

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

## Briefing Number 21 – CoRWM R & D briefing

Radioactive Waste Briefing Number 21, September 2009

### NFLA Secretariat response to the:

#### COMMITTEE ON RADIOACTIVE WASTE MANAGEMENT'S 'REPORT ON NATIONAL RESEARCH AND DEVELOPMENT FOR INTERIM STORAGE AND GEOLOGICAL DISPOSAL OF HIGHER ACTIVITY RADIOACTIVE WASTES, AND MANAGEMENT OF NUCLEAR MATERIALS'

#### **Notes to NFLA member authorities:**

This official consultation by the NDA is open until **11<sup>th</sup> September 2009**. The Nuclear Free Local Authorities response to the consultation can be found below.

If you wish to submit an individual response then please send it to:

CoRWM Secretariat  
Area D, 3rd Floor  
3 Whitehall Place  
London.  
SW1A 2HD

**Or Email it to:** [corwm@decc.gsi.gov.uk](mailto:corwm@decc.gsi.gov.uk)

If you do send a local submission please copy it to the NFLA Secretariat – [office@nuclearpolicy.info](mailto:office@nuclearpolicy.info) so that the Secretariat is aware of your response.

The response has been composed by the NFLA Scotland Policy Advisor, Pete Roche, with minor edits by the NFLA Secretary, Sean Morris.

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## **1. Summary**

In the view of the Nuclear Free Local Authorities (NFLA) a detailed analysis of the 1997 Nirex Inquiry report and several other problems which have emerged since suggest that CoRWM should accept the possibility that it may never be possible to have sufficient confidence in computer models of the risks involved in burying radioactive waste in a deep repository.

CoRWM's comments on the storage of waste, particularly high-level liquid waste stored at Sellafield lack any sense of the urgency required to deal with this problem.

CoRWM fails to highlight the problems associated with plans to bury spent fuel from proposed new nuclear reactors, and in NFLA's view should be recommending that no justification decision is taken on building new reactors until research on the disposability of high burn-up fuel is carried out and subjected to a public inquiry.

## **2. Background**

The Nuclear Free Local Authorities (NFLA) responded on 12<sup>th</sup> May 2009 to CoRWM's consultation draft on Deep Geological Disposal of higher activity wastes.<sup>1</sup> This response made two important points which are relevant to this latest report on R&D.

Firstly, NFLA expressed disappointment that there had been no analysis of the outcome of the 1997 Nirex Inquiry on the proposed Rock Characterisation Facility (RCF), and that this was being left to the West Cumbria Managing Radioactive Waste Safely Partnership.

Secondly, it was noted that the Environment Agency (EA) of England and Wales, in two reports had reviewed the research programme of the former UK Nirex Ltd, and identified more than 20 scientific, technical and engineering issues that need to be better understood in order to have confidence in containment of radioactive wastes over very long timescales.<sup>2</sup>

### **3. Lessons from the Nirex Inquiry**

In 1997 the Secretary of State for the Environment, John Gummer, formally rejected Nirex's Appeal. He based his rejection on the evidence presented to him by the Inquiry Inspector, Mr C S McDonald, and the Technical Assessor, Mr Colin Knipe.

The Inquiry Inspector concluded that the nuclear industry should not be given the go-ahead to build the RCF *"in [their] current state of inadequate knowledge"*.<sup>3</sup>

Mr McDonald reported that the chemical containment system the industry was proposing was:

*"...new and untried with more experimentation and modelling development indubitably required."*<sup>4</sup>

He referred to *"the profound novelty and complexity of the deep disposal multi-barrier concept."* He continued:

*"The expansion in scope of the work over the last 5 years or so has also been very impressive, but does indicate amongst other things that the practical difficulties of the deep disposal option were originally underestimated by the international consensus"*.

And Colin Knipe said the evidence:

*"...suggests that considerably more experimentation and model development is needed on radionuclide solubility, sorption and general thermodynamic relationships over the range of temperatures and chemical conditions."*<sup>5</sup>

John Gummer stated:

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<sup>1</sup> [http://www.nuclearpolicy.info/docs/consultations/CoRWM\\_reponseMay09.pdf](http://www.nuclearpolicy.info/docs/consultations/CoRWM_reponseMay09.pdf)

<sup>2</sup> Review of the Nirex Research Programme NWAT/Nirex/06/005 V2. August 2006.  
Review of Nirex's Understanding of Near-field Processes in the Phased Geological Repository Concept NWAT/Nirex/06/002 V 4.1 March 2007

<sup>3</sup> McDonald (1997) Cumbria County Council: Appeal by UK Nirex Ltd, APP/H0900/A/94/247019. p277 para 8.56

<sup>4</sup> C S McDonald (1997) Inspector's Report following 'Nirex RCF' Inquiry, Cumbria County Council, File (APP/H0900/A/94/247019) pp 241-242 - para 6E.70

<sup>5</sup> Colin Knipe's Technical Assessor's Report is at <http://www.jpbc.co.uk/nirexinquiry/nirex.htm>

*"I remain concerned about the scientific uncertainties and technical deficiencies in the proposals presented"*<sup>6</sup>

CoRWM concluded in 2006 that these outstanding scientific issues had not been resolved. And in 2008, Dr Mortimer Lewis (of DEFRA) 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."*<sup>7</sup>

The NFLA remains convinced that a full examination of the scientific uncertainties and technical deficiencies in the case presented by Nirex to the public inquiry is urgently required. When this question was raised at the Edinburgh plenary meeting in April 2009, the response was that this was being left to the West Cumbria Managing Radioactive Waste Safely Partnership. Since then the Partnership has received a presentation from John Hetherington on "Lessons from the Nirex Process".<sup>8</sup>

This was not an examination of the scientific lessons to be learned, it was much more to do with stakeholder engagement and process. Hetherington does not address the generic scientific difficulties associated with the evaluation of the risks which may arise from the burial of radioactive wastes. In fact Hetherington describes the Inquiry as being part of a "Decide-Announce-Defend" process. However, it is important to recognize that the Inquiry process enabled potential risks to be addressed in an open forum.

Clearly, the type of discussion initiated by John Hetherington is required, but it does not take the place of an analysis of the scientific uncertainties and technical deficiencies raised in the Nirex Inquiry report.

Given that Cumbria has been the only area to suggest that it would consider hosting a nuclear waste repository it is worth noting that the Nirex Inquiry Inspector, Chris McDonald wrote to The Guardian in 2007 stating that the safety case for a repository near Sellafield showed the site is not suitable and investigations should be moved elsewhere.<sup>9</sup>

David Smythe, former professor of geophysics at Glasgow University who gave evidence on behalf of Friends of the Earth at the Nirex Inquiry told The Guardian there is clear evidence that West Cumbria possesses no suitable rocks.<sup>10</sup>

However, the idea that Nirex failed to win its case at the public inquiry because of a failure to carry out a proper stakeholder engagement, or because locating a burial facility in that particular area would be unwise is not borne out by the Inquiry Report and Technical Assessor's report. These suggest the failure occurred because Nirex was unable to provide convincing evidence that the implications for health in the future were sufficiently predictable. In short, the Inquiry established that the Nuclear Industry simply did not have the data to justify claims that the risks arising from the burial of nuclear waste would be insignificant. The reports raised fundamental difficulties associated with the burial of radioactive waste wherever a repository is located.

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<sup>6</sup> Department of the Environment News Release: 'John Gummer Refuses Nirex Planning Appeal' 17 March 1997, page 2

<sup>7</sup> Letter to Dr Rachel Western – Nuclear Researcher for FoE Cumbria Groups.

<sup>8</sup> See section 3 of the West Cumbria Managing Radioactive Waste Safely Partnership, Meeting Report 14<sup>th</sup> July 2009 <http://www.copeland.gov.uk/pdf/Mtg%20Rpt%2014Jul09-v2.pdf>

<sup>9</sup> Guardian letters 28th June 2007 <http://www.guardian.co.uk/letters/story/0,,2113027,00.html>

<sup>10</sup> Guardian 2nd Nov 2007 <http://www.guardian.co.uk/business/2007/nov/02/>

## **CoRWM should recommend commissioning an analysis of the scientific uncertainties and technical deficiencies raised by the Nirex Inquiry report and details of progress made since the inquiry.**

### **4. Environment Agency Reports**

The Environment Agency's (EA) reports which reviewed the research programme of the former UK Nirex Ltd, identified more than 20 scientific, technical and engineering issues that need to be better understood in order to have confidence in containment of radioactive wastes over very long timescales.<sup>11</sup> The 2006 report made four recommendations, which were subsequently reproduced in the NDA's consultation on its Proposed Research and Development Strategy, which closed in November 2008.<sup>12</sup> They were:

- (1) Nirex should provide a suitably detailed account of its future research programme, to enable advance external review by a suitable range of stakeholders. It should be proactive in seeking such comment.
- (2) Nirex should review the output of its research programme against predefined research objectives, in order to evaluate performance.
- (3) Nirex should document more formally the process by which the research programme is defined and how that process is implemented.
- (4) Nirex should document the steps that are being taken to ensure that the research programme is addressing an appropriate range of issues, given the need to accommodate possible future policy directions, for example, if the selected disposal concept were to differ from Nirex's Phased Geological Disposal Concept.

One of the purposes of the NDA consultation document was "*to take a first step in addressing these recommendations*". Section 4 was an outline description of the current status and future direction of the different areas of the research programme, including "*discussion of the residual uncertainties that require further research*".

The EA responded to the consultation document saying the NDA would need to provide much more detail on its future research programme; the NDA has no clear objectives that will define whether suitable or sufficient research has been done; the EA said the proposed R&D strategy document was not forward looking and provided no linkage to research projects already underway. Where the NDA identified further research requirements, these were poorly defined. Finally, the EA said the NDA strategy gave no indication of having shifted its focus from optimization of the "Phased Geological Repository Concept" to choosing the best concept.<sup>13</sup>

In March 2009, the NDA's Radioactive Waste Management Directorate published a report on its R&D Strategy to underpin Geological Disposal.<sup>14</sup> This is part of the NDA's response

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<sup>11</sup> Review of the Nirex Research Programme NWAT/Nirex/06/005 V2. August 2006.  
Review of Nirex's Understanding of Near-field Processes in the Phased Geological Repository Concept  
NWAT/Nirex/06/002 V 4.1 March 2007

<sup>12</sup> NDA Radioactive Waste Management Directorate, Proposed Research and Development Strategy, May 2008. (para 3.6.1) <http://www.nda.gov.uk/documents/upload/Draft-NDA-RWMD-Proposed-Research-and-Development-Strategy-May-2008.pdf>

<sup>13</sup> Response to Nuclear Decommissioning Authority consultation on proposed research and development strategy. November 2008 [http://www.environment-agency.gov.uk/static/documents/Research/1976\\_RWMD\\_Proposed\\_RD\\_strategy.pdf](http://www.environment-agency.gov.uk/static/documents/Research/1976_RWMD_Proposed_RD_strategy.pdf)

<sup>14</sup> NDA's Radioactive Waste Management Directorate, Research and Development Strategy to underpin Geological Disposal of the United Kingdom's Higher Activity Wastes, March 2009.

to comments made by the EA and others during the earlier consultation. A separate document describing the details of the NDA's forward programme of R&D will be published later this year.

In other words there is no indication of significant progress on the more than 20 outstanding scientific, technical and engineering issues identified by the EA as needing to be better understood in order to have confidence in the containment of radioactive wastes over very long timescales. There is simply a strategy for carrying out further R&D.

Whilst NFLA agree with CoRWM about the need for "...organisations involved in radioactive waste management R&D [to] routinely produce documents that explain in accessible language what they think the key uncertainties are and what R&D is in hand or planned to address those uncertainties" (para 3.93) **it would have undoubtedly been helpful if CoRWM had commented on this exchange between the NDA and EA and on progress made on resolving the outstanding scientific and technical issues highlighted by EA.**

The EA says the aim of its examination of Nirex research was to highlighting the kinds of R&D that the NDA's Radioactive Waste Management Division (RWMD) would need to carry out if the Government accepted geological disposal as a national policy. The "key technical challenges" were illustrative of items that need to be explored in developing a safety case.

CoRWM pointed out in its recent report on Geological Disposal that "*An essential aspect of inspiring the confidence of stakeholders in geological disposal is demonstrating that the uncertainties in how the facility will perform are properly identified and that the R&D that is required to address them has been identified and will be commissioned.*"

**CoRWM should recommend to Government a regular system for updating stakeholders and the public on progress with regard to resolving the scientific and technical uncertainties and the R&D which has been commissioned to resolve these issues.**

## **5. Structure of the Report**

Sections 5 and 6 appear to be the most important sections of the report, and yet they appear right at the end. We would suggest moving these to the front.

### **Some Specific R&D issues for Geological Disposal**

#### **Waste chemistry**

In order to evaluate the risks from burying different kinds of radioactive waste in a geological repository it is necessary to know the chemical properties of the waste. This is made clear by DePaolo and Orr. (See para 6.53) Unfortunately, the Radioactive Waste Inventory just gives the isotopic content, not the chemical properties.

**CoRWM should investigate the feasibility of including information on chemical properties in future radioactive waste inventories.**

We note that DePaolo and Orr call for an understanding of fundamental physical and chemical processes that control migration to be built, and that this will require a new generation of experiments and models.

In October 2007 the International Atomic Energy Agency (IAEA) published a document on recent findings concerning the solubility of radioactive wastes when they are in the environment of a burial facility.<sup>15</sup> On page three, the report states;

*"The capacity to model all the effects involved in the dissolution<sup>16</sup> of the waste form, in conditions similar to the disposal site, is the final goal of all the research undertaken by many research groups over many years. As we will see in this report, **this kind of investigation is far from being finished**" (emphasis added)*

This suggests that it may, in fact, be premature to assume it is possible to safely bury radioactive waste at all.

Other studies even suggest that it may never be possible to be able to have sufficient confidence in predictions of the level of risk involved. For example the Nuclear Energy Agency (NEA) held a workshop on 'Sorption' (the capacity of surfaces to pick out chemicals from the liquid that flows over them) in Oxford in May 1997.<sup>17</sup> Mr Hans Wanner, of the Swiss Federal Nuclear Safety Inspectorate (HSK); states:

*"The term "uncertainty" is commonly connected with "error" in a statistical sense, but a statistical basis rarely exists for Kd [sorption] values because they depend on too many unknown parameters. Hence the assignment of an uncertainty to a Kd value is usually a priori unscientific and unjustifiable" (page 97)*

**It is recommended that CoRWM recognise the possibility that it may turn out to be impossible to predict with sufficient confidence the risk associated with radioactive waste burial.**

## **Gas**

**Para 6.58 needs to be clearer:** there is a conflict between needing to let hydrogen gas escape from the repository, because a build-up underground could affect groundwater movement and disrupt the facility, but there is also a need to keep radioactive methane gas contained because it could expose humans and other organisms on the surface. This is an important issue that affects every aspect of the concentric barriers approach used in the deep geological disposal of radioactive waste.

Para 6.82 refers to the generation of gases from the corrosion of metals, and suggests there may be an issue of whether gas generated in the ILW/LLW part of the facility could affect groundwater movement in the HLW/SF part of the facility. Para 6.78 refers to cement-based materials in the ILW/LLW part of the facility causing groundwater to become highly alkaline which in turn may affect the bentonite clay used in the HLW/SF

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<sup>15</sup> "Spent Fuel and High Level Waste: Chemical Durability and Performance under Simulated Repository Conditions Results of a Coordinated Research Project 1998-2004" [http://www-pub.iaea.org/MTCD/publications/PDF/te\\_1563\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/te_1563_web.pdf)  
IAEA-TECDOC-1563 (October 2007 )

<sup>16</sup> 'Dissolution' refers here to the process in which solids dissolve in liquids

<sup>17</sup> "Using Thermodynamic Sorption Models for Guiding Radioelement Distribution Coefficient (Kd) Investigations – A Status Report"

part of the facility. It is, therefore, surprising that there is no mention of the problems associated with the behaviour of reactive metals within cement grouts.

The NDA, for example, points out that:-

*"...aluminium, Magnox and uranium are reactive metals that can corrode rapidly under high pH conditions [caused by the cement, resulting in the formation of hydrogen gas]. The corrosion products occupy a greater volume than the original metal and have the potential to cause cracking of the wasteform and deformation of the waste container."<sup>18</sup>*

The Environment Agency says:

*"The importance of reactive metals should not be underestimated. We are aware of one important waste stream containing metals that react expansively with cement, where expansive fracturing of the encapsulated waste form is anticipated within 140 years, based on one estimate. Approximately 17,000 such conditioned waste packages are now in storage."<sup>19</sup>*

CoRWM itself complains elsewhere that the NDA gives:

*"...no indication ... of the potential scale or seriousness of the problem. It is acknowledged (p.37) that some packages will require "reworking" by repair, over-packing or re-packaging but it is difficult to see how this might be done, especially recovering the waste for re-packaging. Surely this is a major issue that should be addressed as a priority in the R&D strategy?"<sup>20</sup> (para35)*

and:

*"...among the more significant and urgent [issues] are those relating to the encapsulation of ILW in cement and the need to develop alternative encapsulants. It is not clear that some of the existing ILW packages prepared under the LoC [Letter of Compliance] process are actually fit for purpose". (para 34)*

This makes CoRWM's failure to highlight this issue all the more peculiar.

**It is clear that the cement currently being used to immobilise 'intermediate level wastes' is proving to be problematic. However, it is not clear that the NDA is planning to take any immediate action to address the problem. CoRWM must address this issue in its final R&D report.**

## **6. Management of Spent Fuels (SF)**

We are pleased to note CoRWM's observation (para 6.20) that dry storage is rapidly gaining favour as an option for the long-term management of SF. The NFLA has argued for many

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<sup>18</sup> NDA Radioactive Waste Management Directorate, Proposed Research and Development Strategy, May 2008. (page 35) <http://www.nda.gov.uk/documents/upload/Draft-NDA-RWMD-Proposed-Research-and-Development-Strategy-May-2008.pdf>

<sup>19</sup> The Longevity of Intermediate-Level Radioactive Waste packages for geological disposal: A review. Environment Agency, August 2008. <http://publications.environment-agency.gov.uk/pdf/GEHO0808BOLU-e-e.pdf?lang=e>

<sup>20</sup> Comments on NDA RWMD R&D Strategy, CoRWM Working Group C. 6<sup>th</sup> Oct 2008. <http://www.corwm.org.uk/Pages/Current%20Publications/2408-%20CoRWM%20Comments%20on%20NDA%20RD%20Strategy%20Final.pdf>

years that radioactive waste management policy should be underpinned by environmental principles.<sup>21</sup> These principles would rule out reprocessing as a waste management option.

## 6.1 *Magnox Spent Fuel*

The NDA claims that reprocessing was the only proven technology for management of Magnox fuels.<sup>22</sup> But, as CoRWM points out, even in the event that the reprocessing strategy proceeds to completion, it is inevitable that there will be some spent Magnox fuel that cannot be reprocessed. Contingency strategies will be required in case the continued operation of the Magnox reprocessing plant is not possible. The NDA is investigating these.

The Environment Agency has pointed out that the cessation of Magnox reprocessing would be good for the environment because of the reduction of discharges that would result.<sup>23</sup> EA, therefore, points out that it will be necessary to examine the contingency strategies "*...to determine whether one of them should be adopted in preference to reprocessing.*"

The NDA has told CoRWM that it aims to "*have one or more contingent strategies ... capable of being used instead of reprocessing through Magnox reprocessing plant. NDA could then identify whether a contingent strategy was better than continuing with the baseline strategy*". The NDA is studying disposability of Magnox fuel, e.g. issues of container design, such as risks of hydrogen build-up resulting from the formation of uranium hydride, and wants to be sure that Magnox fuel could be disposed of if necessary, so that there is a real alternative to reprocessing.<sup>24</sup>

NFLA takes the view that Magnox reprocessing should end as close to the original 2012 closure date as possible so that the UK can meet its commitments to the other OSPAR states around the North-east Atlantic. **CoRWM should, therefore, recommend that regulators seriously consider the option of interim storage of Magnox spent fuel in reactors prior to the development of purpose built dry storage facilities.**<sup>25</sup>

## 6.2 *AGR Fuel*

The NII reported to CoRWM in December 2008 that the AGR position was 'less satisfactory' than Magnox.<sup>26</sup> Contingency strategies were needed and one of them would almost certainly involve dry storage. Similarly, the NDA reported to CoRWM in August

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<sup>21</sup> See for example <http://www.greenpeace.org.uk/media/reports/environmental-principles-of-radioactive-waste-management>

<sup>22</sup> CoRWM Meeting with NDA Management. Plutonium, Uranium and Spent Fuels. Doc 2418 8th August 2008.

<http://www.corwm.org.uk/Pages/Other%20Meetings/2418%20-%20management%20of%20plutonium,%20uranium%20and%20spent%20fuel%20-%20meeting%20with%20NDA,%208%20August%202008,%20final.doc>

<sup>23</sup> CoRWM Meeting with HSE and the Environment Agency on management of spent fuels, plutonium and uranium. Doc 2520 page 2 (para 11) <http://www.corwm.org.uk/Pages/Other%20Meetings/2520%20-%20Meeting%20with%20NII%20%20EA%20-%20Management%20of%20SF%20Pu%20U%20Manchester%209%20Dec%208%20final.pdf>

<sup>24</sup> CoRWM Meeting with NDA on management of spent fuels, plutonium and uranium, 11 December 2008 Doc 2523 pp 1-2 (para 5-6)

<http://www.corwm.org.uk/Pages/Other%20Meetings/2523%20-%20meeting%20with%20NDA%20on%20SF%20Pu%20U%20%2011%20Dec%208%20final.pdf>

<sup>25</sup> CoRWM Doc 2520 (ref 21) page 2 (para 9)

<sup>26</sup> CoRWM Doc 2520 (ref 21) page 3 (para 15)

2008 that "it was clear that dry storage facilities would have to be developed at Sellafield".<sup>27</sup>

As CoRWM points out (para 6.25) there could be up to 7,000 tonnes of AGR spent fuel remaining in storage when oxide reprocessing ends. The NDA says it is re-thinking its oxide fuel strategy, but that any new strategy will include dry storage. If dry storage is going to be required in any case clearly it would be better for the environment, as with Magnox spent fuel, if this were implemented as soon as possible in preference to reprocessing.

**CoRWM should recommend to the NDA that they implement a dry storage strategy for AGR spent fuel as soon as possible.**

### **6.3 Plutonium**

NFLA note that since the CoRWM R&D consultation document has been printed the Department of Energy and Climate Change has published the first of two pre-consultation papers on plutonium.<sup>28</sup> CoRWM suggests that the R&D programme into the management of the UK's civil plutonium stockpile has been an example of good practice. Perhaps this is true, however, after reading the most recent pre-consultation document it is clear the issue is far from resolved.<sup>29</sup>

### **6.4 New Build Spent Fuel**

CoRWM does not appear to consider the management of spent fuel from new reactors. The NFLA has been critical<sup>30</sup> of the Nuclear Industry Association (NIA) for giving far too few details and leaving too many questions unanswered, in its Justification Application,<sup>31</sup> about the detrimental impact waste stores are likely to have on communities with new nuclear reactors over their 100 year life; about the impact of using new higher burn-up fuel with a higher levels of enrichment than has been used in the past; and the impact on the size, footprint, cost etc of the proposed geological disposal facility.<sup>32</sup> **CoRWM should recommend research to fill these knowledge gaps, and that no justification decision is taken prior to this research being submitted to a public inquiry.**

The NDA envisages using the copper and clay approach used in Sweden for UK New Build Spent Fuel. The Swedish NGO Office for Nuclear Waste Review (Swedish NGO MKG)<sup>33</sup> has published a report entitled "Outstanding Research Questions + Disposal Programme"<sup>34</sup>

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<sup>27</sup> CoRWM Doc 2418 (ref 20) page 3 (para 17)

<sup>28</sup> [http://www.decc.gov.uk/media/viewfile.ashx?filepath=what\\_we\\_do/uk\\_energy\\_supply/energy\\_mix/nuclear/plutoniummanagement/1\\_20090902105255\\_e\\_@@\\_preconsultationdiscussionpaperplutoniummanagement.pdf&filetype=4](http://www.decc.gov.uk/media/viewfile.ashx?filepath=what_we_do/uk_energy_supply/energy_mix/nuclear/plutoniummanagement/1_20090902105255_e_@@_preconsultationdiscussionpaperplutoniummanagement.pdf&filetype=4)

<sup>29</sup> For more information regarding the NFLA position on plutonium management see <http://www.nuclearpolicy.info/docs/radwaste/RWB18.pdf>

<sup>30</sup> See NFLA Briefing on the Justification Consultation, February 2009. <http://www.nuclearpolicy.info/docs/nuclearmonitor/NNM15.pdf>

<sup>31</sup> Consultation on the Nuclear Industry Association's Application to Justify New Nuclear Power Stations. Volume 1 Consultation Document. DECC December 2008. <http://www.berr.gov.uk/files/file49230.pdf>

<sup>32</sup> See for example: Richards, H. Too Hot to Handle: The truth about high burn up fuel. April 10, 2008 <http://www.no2nuclearpower.org.uk/reports/TooHottoHandle.pdf> and Richard, H. Deep Repositories for Spent Fuel: Burying the Truth. March 29, 2008. <http://www.no2nuclearpower.org.uk/reports/buryingthetruth08.pdf>

<sup>33</sup> Swedish NGO Office of Nuclear Waste Review (Miljöorganisationernas kärnavfallsgranskning in Swedish)

<sup>34</sup> Report 4 - "Comments from the Swedish Society for Nature Conservation, SSNC, and the Swedish NGO office for Nuclear Waste Review, MKG, on the industry's, SKB, research programme – 'Fud-07'" Part B - (pp 21-23)

This report highlights "...outstanding issues and unsolved problems in the industry's research and development project ..." which will need to be resolved before construction should be allowed to begin. The Swedish Society for Nature Conservation (SSNC) and MKG point out that the industry in Sweden gives the impression that it is ready to start constructing a final repository, and that any gaps in knowledge will be acquired during the construction process, whereas a great deal of uncertainty on key issues remains. The report concludes that the industry still has a long way to go before it can demonstrate that the KBS-3 method carried out at either of the candidate sites fulfils criteria that would ensure long-term environmental safety.

The SSNC and MKG list several areas which they say may require considerable involvement on the part of government authorities and a detailed assessment of the quality of the industry's work, namely:

- a study of copper corrosion
- a study of microbial activity and barrier functions
- a study of the performance of bentonite clay after the repository has been sealed and capped; and
- a study of the extreme tectonic pressures in the formation at the Forsmark site and an estimation of the risk for a total breakdown of the repository

In the opinion of the SSNC and MKG, the Government should make it clear to the industry that authorization to build a final repository will not be forthcoming until all important issues relating to long-term safety have been clarified and resolved.

It seems that there is a lot more work to be done on copper corrosion with a major conference due in Stockholm in November. With some of the most recent research on copper corrosion suggesting that corrosion rates in a repository are likely to be much faster than previously thought, this is obviously an area where CoRWM should pay particular attention.<sup>35</sup>

## **7. The Hazard Presented by Liquid High Level Wastes**

Ironically, the deadline for responses to CoRWM's R&D consultation is September 11<sup>th</sup> – or 9/11. This date is ironic because of the extreme danger that Sellafield presents – were there to be an attack on the site. Yet problems with the high level liquid waste at Sellafield are not addressed in this report.

The American expert on nuclear hazards and security, Gordon Thompson, has described nuclear facilities as "*Weapons for an Enemy*"<sup>36</sup>

The Sellafield liquid HLW presents a particular risk – because being liquid it would readily spread if a plane were to crash at Sellafield. Estimates have been made of the impact of such an attack - it could result in the need to evacuate areas as far apart as Glasgow and Liverpool,<sup>37</sup> and that there could be as many as two million fatalities.<sup>38</sup>

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<sup>35</sup> Pers Com with MKG.

<sup>36</sup> Civilian Nuclear Facilities as Weapons for an Enemy: A submission to the House of Commons Defence Committee by Gordon Thompson.

[http://www.irss-usa.org/pages/documents/UKDefCttee01\\_02\\_000.pdf](http://www.irss-usa.org/pages/documents/UKDefCttee01_02_000.pdf)

<sup>37</sup> '*Assessing the risk of terrorist attacks on nuclear facilities*' Parliamentary Office of Science and Technology Report - Report 222, July 2004 page 81

<sup>38</sup> "STOA Study Project" on the "*Possible Toxic Effects from the Nuclear Reprocessing Plants at Sellafield (UK) and Cap de la Hague (France)*" Mycle Schneider et al

The Liquid HLW at Sellafield is supposed to be turned into a solid by a process known as 'virtrification'. However, treatment facilities designed to achieve this are subject to severe technical problems. These problems were detailed in the July 2008 Newsletter of the Nuclear Installations Inspectorate (NII).<sup>39</sup>

In April of this year – the Sellafield Liquid HLW tanks experienced a 'near miss' in which the cooling water system failed. Due to the fact that the HLW is self-heating, it is at constant risk of boiling dry. The 'Sellafield News'<sup>40</sup> reported that that the incident was so serious that the Site Emergency Control Centre arrangements had to be called on.

The following month another emergency occurred within the HLW treatment facilities – this time in 'Evaporator B'.<sup>41</sup> Although Sellafield initially claimed that there would be no subsequent plant shut-downs; the closure of THORP (for up to seven months) was announced was announced in June.<sup>42</sup>

It is not until page 87 – and then in a footnote – that CoRWM makes reference to the fact that:

*"CoRWM understands that NDA work on the oxide fuels reference strategy is being accelerated because of **problems with the Sellafield evaporators for liquid HLW** and the consequent effects on THORP throughput. This section of the report will be updated prior to publication to reflect developments"*

**CoRWM should make absolutely clear both to Government – and to stakeholders the absolute imperative of addressing the dangers associated with Liquid HLW as a matter of urgency.**

## **8. International Research & Development**

CoRWM should update the final version of its report on developments in other countries. In particular, a new section on Germany should be included in section 3.

Germany's only storage test facility for high-level nuclear waste at Gorleben is unsafe and needs to be closed.<sup>43</sup> German Environment Minister Sigmar Gabriel said that the salt dome Gorleben, chosen in the 1970s to become Germany's national storage facility for high-level nuclear waste by 2030, "is dead." The comments came after it emerged that the former government of Chancellor Helmut Kohl had brushed over legal and safety concerns related to the site. The Kohl government altered a scientists' report that came to the conclusion that the dome in Lower Saxony was not suitable for long-term storage of nuclear waste.

## **9. Recommendations**

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Commissioned by the European Parliament, Directory General for Research Scientific and Technological Option Assessment (STOA) Programme  
Contract No EP/IV/A/STOA/2000/17/0 - Final Report - August 2001

<sup>39</sup> Nuclear Newsletter, July 2008. <http://www.hse.gov.uk/nuclear/nsn4308.pdf>

<sup>40</sup> 'Sellafield News' Wednesday 8<sup>th</sup> April 2009 – Issue 1101 (page 2)

[http://www.sellafieldsites.com/UserFiles/File/Sellafield%20News/Sellafield%20News%2008\\_4\\_09.pdf](http://www.sellafieldsites.com/UserFiles/File/Sellafield%20News/Sellafield%20News%2008_4_09.pdf)

<sup>41</sup> Whitehaven News 24<sup>th</sup> June 2009. [http://www.whitehaven-](http://www.whitehaven-news.co.uk/news/thorp_threats_1_557207?referrerPath=home)

[news.co.uk/news/thorp\\_threats\\_1\\_557207?referrerPath=home](http://www.whitehaven-news.co.uk/news/thorp_threats_1_557207?referrerPath=home)

<sup>42</sup> Whitehaven News 3<sup>rd</sup> June 2009 [http://www.whitehaven-](http://www.whitehaven-news.co.uk/news/thorp_to_shut_next_month_1_563113?referrerPath=news)

[news.co.uk/news/thorp\\_to\\_shut\\_next\\_month\\_1\\_563113?referrerPath=news](http://www.whitehaven-news.co.uk/news/thorp_to_shut_next_month_1_563113?referrerPath=news)

<sup>43</sup> German nuke waste storage site 'dead' UPI, 26<sup>th</sup> August 2009

[http://www.upi.com/Energy\\_Resources/2009/08/26/German-nuke-waste-storage-site-dead/UPI-25871251311089/](http://www.upi.com/Energy_Resources/2009/08/26/German-nuke-waste-storage-site-dead/UPI-25871251311089/)

- 1) CoRWM should recommend commissioning an analysis of the scientific uncertainties and technical deficiencies raised by the Nirex Inquiry report and details of progress made since the inquiry.**
- 2) CoRWM should comment on the exchange between the NDA and EA and on progress made on resolving the outstanding scientific and technical issues highlighted by the EA in 2006 and 2007.**
- 3) CoRWM should recommend to Government a regular system for updating stakeholders and the public on progress with regard to resolving the scientific and technical uncertainties and the R&D which has been commissioned to resolve these issues.**
- 4) CoRWM should investigate the feasibility of including information on chemical properties in future radioactive waste inventories.**
- 5) CoRWM should recognise the possibility that it may turn out to be impossible to predict with sufficient confidence the risk associated with radioactive waste burial.**
- 6) Para 6.58 needs to be clearer – there is a conflict between the need to let some gases escape from a repository and the need to contain radioactive gases.**
- 7) It is clear that the cement currently being used to immobilise ‘intermediate level wastes’ is proving to be problematic. However, it is not clear that the NDA is planning to take any immediate action to address the problem. CoRWM must address this issue in its final R&D report.**
- 8) CoRWM should recommend that regulators seriously consider the option of interim storage of Magnox spent fuel in reactors prior to the development of purpose built dry storage facilities.**
- 9) CoRWM should recommend to the NDA that they implement a dry storage strategy for AGR spent fuel as soon as possible.**
- 10) CoRWM should recommend research on the disposability of high burn-up spent fuel from proposed new reactors, and that no justification decision is taken prior to this research being examined at a public inquiry.**
- 11) CoRWM should make absolutely clear both to Government – and to stakeholders the absolute imperative of addressing the dangers associated with Liquid HLW as a matter of urgency.**