BANNG

Blackwater Against New Nuclear Group

BANNG PAPER NO. 11

MANAGEMENT OF THE UK's PLUTONIUM STOCKS

A Consultation on the long-term management of UK owned separated civil plutonium

RESPONSE OF THE BLACKWATER AGAINST NEW NUCLEAR GROUP (BANNG)

Overview

The Blackwater Against New Nuclear Group (BANG) is a Citizens Based Organisation (CBO) primarily concerned about the implications of potential proposals to build new nuclear reactors on the Bradwell site in Essex. BANNG's concerns are not just narrowly focused on Bradwell but take a broader perspective on all issues of nuclear policy that may have a bearing on the future development of the site. In this context we have previously responded to government consultations on the Generic Design Assessment (see, BANNG, 2010a), on Justification (2009a, 2010b) and on Fixed Unit Pricing and Decommissioning Costs (2010c, 2011a). We have approached the current consultation on the future of plutonium stocks in a similar vein. We have both some general observations and some that are more specifically directed at the implications for new build on sites such as Bradwell.

Overall, we are perplexed both by the timing and the preliminary conclusions of this consultation. We do not understand why it is necessary to elaborate a policy at this point especially when the policy options are so palpably undeveloped and unclear. Given the emphasis on safety and security issues we are surprised the consultation has not been suspended in the wake of the Fukushima catastrophe. We are also concerned about three policy implications. One is that the adoption of a MOX option would necessitate some form of subsidy to enable it to be commercially attractive. Such a subsidy would seem to be contrary to Coalition Government policy. Second, the preferred option is predicated on the availability of a suitable form of disposal for wastes which is, at present, uncertain. And, third, the

development of MOX would support the development of new build reactors capable of taking the fuel located at sites such as Bradwell which, we believe are unsuitable for all the reasons presented in previous consultation responses (see BANNG, 2008, 2009b, 2010d, 2010e, 2011b).

BANNG considers the consultation on the future of plutonium stocks to be premature and prejudiced in favour of a solution that will require public subsidies and encourage the development of new build and the creation of more wastes for which there is no solution. The continuation of reprocessing and the manufacture of MOX fuel will intensify the risks from terrorism and proliferation. Consequently, BANNG urges the consultation be withdrawn and that reconsideration be undertaken to develop options that minimise risks and which are practicable.

Plutonium as Waste

A brief history of plutonium in the UK is given in Chapter 1 of the consultation. From this it is clear that plutonium has been through several manifestations. Initially, it was produced for weapons and the military purpose remains though we are dealing here with the civil stockpile. This is quite considerable amounting to well over 100 tonnes including some 28 tonnes foreign owned. This is a substantial volume and clearly there is a need to consider its future management. Presently the plutonium is in secure stores and can remain so for the immediate future at least up to the point of decommissioning (2078 Dounreay, 2120, Sellafield).

The civil stockpile has long been regarded as a resource, the output from reprocessing justified originally as a source of fuel for fast reactors. With the collapse of the breeder research programme, the development of MOX fuel for fission reactors became the prospective outlet for the plutonium. So far the efforts to develop MOX production capability in the UK have failed with a meagre 15 tonnes in 9 years of operation against the 560 tonnes planned for the first ten years. It must be noted that here, as in some other areas of operation (e.g. THORP), the UK's performance has been abysmal. This is not a good augury for the development of plutonium economy in the future. The revival of reprocessing to produce plutonium for civil use would create high volumes and complex high and intermediate level waste streams as well as opening up the risks of diversion and proliferation. In our view these risks far outweigh any putative gains from using plutonium in MOX fuel. It is, of course, recognised that the reprocessing programme for Magnox fuels should continue until completed for technical waste management reasons.

The other option explored in the consultation document, immobilisation, means treating plutonium as a waste rather than as a resource. The technical means of achieving safe long-term storage at volumes that can be accommodated in a repository (if that option is ultimately pursued) are in a developmental stage. However, if plutonium is treated as a waste it would follow that research and development effort could be concentrated on its safe and secure management in a waste form.

BANNG considers that continuing to treat plutonium as a resource is likely to encourage the further development of reprocessing which is a high risk technology creating more plutonium as well as complex wastes and risks from proliferation. **We believe that it is far safer to immobilise and store plutonium and that therefore plutonium should be declared to be a waste product.**

MOX as waste management

From the consultation document it is clear that MOX is regarded more as a solution to reducing the plutonium stockpile than as a means of fuelling reactors. As the document puts it: 'at current prices, manufacture of MOX is primarily a route for consuming plutonium stocks rather than a commercial operation in its own right' (3.14). It is recognised that the value of the fuel will not cover the cost of its fabrication. And this situation is likely to persist well into the future until uranium supplies begin to diminish. Consequently, some form of public subsidy will be necessary. It may be argued that, unlike the alternative option, at least MOX production would recover some of its costs through sales. But, the uncertainties in terms of technology and markets are too great to be confident that MOX would be, as is claimed, the more cost-effective or value for money solution. In any event the MOX solution to plutonium management introduces uncertainties and risks both economic and technical that are of a higher order than those associated with storage.

A major uncertainty rests with the technology itself. The document claims repeatedly that MOX manufacture is a 'mature process' (3.7. 3.17), employing 'proven technology' that has operated successfully overseas (3.9, 6.7). In view of the pathetic record of the SMP and the single overseas example of France this seems an absurd assertion without any solid empirical foundation. In practice, it is highly likely there will be technical problems, cost overruns, delays and other difficulties in developing, commissioning and running MOX facilities. As Perrow (1984) points out in his book, *Normal Accidents,* nuclear production processes are validated by very limited operational experience, designs are complex and frequently altered or adapted with the strong possibility that things can go wrong and most likely will. Certainly, there is little room for confidence that a MOX solution could be successfully delivered.

MOX was not originally intended as a waste management process, rather it was seen as an element of a recycling process for nuclear energy. Given this, it brings a set of issues that are not present with a simpler once-through process. MOX is connected up to energy production and reprocessing which bring risks of accidents, wastes, proliferation and health and environmental impacts much greater than those associated with more passive forms of waste management.

On the issue of MOX as a means of managing plutonium stocks BANNG considers the costs would be too high and the necessity for public subsidy unjustifiable. We do not consider MOX to be a mature or proven technology and conclude that the economic and technical risks and uncertainties associated with the fuel cycle are substantial and should be avoided.

Immobilisation and direct disposal

This is put forward as an alternative option to MOX. The evaluation of the options in Ch. 6 is somewhat tendentious. Basically, the uncertainties associated with immobilisation are suggested to be greater than for the MOX option. The technology exists but is not credible in terms of the volumes of wastes that would be produced; the costs are speculative; much research and development is necessary; current methods appear to be unviable; and there are uncertainties about safety and security. Indeed, the option is so obscure that the Government confesses: 'We have no view of what the process might eventually be or indeed the standards to which it might have to operate' (3.23). By comparison with MOX this is not a mature technology so it is little wonder that immobilisation for direct disposal is pretty well written out of the script. In view of the heavy bias against the immobilisation option it would seem to require some fundamental shift in circumstances to dislodge the Government from its 'preliminary view' in favour of MOX.

BANNG has no quarrel with the conclusion that it would be premature to choose immobilisation as an option at the present time. We would concur that much more research and development is needed especially to find a process that does not result in massive volumes of waste like the estimated 200,000 tonnes of waste that would result for disposal using conventional cementation technology. However, we do feel that a stronger focus on this potential option might well deliver technologies that are safe and relatively cost-effective. If the preliminary policy view in favour of MOX prevails it is highly likely that other – and potentially better – options will be neglected. It is clear that the 'direction of travel' outlined in chapter 7 will give priority to further work on the MOX option.

BANNG does not concur with the Government's view that immobilisation is, in present circumstances, the less attractive of the two high level options. We believe this option should be pursued with vigour since it offers the possibility of a more safe, secure and economic way of managing plutonium as waste in the far future.

Continuing storage as the preferable present option

According to the Government 'continued storage offers a safe interim position for plutonium management but does not offer a long-term use or route to dispose of the stock of plutonium' (7.3). It is important to understand what 'interim' means here. Stores have a design life of 50-100 years and so must be replaced from time to time. But, the lifetime of stores will be more dependent on the availability of a repository. This is currently unknown. The method of disposal has not yet been determined and will be determined by the disposability of the wastes themselves which is, in turn, dependent on the option selected. Although a site selection process has begun, no site is yet in prospect. It is fair to state that, as things stand, geological disposal for the long-term management of nuclear wastes is a prospective, not a definitive proposition.

Both MOX and immobilisation are solutions predicated on eventual disposal though they may impose different requirements on a repository. But, for the time being, continuing storage remains the practical and pragmatic option. In conditions of uncertainty it would seem to make little sense to select a long-term option

preference when the end state (a geological repository) is not yet agreed. Indeed, the consultation document reveals uncertainty in its rather tentative promotion of MOX as its preliminary preferred option. The choice 'in no way commits the UK Government to going down this path. The UK Government will not take a final decision until it is satisfied that it can and that it is right to do so' (7.1).

So, we are entitled to ask, is it really necessary to advance such a qualified, unclear and timid choice right now especially at a time of such great uncertainty following Fukushima? There are considerable doubts about the safety of MOX arising from the accident and doubts about the future of the fuel in Japan's reactors, a key market for UK MOX production. BANNG does not take the view that 'Taking such a decision to set out a direction now affords more certainty than simply waiting to see what the future may bring' (6.9).

BANNG concludes that there is no urgency to make a choice of management options for the long-term management of plutonium. The choices are, in any case, ringed with uncertainties and assumptions that make practical comparisons difficult. The Fukushima accident and resulting uncertainties about MOX safety and markets, reinforces the case for delay. In our view continuing storage remains the most practical and flexible option. For that reason we urge the Government to abandon this consultation.

Plutonium management and new build

Very little is said about new build in the consultation document. It is our view that the MOX option underpins the policy for new build and, by extension, supports the development of new power stations and spent fuel stores on the eight coastal sites selected under the National Policy Statements for Energy (EN1) and Nuclear Energy (EN-6). Commenting on the demand for MOX fuel the consultation points out that it would not be suitable for burning in existing nuclear plants in the UK. Designs being considered for new nuclear would be able to burn MOX (3.15). The intention becomes rather clearer later in the document. 'The UK Government will also need to understand the preparedness and willingness of new build operators to use MOX fuel in their reactors' (6.12).

There is a need for clarity in the Government's thinking on this issue. Hitherto, it has been assumed that the new power stations, if constructed, would have spent fuel stored on site. It has been entirely unclear for how long this might be and, given the uncertainties about the repository, it could remain there indefinitely, certainly until well into the next century. The conditions at some of the sites may well deteriorate and inundation and coastal processes may heighten the risks that must be dealt with by future generations. The possibility that MOX fuels will be used merely adds to the uncertainties. Issues such as the risks from such wastes, what volumes are likely, what is the radioactive inventory, what specific management requirements there will be all need to be addressed. Will the spent fuel be moved to reprocessing facilities or to stores elsewhere? Or, will MOX fuel and spent fuel be stored around the country at various sites. The implications of a reprocessing fuel cycle compared to a once-through cycle need to be thought out. The impacts on sites may well be quite different for each option.

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BANNG is very concerned at the implications of a reprocessing fuel cycle for the use and storage of MOX fuel at sites of new nuclear power plants. We consider the risks of different storage scenarios should be thoroughly identified and evaluated before proceeding any further with the MOX option. The risks and uncertainties surrounding fuel stores at nuclear sites, already considerable, will be greatly compounded if the MOX option is pursued. This reinforces BANNG's strong belief that the sites proposed for new build are far too vulnerable for the nuclear option to be pursued. MOX should not be used as a further justification for developing new nuclear power stations.

Professor Andrew Blowers OBE

Chair, Blackwater Against New Nuclear Group. May 10th. 2011

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