


Appendix 1b:

ID 1325 – Copies of correspondence with Rt Hon Crispin Blunt and Elaine Woodburn



Reprocessing of Reactor Fuel

Dear Rt Hon Crispin Blunt,

I was interested in your request reported in BNFL World December 2002 on page 23 "I can't see how you can avoid reprocessing to make it safe for final disposal. If someone can explain how you can get around that I'd be glad to hear from them"

Would you? Would you really be glad?

I worked at Sellafield for 26 years on reprocessing and the manufacture of mixed oxide fuel for reactors worldwide. We made MOX fuel of different enrichments and shapes from 1% to 100% PuO₂ pellets for special purposes. We made special MOX blocks in polythene and polystyrene which were so clean that they were handled in the open fume hoods without causing contamination. So I have some considerable experience to add to my 1st Class Cambridge degree.

I have been retired for 15 years. Whilst at Sellafield I studied the Windscale Report by Lord Justice Parker and realised that he had made incorrect judgements from his 100 day inquiry. He concluded that

1. Reprocessing was necessary to provide fuel for fast reactors.
2. Reprocessing should commence after 1 year cooling of the fuels removed from the reactors of the CAGR and PWR type.
3. Reprocessing was safe.

His conclusion 3 was correct. His conclusion 2 was impossible. His conclusion 1 is not applicable because there are no fast reactors and sodium cooled reactors are unlikely to be practical producers of power. That left the managers of Sellafield to adopt the production of MOX fuel for reactors of the LWR and PWR type. There was one point which most people who have not actively been associated with MOX fuel are unaware of and which may not have come to your notice.

Plutonium from reprocessing is a mixture of isotopes. It is principally Pu 239 but there are also isotopes of Pu 240, Pu 241 and Pu 242. The problem is that as the reactor burn-ups increase from 1,000 Mwd/te to 20,000 Mwd/te the Pu 241 isotopic % increases. Pu 241 has a relatively short half life of 14 years and decays into Am 241 which has a relatively long half life of 400 years and it is a strong γ emitter. This means that 1 year cooled high burn-up fuel contains a large % of Pu 241 and on storage or in use on plants it deposits on the glovebox walls creating in 5 to 10 years a high γ emitting layer. New plants are great but old plants are a real problem, men don't like them and the γ problem increases all the time. Is there a solution to this problem? Yes! I reported it to my manager at Sellafield (Dr J C Dalton) in a short paper entitled THORP 50A.

This paper on THORP 50A was not published but it showed that THORP 1 (1 year cooled reprocessing) would not work because the cooling period was too short and indeed this plant was never built at Sellafield.

THORP 5 (a plant processing 5 years cooled fuel) is in operation at Sellafield and this produces plutonium oxide for the MOX plant but the oxide has a high percentage of Pu 241 which in course of time will lead to difficulties in the MOX plant.

THORP 50A was based on PWR reactors, which were not recognised as the future British reactor when I produced my paper. Today we have Sizewell B and all future reactors will be of this type. The fuel from these reactors should be discharged into ponds (or dry storage) for **50 years** cooling thus reducing the Pu 241 content to a relatively small percentage of the plutonium content on discharge. The Power Station would operate for about 20 years before it is ready for decommissioning and then the concrete shell can be used **if necessary** for holding a small reprocessing plant to make either plutonium oxide for MOX fuel fabrication at another site or even to make MOX fuel on the power station site. The waste products would then be all contained within the shell of the very substantial reactor building. However if MOX fuel is not required the reactor fuel cooled for 50 years can be encased in stainless steel cans just like the vitreous blocks made at Sellafield, and they can remain in the reactor building.

This THORP 50A concept was hidden because it was contrary to the policies of the management of Sellafield at that time, who passionately believed in Fast Reactors and their ability to operate co-precipitation plants. The concept was unpopular because

1. It eliminated the transport of highly radioactive fuel around the country
2. It eliminated the vitrification plants in the future
3. It eliminated the need for MOX plants for 50 years
4. It eliminated the Tc (Technetium) discharge to sea for 50 years
5. It eliminated the building of more CAGR reactors. You will be unaware that what happened in Chernobyl **can** happen in an AGR type reactor but we hope that will not happen.

Thus there is a simple, effective and efficient method of disposing of radioactive waste from PWR reactors without the type of plant you saw at Sellafield. That plant **is essential** for the reprocessing of fuel from Magnox and CAGR reactors and it also provides an income from foreign investors who wish their fuel to be reprocessed after cooling for only a few years. That plant is not necessary for any future PWR reactors built in Britain. I enjoyed working at Sellafield.

You asked "How you can avoid reprocessing"?

An answer is to build 10 to 20 PWR power stations as soon as possible and keep the used fuel in ponds for 50 years.

In 45 years time ask yourself "Do we need MOX fuel now or can we wait even longer before reprocessing?" The answer to this question lies in the availability of natural Uranium supplies in 50 years time. When I was born in Castleford coal from deep mined pits was essential but where my parents and grandparents worked the pits are all closed and demolished nevertheless there are still many coal fired power stations in Yorkshire. Times have changed for the coal industry and they should change for the nuclear industry too.





CRISPIN BLUNT MP
Member of Parliament for Reigate

HOUSE OF COMMONS
LONDON SW1A 0AA



3rd February 2003



Thank you for your letter regarding reprocessing of reactor fuel. You have written a very comprehensive and informative letter, and I am grateful for your adding your experience to the discussion. I will certainly raise your suggestions on disposal, and the avoidance of reprocessing in my ongoing discussions with the nuclear industry.

We all agree that the energy sector faces huge challenges and will need to be led by the best, most innovative and dynamic managers, with the primary priority of our energy policy being compliance with our Kyoto obligations.

As a Party we will clearly set out our plans for the sector when we launch our energy policy. The current lack of clarity and muddled thinking of the Government have resulted in long debates in the House of Commons over the future of British Energy. Times have changed for the sector, but the debacle over British Energy could have been avoided with a clearer lead from government. A clear idea on reprocessing or disposal is a key ingredient for the future of nuclear in this country, these issues will have to be addressed, your letter is therefore very timely.

*Yours sincerely
Crispin Blunt*

Crispin Blunt

P.S. I am very glad you wrote - I have much to learn and your letter has helped.

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Remembrance Day 2011.

Nuclear Waste disposal

Dear Councillor Elaine Woodburn,

In 1965 at Sellafield during research into MOX fuel manufacture and behaviour in reactors I found a "new" atomic hypothesis called an NENDOREC hypothesis. It was studied by the management of Sellafield and I received the letter below from the Chief Technical Manager.

I quote the Chief Technical Manager's 1965 assessment of an early NENDOREC paper in full below

I have skipped through this rather superficially. To the conscious mind it reads like the ravings of a lunatic so I let it simmer in my subconscious for a few days.

Your "NENDOREC" is complete nonsense even in the dim recess of my mind but you may have glimpsed a fundamental truth in grotesque form.

I think your "NENDOREC" cannot be expressed in mathematical form, indeed your ideas are medieval, but the concept (so my subconscious tells me) can be fitted into the latest plasma physics – particularly the theory of discontinuity of plasma.

Why should you not apply plasma physics to solid state reactions? Indeed I doubt whether you realise that you have been doing so. Such action is either genius or lunatic ravings – both so similar,

Don't ask me to help further I might distort your thought processes into conventional lines and this is fatal for new ideas, but I would like to read your next product.

The Chief Technical Manager was Mr G E Buckley.

I submitted two non-industrial suggestions that would save the Government (owners of Sellafield) £100,000,000. These were

Suggestion 30-81 on the structure of the nucleus of an atom.
Suggestion 31-81 on fusion and CAGR fuel

The Sellafield management said that they were happy to spend £100,000,000 to show that I was a lunatic, even though I had obtained first class honours at Cambridge University. Dr Strain and Dr Creed saw this letter but being in the pay of BNFL they were unwilling to write that I was not a lunatic, a lunatic is a medical condition. The Sellafield management said that the £100,000,000 was chicken feed and it did not matter if it was wasted, they were the authority! That £100,000,000 on CAGR's grew to £30 billion and in the end the Government gave them to the French Electricity Company for £18 billion. Dr P D Wilson, a regular correspondent to the Whitehaven News on nuclear matters examined my paper and decided that I was on the wrong side of eccentricity. He favoured CAGR's whereas I favoured PWR's.

The hypothesis showed that the AGR's were not the best way to produce nuclear power before they were built, and all the evidence for that was available at Sellafield in the 1960's. The CAGR's were never built to the specification laid before the government because of many faults in the technology and science. The hypothesis showed that the sun was not and is not a nuclear fusion reactor in the plasma phase of matter. Dr J Cunningham, when Minister of Science, wrote to me that he had confidence in financing plasma phase nuclear research. A few years later when Rt Hon Norman Lamont held that post he and Dr Cunningham both agreed that spending on nuclear fusion research was worth funding. It has produced nothing and it never will

produce power because the sun is not a plasma fusion reactor, despite what is published in so many books. Experiments at Sellafield showed the errors only too clearly.

You have seen the demise of the MOX plant at Sellafield that was built to demonstrate that my research was invalid. That MOX plant was simply a Springfields U-235 technology set in a set of expensive gloveboxes at a cost of £200,000,000. It did not recognise my work that plutonium is nothing like U-235 when it comes to fuel manufacture and irradiation in PWR reactors.

When Rt Hon Crispin Blunt visited Sellafield he asked what shall we do with nuclear waste, something that you have been studying. I informed him that the way forward was simple, but not accepted by the Sellafield management because it did not involve transport of nuclear waste around the country.

1. Do not reprocess spent PWR nuclear fuel until it has cooled for at least 50 years.
2. Build PWR reactors and operate them for 20 years (now this could be 60 years) and then decommission them.
3. 20 years after decommissioning build within the reactor shell a small reprocessing plant to recover plutonium if there is a market for it.
4. The depleted Uranium, fission products and waste should all be stored within the reactor shell and left for posterity.
5. If there is no market for plutonium then all the fuel from the reactor should be placed in the reactor shell and left for posterity.

I am certain that the work done on the decommissioning of the Windscale AGR has shown to the NDA management that it will be impossible to decommission Heysham power station to a Greenfield site economically.

Those persons in the NDA who think that the storage of plutonium oxide in sealed cans in an underground storage are clearly unaware that in 1950 an accident occurred in Cambridge University when a Radium sample made and sealed by Professor Rutherford burst under pressure because the α particles had changed into Helium gas. In 1957 it was α particles that had changed into Helium gas that caused the Windscale Pile to catch fire. So to put the plutonium cans into an underground storage will only create problems for posterity.

You are chiefly interested in money* but my interests lie in seeking the truth about NENDORECS. NENDOREC is an acronym for Nuclei with an Equal Number of Degrees of Order Resonating within an Electron Cloud boundary, it is a simple extension of ATOMS as defined by Dalton of Eaglesfield, but unfortunately modern science teaching has distorted his work by limiting atoms to elements.

*You say in the Whitehaven News. "This work is paid for by the Government, not local taxpayers. However it is the Community representatives on the Partnership who decide how this money is spent". All tax payers finance the Government who are the elected representatives of the residents of the UK (taxpayers and non-tax payers). Property owners finance Copeland Council, local taxpayers also finance Copeland Council via their contributions to the Government.

What type of "research" do you suggest should be done in this study of nuclear waste disposal?