, and in reference to the Government's preliminary policy view to establish a new MOX fuel fabrication facility, the NFLA fundamentally disagrees with this policy view.
- The NFLA believe immobilisation of the plutonium and its treatment as a waste is the most sensible policy view for the Government to take forward.
- The creation of further plutonium stocks should be stopped as quickly as possible.
- Converting the existing stockpile of UK plutonium to MoX fuel would require the construction of a new MoX fuel fabrication plant. This would not be an economic use of resources and there are many other more efficient climate abatement options.
- The use of MoX fuel fails to meet non-proliferation objectives; involves unacceptable safety and security risks, and is a threat to civil liberties. Spent MoX fuel would be a much more hazardous waste form to deal with than conventional spent fuel.
- Selling plutonium to overseas customers, either in the form of MoX or plutonium oxide also fails to meet non-proliferation objectives. In addition to posing a threat of proliferation at the state level, MoX-fuel and plutonium commerce also poses a risk of theft or diversion by criminal organizations or terrorist groups. Anything which would legitimize plutonium commerce must be rejected.
- All immobilization options mentioned in the NDA's earlier credible options paper should be investigated further and tested against environmental principles, including in particular proliferation resistance, and other criteria such as cost, dose levels to the work force and so on. All this work should be conducted using a clear set of environmental principles.
- Developing a new MOX fabrication facility further threatens the UK's commitments under the OSPAR Treaty and should therefore be avoided for this reason alone.

## **j) References**

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<http://www.wise-paris.org/english/reports/STOAFinalStudyEN.pdf>
- (3) Daily Telegraph, 4th Feb 2011, <http://www.telegraph.co.uk/news/wikileaks-files/london-wikileaks/8305283/UK-RAMPING-UP-ON-NUCLEAR-POWER-BUT-CHALLENGES-REMAIN.html>
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<http://www.independent.co.uk/opinion/commentators/steve-connor-how-do-we-solve-the-plutonium-conundrum-2279634.html>
- (6) Friends of the Earth USA Press Release 12<sup>th</sup> November 2009  
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- (11) Telegraph 11th Feb 2011 <http://www.telegraph.co.uk/earth/earthcomment/geoffrey-lean/8319807/A-bomb-factory-in-our-back-yard.html>
- (12) Bloomberg 14<sup>th</sup> April 2011 <http://www.bloomberg.com/news/2011-04-14/nuclear-regulators-delay-study-of-fukushima-lessons-until-2012.html>