CORE

Cumbrians Opposed to a Radioactive Environment

Management of the UK's Plutonium Stocks. 10th May 2011

A response by CORE (Cumbrians Opposed to a Radioactive Environment) to the consultation on the long-term management of UK-owned separated civil plutonium.

CORE is an environmental pressure group formed in 1980 to campaign on Sellafield's commercial operations – principally those of spent fuel reprocessing and related issues including radioactive discharges, environmental contamination, the transport of nuclear materials, plutonium fuel production and health detriment. CORE's campaign is supported worldwide by members and supporters whose views are conveyed in this written consultation submission. CORE has no objections to its response being made public. Questions posed in the consultation document are answered below and prefaced by a number of general comments.

In summary, CORE views this public consultation as falling far short of the standard required for legitimate consultation. It is flawed by the omission of vital information that is available from other sources and upon which well considered judgements can only be made. The selection of a preferred option by Government prior to the launch of the consultation was not only unwise in light of the admitted range of issues yet to be resolved, but will also lead to immediate and well founded public suspicion that a decision on options has already been taken, and that it has been taken for no good reason other than to engender support for UK's new-build plans and to further subsidise the nuclear industry generally.

The case for the re-use option has not been made by Government through the consultation document and the unseemly and unnecessary haste in which the Government has come to its preliminary view will further erode public confidence in the openness and transparency of the overall process and, in particular, the Government ability to think rationally on nuclear issues. The consultation should be suspended until fuller information is available to Government and Consultees.

The consultation and the Government's provisional but preferred option of re-using plutonium are flawed in a number of respects:

i) the Government's taking of a preliminary preference of the re-use option at the outset of the consultation wholly undermines the legitimacy of the consultation process in that it devalues the relevance of submissions by respondents who favour an alternative option to that of re-use. This smacks of a decision having already been made by Government, despite its own admission 'that there remain many practical issues to be resolved

before any policy cold be implemented', and raises the spectre that, once again on nuclear issues, the consultation is a sham:

ii) the consultation is premature in that a) there remain too many unresolved issues on the re-use option for high level judgements to be made, b) that there being no necessity for a decision on options to be taken in the immediate future, a more properly considered decision only able to be made in light of more substantial information being available to Government and consultees:

iii) insufficient information is provided on the crucial issue of the costs of implementing the re-use option. For whilst an outline of some cost estimates have already been provided by the Nuclear Decommissioning Authority (NDA) in its 2010 Plutonium Credible Options Analysis (redacted), these estimates are omitted from the consultation document. Their inclusion would have better enabled respondents to form a more reasoned judgement in comparing alternative options. CORE's submission makes a number of references to the NDA's Analysis paper – hereafter simply referred to as NDA:

iv) the consultation is premature not only for the reasons given above but also in light of the ongoing accident at the Fukushima Dai-Ichi reactors in Japan, and the as yet unknown ramifications of the use of MOX fuel in one reactor under accident conditions. As the Convention on Nuclear Safety in Vienna (14th April 2011) has concluded that a full analysis of the Fukushima accident cannot be expected to be available until mid-2012 at the earliest, the responsible and prudent course of action for the UK Government to take, in the interest of updated and relevant information being available for consultees, is to delay the current consultation until the full implications of Fukushima are known;

v) the consultation document contains some inaccurate and misleading information which flatters the case for the plutonium re-use option, namely a) that the US has adopted the plutonium re-use option. This sweeping statement conceals the failure by the US Government to implement the option, the disinterest shown by electricity utilities to the use of MOX fuel in their LWR reactors and the advances made in the plutonium immobilisation option at the US DOE's Savannah River facility. The sole US experience of MOX use to date resides with Duke Energy's trial of 'lead test MOX assemblies' in one reactor – a trial aborted after just two irradiation cycles, with the utility subsequently dropping out of the MOX programme. b) that for SMP, independently verified figures suggest that only 13.8 tonnes of MOX fuel (not the 15 tonnes stated) was produced over a 9 year period of operation of a plant that boasted a 120tonne/year production rate.

CORE response to consultation document questions.

Q1. Do you agree that it is not realistic for the Government to wait until fast breeder reactor technology is commercially available before taking a decision on how to manage plutonium stocks?

A1. Yes – a somewhat spurious question given Government acknowledgement that all UK research into fast breeder reactors was abandoned in 1994 and that they remain commercially non-viable for the foreseeable future.

Q2. Do you agree that the Government has got to the point where a strategic sift of the options can be taken?

A2. There is of course some merit in sifting the options but, when it is abundantly clear that significantly more information is required before all options can be properly assessed, the sifting process is too immature for a preliminary view to have been taken by Government and its preference of re-use is therefore highly premature. Many will see this as a preference taken with unnecessary haste where there is no pressing need for haste, and one clearly designed to give tacit support to UK's planned new-build programme and subsequent use of MOX fuel in those reactors.

Q3. Are the conditions that a preferred option must in due course meet, the right ones?

A3. With 'due course' being the operative words, it is hard to reconcile the taking of a preliminary view now given the historical experience which shows that preliminary Government views on nuclear issues are seldom if ever overturned at a later stage. Due course means exactly what it says and not as implied n this case, at the end of a consultation process flawed by its paucity of information.

Q4. Is the Government doing the right thing by taking a preliminary policy view and setting out a strategic direction in this area now?

A4. No – see A3 above.

Q5. Is there any other evidence government should consider in coming to a preliminary view?

A5. Yes, all the information omitted from the consultation document but available from other sources including the NDA.

Q6. Has the Government selected the right preliminary view?

A6. No for the reasons outlined below:

- The repeated statements by Government in the consultation document that MOX production is a proven technology is misleading and certainly disingenuous in terms of UK experience – which is where the proposed new MOX plant would apparently be built. Most consultees will see the UK experience – via the Sellafield MOX Plant (SMP) and its predecessor the disgraced MOX Demonstration Facility (MDF) as ample evidence of Government inefficiency in decision making, financial profligacy, technical inability and worker malpractice in the manufacture of MOX fuel. The specialist, technical and fuel-related skills referred to by Government have, in terms of UK MOX production, been conspicuously absent and therefore given unwarranted stature by Government.

  The comparison with French manufacturing success, as outlined in the consultation document, may well be looked on with interest – and doubtless some jealousy - by UK Government and nuclear industry, but will do little to bolster the pretence that a future MOX plant in the UK will be any more successful or cost effective than those predecessors, or convince consultees that all will somehow be different in the future.

  The bland statement in the consultation document that 'there would of course be regulatory requirements, such as Justification, that a new plant would have to satisfy' (para 3.11) is of course only the tip of the iceberg. The siting of a new MOX plant cannot possibly yet be determined, but the inference from the consultation document is that it will be on the Sellafield site. Conversely, the NDA suggests that it may also be offsite. This would necessarily entail significantly more than 'regulatory requirements' and involve a combination of complex planning assessments (in addition to those required for on-site build) and legal challenges - their overall timescales acting as a show-stopper for the prospect of the off-site building of a new MOX plant. This scenario should have been taken into account by Government and details made available to consultees.

- The suggested transport of Dounreay's plutonium stock to Sellafield – as part of the re-use option - will be widely opposed on safety and security grounds and would wholly undermine the internationally accepted principle that nuclear materials/waste were managed at the site of origin.

- No consideration has been given in the consultation document to the socio-economic impact on West Cumbria of producing MOX fuel in a new MOX plant sited at or adjacent to Sellafield. At a time when there is a clear calling from local authorities and others for a major diversification of the local economy towards non-nuclear enterprises, the construction and operation of a new MOX plant would act as a deterrent to such diversification plans and unnecessarily consign West Cumbria to a further extended period of

domination by and dependence upon the nuclear industry. Such a setback cannot be justified by the Government's premature and poorly constructed argument for the re-use option as presented in the consultation document.

CORE's preferred option – the immobilization of plutonium via its manufacture into low-spec MOX in the existing SMP – has significant advantages for the region including the maintenance of job levels at Sellafield, no requirement for the construction of any new facilities and no requirement for overseas transport of either fresh or spent MOX fuel – the immobilized plutonium being long-termed stored and managed at Sellafield. The clear advantage to Government is that no new immobilization plant would be needed and, as described in the consultation document, utilizes a well developed technology producing a waste form suitable for disposal (para 3.25) and can be delivered on a reasonable timeframe (Ch 6, para 6.7 Availability)

- The use of MOX fuel in UK new-build reactors did not form part of the Regulatory Justification process – with only the use of low-enriched uranium fuel being justified. Potential developers in the UK have warned of the significant costs that will be incurred in reconfiguring reactors to take MOX fuel. The view that the re-use of plutonium as MOX fuel in these reactors is misleading and inaccurate, and any intent for such use should be confirmed to consultees by Government without further delay.

- The amount of plutonium from the UK stockpile is currently unknown. Much of it is significantly aged and therefore unserviceable without further treatment to remove the inevitable build-up of Am-241 etc. The preference for use of 'fresh' plutonium by operators is well documented – as confimed by the World Nuclear Association (WNA) which states '*plutonium from reprocessed fuel is usually fabricated into MOX as soon as possible to avoid problems with the decay of short-lived plutonium isotopes. In particular, Pu-241 (half-life 14 years) decays to Am-241 which is a strong gamma emitter, giving rise to a potential occupational health hazard if separated plutonium over five years old is used in a normal MOX plant. The Am-241 level in stored plutonium increases about 0.5% per year, with corresponding decrease in fissile value of the plutonium'*

- The statement in the consultation document (para 3.19) that 'the Sellafield stockpile would convert to sufficient MOX fuel to power 2 reactors for 60 years with a 40% MOX core is therefore complete bunkum given that the amount of 'serviceable' plutonium in the stockpile has not yet been determined and that much will need clean-up or will be rejected by operators on the basis of the exorbitant clean-up costs involved. A sensible and clearly more practical optioneering exercise would, as a pre-cursor, require that the total amount of plutonium capable of re-use as MOX fuel had been defined in advance of any preference being made by Government.

- The consultation document provides no information or guidance on the source of uranium to be used as carrier material for plutonium in MOX fuel. Whilst the inference from the NDA is that depleted uranium will provide the carrier it must also be the case that uranium recovered via reprocessing (RepU) or natural uranium might also be used. As the type of uranium selected for MOX use will have differing cost implications – and must presumably be a matter of choice for potential customers – Government should explain in some detail for consultees the various uranium carrier options, their estimated costs in terms of MOX fuel manufacture including, in the case of RepU, the need for and estimated costs of facilities for cleaning up RepU and the estimated timescales of constructing such facilities and who will bear those costs.

- CORE notes, at para 13 of the consultation document that, in selecting re-use as its preferred option, the Government admits that on current uranium prices the re-use option is primarily a method of consuming plutonium rather than having any merit as a commercial venture – and that 'it is unlikely that the value of (MOX) fuel will reach a point where it covers the full cost of its manufacture' (para 3.12) Given therefore that natural uranium supplies are known to be sufficiently plentiful to ensure that its market price remains relatively low in the short and medium term, and that the costs of MOX fuel manufacture are unlikely to be fully covered, the adoption of the re-use option will have no significant commercial value for the foreseeable future and the 'consumption' of plutonium would be far better effected by the adoption of the low-spec MOX option.

  CORE further notes the Government suggestion that MOX fuel may have to be valued at a discount to ordinary uranium based fuel and that any demand for MOX under the re-use option is only likely to be triggered if made available 'at a suitable price'. In anybody's language this a subsidy to the nuclear industry as a whole and particularly to new-build developers in the UK. Such a subsidy is wholly contrary to Government statements on UK new-build.

- The case, as suggested by Government, for the re-use of Sellafield MOX fuel in Candu or European reactors is short on both fact and substance. Where is the market research showing that such a demand exists and at what level ? Why aren't the additional costs of two new transport ships and fleet of new transport containers (identified by NDA) provided for consultees in order that they can properly gauge the Government's financial competence in arriving at its re-use option ? As it stands, the prospect of securing MOX business in Europe appears to have been irrevocably weakened by recent changes to German policy on nuclear power. Further, the transport of MOX fuel for Candu reactors has never before been undertaken on the scale inferred in the preferred re-use option (NDA).

Further, no detailed assessment has been provided in the consultation document about the costs, timescales, safety and security of the inevitable return shipments of spent MOX fuel from overseas customers should they exist.

- No proper weighting is given in the consultation document to the political sensitivity of such hazardous transports or to public concern and international opposition to them. This is a gross oversight and should be rectified.

- No detailed consideration has been provided in the consultation document to the problems of spent MOX fuel disposal. These are highlighted in a British Nuclear Fuel's document (Evaluation of Spent MOX fuel as a Wasteform. 2003) which states that *'the relatively large inventory of 'threat' readionuclides in spent MOX, coupled with the presence of a rapidly solubilised 'instant release fraction', is considered to be a major concern in a repository disposal context'*.

- The report concludes that i) the higher inventory of 'threat' radionuclides in MOX ensures that the material represents a greater radiological hazard than spent UOX fuels; ii) studies with spent MOX have revealed that the material contains a significant content of labile radionuclides (including ^{129}I, ^{99}Tc, ^{137}Cs and ^{79}Se), which are anticipated to be readily solubilised on groundwater contact. The instant release fraction of spent MOX exceeds that of spent UOX; iii) whilst matrix dissolution rates of MOX are low (relative to vitrified wasteforms), the presence of a significant instant release fraction is a major cause for concern in a disposal context. Containment of the MOX waste in a ceramic wasteform would generate radionuclide concentrations as much as 10^5 times lower than those associated with the direct disposal of spent MOX fuel, following breach of the waste packages by repository groundwaters.

- Similarly, no reference is made in the consultation document either to the increased costs or extra repository capacity required by the disposal of spent MOX fuel. The omission of these significant issues, including the increased disposal hazards identified by BNFL above highlights the unacceptably shallow level of Government assessment of the re-use option. These disposal challenges and costs need to be properly assessed at this stage of public consultation and not 'in due course' as suggested by Government (para 3.13).

Q7. *Are there any other high level options that the Government should consider for long-term management of plutonium?*

A7. No.

With a decision on the selection of the re-use option requiring significantly more information being available to Government and public domain, this public consultation should be re-run at a time when such information is available – and with no preference adopted by Government in advance of the consultation. For the reasons given above, CORE believes that, relying even on the scant information provided in the current consultation document, the Government case for the re-use option has not been made on commercial, proliferation, environmental or socio-economic grounds. The better and more obvious option, as outlined in the consultation document, is the immobilisation of plutonium via the low-spec MOX route, utilising the existing Sellafield MOX plant. This option should now be pursued by Government and its advantages clearly defined and laid out for further public consultation.

Current events in Japan, principally the imminent closure of Chubu Electric's Hamaoka power station, Chubu's decision to postpone its MOX programme for Hamaoka's Unit 4 and the increasing official and public opposition in Japan to the further use of MOX fuel in some of its reactors, may well dictate that the use of SMP for Japanese MOX (Hamaoka being the only firm contract for SMP to date), as forecast by the NDA and the consultation document may never materialise. In which event, SMP would be available for plutonium immobilisation via low-spec MOX production on its restart following reconstruction. Such a scenario cannot be ruled out and it would be prudent therefore for Government to delay the current consultation until the Japanese outcome is known.

10th May 2011.