Second Submission to
Cumbria County Council's
Minerals and Waste Development Framework

Dr Rachel Western
21 October 2008

Re: Soundness Test 7 – 'policies that fail to represent the most appropriate in all the circumstances.

.. the relevant circumstances being the failing of the funding base (for HLW storage)

and the failure of the science for radioactive waste disposal

High Level Waste

Introduction

At the Sellafield nuclear complex in Cumbria, spent nuclear fuel rods are dissolved in nitric acid and then chemically treated in order to extract plutonium. This produces a liquid solution of radioactive wastes that is extremely radioactive.

In my 30th May 2008 Submission to the Cumbria Minerals and Waste Development Framework, I commented that the process of solidification (vitrification) of this highly radioactive stream of radioactive waste was proving to be highly problematic.

In this submission – I make the same point, but rather than focussing on the Sustainability Appraisal, I refer instead to Core Strategy Policy 10 – '*High and Intermediate Level Radioactive Waste Storage*'. I argue that new evidence – available from the July 2008 edition of the Nuclear Installations Inspectorate and from the Whitehaven News (8th October 2008) indicates that the statements in the Cumbria County Council document of March 2008 (Submission Draft Core Strategy - para 8.2 – page 45) – do not take into consideration the technical and financial crisis currently being experienced at Sellafield.

In particular, my suggested revision of Policy 10 should be read in the context of: '*safe and secure interim storage*' (para 8.4 page 45, Draft Core Strategy)

I further argue that - given that:

i) the potential hazard presented by the high level liquid waste is so high, and
ii) the Sellafield financial crisis is taking place within the context of an extraordinary global and national financial crisis – such that Governmental underwriting cannot be relied upon

then it is imperative that Cumbria County Council take a proactive approach in order to avoid undue hazard.

Background

In a June 2006 NDA document on Radiological Hazard Potential, the NDA Engineering Directorate[1] wrote:

> "*Materials which are liquids or gases could all escape if all storage protection was removed*" (page 6)

In the year 2000, British Nuclear Fuels (BNFL) estimated that the likelihood of a plane crashing into the liquid high level waste tanks on the Sellafield site was 1 in 100 million a year.[2]

The Hazards Associated with the Liquid High Level Waste at Sellafield

In the year following BNFL's '1 in a 100 million' year, the 9/11 plane crash took place. As BNFL felt that the risk of such a plane crash so low, they did not design the tanks to be able to be withstand aircraft impact.[3] Thus – if there were to be a 9/11 at Sellafield the radioactive contents of the tanks would be released.

Some idea of the possible implications of such an event may obtained from the evidence which Gordon Thompson, (an American nuclear expert) submitted to the House of Commons Defence Select Committee in January 2002 – just four months after 9/11.

His evidence was entitled [4] '*Civilian Nuclear Facilities as Weapons for an Enemy*'; and it stated that:

> *"A notable example of a potential radiological weapon for an enemy of the UK is the B215 facility at Sellafield. This facility houses 21 steel tanks and associated equipment in above-ground concrete cells. The tanks contain high-level radioactive waste (HLW) in the form of a self-heating, acidic liquid that requires continuous cooling and agitation. This liquid HLW is a product of nuclear fuel reprocessing at Sellafield. At present, the tanks contain about 1,550 cubic metres of liquid HLW. The radioactive isotopes in this liquid include:*
>
> *about **8 million** TBq (2,400 kilograms) of caesium-137*
>
> *For comparison,*

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[1] Nuclear Decommissioning Authority *"The "Radiological Hazard Potential" - Helping to make sense of cleaning up the UK's nuclear sites*" [Engineering Directorate Document No: EGR003 Revision: Rev 1] 13th June 2006

[2] '*Assessing the risk of terrorist attacks on nuclear facilities*' Parliamentary Office of Science and Technology Report - Report 222, July 2004 (page 79)

[3] POST (2004) page 79.

[4] http://www.irss-usa.org/pages/documents/UKDefCttee01_02_000.pdf, p2

> *the 1986 Chernobyl reactor accident released to the atmosphere about* **90,000** *TBq (27 kilograms) of caesium-137, representing 40 percent of the inventory of caesium-137 in the reactor core. Most of the offsite radiation exposure from the Chernobyl accident can be attributed to caesium-137, which has a half-life of 30 years.* (page 2)

(a TBq is a unit of radioactivity)

Separately, estimates have been made of the impact of such an incident. These estimates vary – but some commentators have reported that following such an attack on the liquid high level waste tanks it may be necessary to evacuate between areas as far apart as Glasgow and Liverpool.[5].

New Information

There are three main facets of the high level waste treatment on the Sellafield complex. Firstly the evaporators, then the storage tanks and finally the vitrification lines. The July 2008 edition of the Nuclear Installations Inspectorate Newsletter indicates that there are problems associated with each of these aspects of high level liquid waste storage treatment.

Evaporators:

> Sellafield already has three evaporator (A,B and C). In addition to the planned Evaporator D
>
> "*Sellafield Limited is also considering the need for further evaporative capacity (Evaporator E)*" (page 17)

Storage Tanks

> "*Recent HAST* [Highly Active Storage Tanks] *cooling coil failure rates and, specifically, the location of recent failed coils has led to uncertainties over the ability of the newer HASTs to continue to service the needs of the HAL stocks strategy.*
>
> ……
>
> "***Replacement HASTs should be progressed with the utmost urgency.*** *We are currently awaiting the submission of Sellafield Limited's document on their strategy for the safe storage of HAL* .[High Active Liquor]*"* (Emphasis Added) (page 16)

Vitrification Lines

> "*Currently (end of May 2008) all three vitrification lines are shut down. Line 1 suffered a plant malfunction in February 2008 which resulted in the need to undertake significant repair work: planned work will be*

[5] POST (2004) page 81

undertaken coincidentally with the result that Line 1 is expected to return to HAL feed in late summer 2008. Lines 2 and 3 have operated fairly consistently in recent weeks though both are currently undergoing outages. WVP also suffered a shut down of operations caused by the loss of site steam supplies." (page 17)

Funding Problems

On the 8th October the Whitehaven News reported:

> *"Both the NII and the Environment Agency have expressed concern that "funding shortfalls" for the operation of Sellafield could undermine regulatory standards.*
>
> *Evaporator D has been described as "politically sensitive" at a time of escalating costs."*[6]

This funding issue was referred to extensively in the July 2008 issue of the Nuclear Installations Inspectorate Newsletter. For example:

> "*Funding constraints are restricting the licensee's ability to deliver major projects and safety improvements on the site"* (page 11)
>
> "*Sellafield Limited has now shared the content of Lifetime Plan 2008 (LTP08) with us and it does indicate a significant shortfall in funding between the costs of the in-year programme of work identified by the licensee for the Sellafield site and the level of funding available from NDA.*". (page 12)

The Material Balance

The plutonium output from the chemical treatment of the spent nuclear fuel rods is meant to be made into nuclear fuel rods inside the 'Sellafield MOX Plant'.[7] However, it is simply building up as the 'MOX' fuel plant essentially isn't working.

In February 2008, Energy Minister Malcolm Wicks admitted that the MOX Plant had only managed 2.6 tonnes of production in 2007 – and a total of only 5.2 tonnes since opening in 2001. This can be compared to a design capacity of 120 tonnes of MOX fuel a year.[8]

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6 Multi-million pound bill for Sellafield by Alan Irving, Whitehaven News, Wednesday, 08 October 2008
http://www.whitehaven-news.co.uk/news/1.251885

7 'MOX' stands for 'Mixed Oxide' and refers to the fact that the fuel rod contains a mixture of plutonium and uranium.

8 Paul Brown "Voodoo Economics" (Published by Friends of the Earth) May 2008, http://www.foe.co.uk/resource/reports/voodoo_economics.pdf

Conclusion for High Level Waste Storage

Given that:

i) a by-product of the extraction of plutonium (which is the main function of the Sellafield complex) from spent nuclear fuel rods is the extremely hazardous liquid high level waste stream
ii) the Sellafield 'MOX' plant, the facility for making plutonium into fuel rods essentially is not working
iii) as of the Summer, Sellafield did not have adequate funds to ensure the solidification of the liquid HLW stream
iv) more recently the funding crisis has become much worse

Core Strategy Policy 10 should be amended to read:

> "**the creation of additional liquid high level liquid wastes should be avoided until the funding and technical basis for their solidification is ensured**"

Nuclear Waste Disposal

In my submission to CCC of 13th December 2007, I wrote:

> *"The Consultation document does not register the fact that during the 'Sept '95 – Feb '96 Cleator Moor Inquiry, the possibility of a nuclear waste disposal site in Cumbria was rigorously examined. During this Inquiry, Nirex (the organisation proposing to bury the nuclear waste) applied a great deal of resources to make their case – and to find errors in the case against them (through a process of cross examination) – however the Independent Inspector (MacDondald) and Assessor (Knipe) concluded against Nirex."*

Subsequent to this submission, I have become aware of the contradictory requirement for 'geological criteria' radioactive waste disposal that arise due to the 'gas issue'. Thus,

i. radioactive methane could be produced at such high levels that its escape would need to be prevented – in order to avoid an unacceptable dose;

ii. but at the same time bulk hydrogen (that wasn't radioactive) would need to be released to avoid a pressure build up

Thus the revised Policy for Core Strategy Policy 11 should read:

> "***There should be no decision to enter into a Voluntarism arrangement until geological criteria are established***"

Furthermore, during the Summer of this year I was in correspondence with Dr Lewis Mortimer of DEFRA concerning the scientific basis of CoRWM's July 2006 recommendation for nuclear waste disposal. In his response of the 27th August, Dr Mortimer wrote:

> "*CoRWM also recommended that further research and development should be carried out aimed at reducing uncertainties as the process moves forward.* ***It is important to be clear that more work needs to be done***" (Emphasis added)

Thus, the revised Policy for Core Strategy Policy 11 should be further amended to read:

> "***Given that boreholes have the potential to damage a disposal site – but more importantly carry the risk of financial momentum (given their high cost) – no borehole programme should be initiated until there is a rigorous case for nuclear waste disposal.***"