

Log of Storage-Related Responses Received to CoRWM 'Invitation to Comment' (Summer 2008)

Out of the 10 responses received to the invitation to comment on CoRWM's work (doc. 2403), there were 6 that commented on interim storage. These are summarised in Table 1, together with notes on how they were acted on, and shown in full in the Annex.

Commentator and date	Issues they commented on	How comments were acted on
1. Thyssen Krupp VDM UK Ltd 4 September 2008	Interim storage – concern about materials used, by an unspecified organisation, for containment.	Not clear what, if anything, this had to do with CoRWM. Secretariat asked them for details, 10 October - no response received
2. Nuclear Legacy Advisory Forum (NuLeAF) 22 September 2008	Interim storage - concerns that NDA should take steps to ensure timely and appropriate engagement with local authorities in relation to storage of ILW at a smaller number of sites.	Issue addressed in Interim Storage report (doc. 2500).
3. Greenpeace 22 September 2008	Interim storage - including lack of clear definitions on what constitutes disposal, storage and waste; firm policy decisions and plans for legacy nuclear materials and new build spent fuel and wastes	Points about definitions considered when drafting CoRWM's own definitions of disposal, storage and waste. However, CoRWM does not agree with Greenpeace suggestions for changes to definitions.
4. Dr David Lowry 30 September 2008	Interim storage - need for the general public to be consulted on the generic concept of storage of radioactive waste and how this will happen; security of storage facilities; seek volunteer communities for a central national store or multiple regional stores; 100% cost recovery from those that generate the waste to include all prep work (technical R&D and contracted policy analysis)	Storage is an essential part of radioactive waste management, not a concept to be consulted on. There are no plans for a central store or for large regional stores. Security issues are dealt with in Interim Storage report. CoRWM cannot recover its costs.
5. Phil Davies 30 September 2008	Interim storage - need to maintain the clearest possible distinction between existing and new build wastes	CoRWM is maintaining a clear distinction. New build wastes are not considered in Interim Storage report (doc. 2500).

Commentator and date	Issues they commented on	How comments were acted on
6. Pete Wilkinson 1 October 2008	Interim storage - call for independent security experts to undertake review of storage proposals; conflation of new build and legacy waste – Government should explain and justify its position; lack of clear definition for disposal, call for CoRWM to ask NDA and agencies to make a statement on what is being pursued and how this reflects CoRWM and Government position; retrievability is incompatible with disposal – CoRWM1 recommendation should have been for storage and not disposal; Government has not heeded CoRWM's package of recommendations – it has cherry picked recommendations and used these as a justification for new build – not CoRWM1's intention	Security issues and definitions of storage and disposal are dealt with in Interim Storage report (doc. 2500). Issue of retrievability is for discussion with volunteer communities. CoRWM has not yet considered storage of new build wastes and spent fuels.

ANNEX- FULL TEXT OF RESPONSES

1. Thyssen Krupp

Invitation to comment: my response

- On interim storage:

We have great concern with regard to the **corrosion resistance of materials** currently being considered for this application – both short term and long term.

In the case of Yucca Mountain (USA) a highly corrosion resistant material (a Nickel Chromium Molybdenum alloy) was selected, but in the case of the UK project, material of **significantly less corrosion resistance** seems to have been selected without **proper metallurgical advice having been considered**. I have enclosed my comments on this report in the e-mail with this document. We have great fears for the long term safety of this work.

- On research and development:

- On geological disposal:

See above summary and e-mail with regard to material selection report.

- On CoRWM and other issues affecting its work:

We suggest that on this important matter proper independent corrosion advice from experienced metallurgists is sought.

It is of great concern that in the USA a highly corrosion resistant material was considered essential but in the UK, material which seem much less likely to be fit for long term service is being considered. The selection criteria seems **totally inaccurate** and the **conclusions have not been made by knowledgeable metallurgical specialists**. **The result could be rather dangerous for long term safety of this work.**

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May we keep you on our database so that we can keep you informed about our work? Yes

We may publish your response unless you want it kept in confidence. Do you wish it to be kept confidential? No

Please post, fax or e-mail this to the address shown in section 6 above. Thank you for sending us your views.

Please find attached word document on "invitation to comment".

Please also consider this document along with our detailed comments below which relate to a document entitled "Material Selection for 3m3 ILW Product Container".

Proper metallurgical advice should be sought before proceeding further with this work.

Best regards,

Robert Smith
Thyssen Krupp VDM UK Ltd.

I noticed many inaccuracies in the report and I believe that BNG may have been misled to some extent by its content and conclusions.

I am concerned that the author, despite appearing to have researched the topic in detail and having sort out advice from other parties, has written a report with little understanding of metallurgy or corrosion issues.

I am extremely concerned as the application of this work is for such a serious use - the storage of radioactive waste for the next 500 years (as I understand it).

I would suggest that BNG conduct an immediate review of this and suspend any current projects that have arisen from its findings.

My detailed review:-

I am curious to understand why BNG asked for an independent company to make this review - North West Projects - but then that the **review was actually made in conjunction with Outokumpu Stainless** (1st paragraph page 2), who **coincidentally are a manufacturer of the product concluded** as seemingly being the best product for the application?

Assumptions (page 11) –

Case 1. **Managed store** – the need for a controlled atmosphere is only applicable if an alloy is selected of relatively low corrosion resistance. If a material of high corrosion resistance is selected it is possible to significantly reduce costs of the storage facility.

Case 2 Point 1. this appears to be the more likely scenario. From the outset the conditions (coastal area of moderate salinity) and temperatures up to 60 C necessitate the use of an alloy of good corrosion resistance – in particular possessing good resistance to **localized corrosion**. With the need to stack boxes the most important criteria is to have good **crevice corrosion resistance**. A comparison should be made of Critical Crevice temperatures for Candidate materials.

Point 2 – this implies that there will be chloride containing water and potential for full immersion of at least parts of the boxes.

Point 5 – again notes the possibility for temperatures up to 50 C. **Nirex state that** “it is assumed that the 'long-term' temperature in the ILW repository will be 50C although short-term excursions of up to **80C** are possible”.

It should be noted that the critical crevice temperature (**CCT**) of **SAF 2507 is only 35 C**. The **CCT of alloy C-276 is over 100 C**.

In the oil and gas industry the widely adopted **NORSOK** standards for material selection in marine environments are applied. In particular this is with regard to stress corrosion cracking of topside pipework - induced by concentrated salts formed by evaporation of seawater from spray, washing, splashing and dripping on the metal surface. The NOROSK standards previously suggested temperatures of above 100 C for duplex stainless steels and 110 C for super duplex stainless steels. The NPL has shown that **these materials can crack at temperatures as low as 80 C**. A threshold temperature for cracking between 70 and 80 C was identified for both 22 Cr duplex and 25 Cr superduplex stainless steel. **THIS IS IMPORTANT IF THE CONDITIONS NIREX GIVE OF TEMEPARTURES OF 80 C IS CORRECT.**

Little mention appears to have been made of **MIC (Microbiologically Induced Corrosion)** – There are concerns in this regard with low Mo containing alloy 825 which has a Mo content of 2.5-3.5%.

There is clearly a need for long term testing of superduplex with only 3% Mo.

Also the **exceptionally long life requirement** of the containers has to be considered in this regard and in regard to all localised corrosion effects.

Page 13 – Introduction.

Second Paragraph:-

The mentioned “**limited global supply of Nickel**” – if this is a problem it will affect all stainless grades considered for selection as well as Nickel alloys, as all have Nickel in their composition.

Third Paragraph – again I find it extraordinary that **one supplier (coincidentally of the eventual chosen material)** appears to have worked with North West Projects “more detail to establish the material of construction for the Sellafield 3m3 ILW Product Container”.

2.1.1 – Nickel alloys were dismissed as being more expensive and / or difficult to fabricate. Nirex / BNG suggested that the importance of this project would mean that cost would not be the deciding factor in material selection.

For a most similar project in the **USA nothing less than a highly corrosion resistant Nickel Chrome Molybdenum** alloy has been selected for the Yucca Mountain Project. Fabrication of such a product is not dissimilar to that of stainless grades.

2.1.2 – Again reference to cost which we were informed was not supposed to be in the remit of the material selection criteria.

3. Further Research – Whilst the **Nickel Institute** were consulted by North West Projects they were not asked for any detail / data on corrosion issues of nickel alloys or stainless grades.

4.4 – again the review of the material “families” appears to have been made by North West Projects inconjunction with Outokumpu Stainless. The latter have a somewhat limited portfolio of Corrosion resistant alloys which does not include Nickel base alloys.

5.1.2 I consider it amazing that coated materials - electroless nickel coated mild steel was considered throughout this project. I believe this gives indication of the lack of understanding by the author of the corrosion issues involved.

5.1.4 - again the review of the material “families” appears to have been made by North West Projects inconjunction with Outokumpu Stainless.

5.1.6 – **poor availability** of Nickel alloys. This is an unbelievable statement. There are many manufactures of such alloys worldwide. Worldwide applications totally dependent on such materials includes the gas turbine (both for aero engines and land based gas turbines for power generation).

Has this statement been created so as to reduce the score for Nickel alloys?
It clearly has no factual merit.

3rd place – 2304Duplex – the only significant application of this grade is for water boilers which is far, far below the tonnage supplied of Nickel alloys globally.

5.2.2 – finally the obvious conclusion is reached in regard of this considered solution.

5.2.3 – **Satisfaction of Need** - From a crevice and pitting corrosion point of view (which surely are the main factors in material selection) it is hard to imagine how anyone of a metallurgical background would put 2101 lean Duplex above 316L in this ranking. This really does suggest a worrying knowledge of corrosion issues by the author of this report.

In lifetime cost 316L does not even occur in the top 4.

The technical competence of this entire work has to be questioned.

6. Conclusions - finally lifetime cost is considered and yet 316L drops out of the top four preferred materials?

7. The technical review should clearly refer to **NORSOK** standards which the author appears to be unaware of. In view of the environmental conditions given by Nirex, review of the NORSOK standards should lead to a new consideration of appropriate corrosion resistant alloys for this critical application.

Appendix A Nickel alloys

- availability of alloy C-276 over the next 30 years is questioned and yet stainless isn't?

- availability of material in suitable form is again questioned for Nickel alloys. Why?

- can the material withstand MIC – whilst there is no doubt over alloy C-276 (**immune**) in this regard it is given a question mark.

11 day failure of 316L has been noted due to MIC. Extensive testing is surely required on duplex for such a critical and long term application?

- room temperature stress relaxation of nickel alloys? – presumably the author of the report is confused with Titanium?

- Can the material be worked in general terms – e.g. machining, drilling, tapping? Nickel alloys are not so very different to stainless grades, so again why the question marks?

Appendix A Stainless grades

Is there more than one material supplier – has tender for chosen material gone out to suppliers other than Outokumpu Stainless – the “apparent co-authors of the report”?

Can the material withstand MIC – should have been a “NO” for austenitic (stainless 316L), likely to be border line for 2205.

Can the material be easily post fabrication cleaned - this is not **even necessary for nickel alloys from a corrosion point of view**, but is a necessity for the stainless grades.(cost implication).

Can the material withstand (i.e. maintain containment) localized atmospheric corrosion (chloride laden saturated air at RT). Finally the most important criteria and yet the environmental condition makes no reference of immersion or possibility of temperatures up to 80 C.

Can the chosen material withstand this is the key question that needed to be addressed in this report.

Does the material have adequate toughness (27J @ -10 C) – unlike nickel alloys, **duplex will undergo a ductile – brittle transition**. Why was -10 C specified? Nickel alloys can be used to cryogenic temperatures.

Can the material withstand brittle failure – presumably genuine concern over **stress corrosion cracking of duplex grades?**

Can the material withstand service induced hydrogen embrittlement (i.e. maintain containment) – this is likely to be a concern with welding of duplex particularly after welding, due to the microstructure of this material – ferrite as well as austenite. It has been evidenced as a problem in the north sea with stainless grades.

Can the material withstand general corrosion – it is **localised** corrosion that has to be considered.

Ranking of materials:-

From the points analysis clearly alloy C-276 appears to be a very poor candidate material. This is most odd given its application for a similar purpose in the USA. One has to be concerned therefore with regard to the points scoring system employed. If correctly scored a rather different conclusion is most evident – that alloy C-276 outscores all other materials in all aspects except cost.

Examples requiring re-scoring:-

Availability – alloy C-276 and 825 should be scored a ++

Availability of suitable forms – alloy C-276 should be scored a ++

MIC – alloy 31 should be scored a ++

Localised submerged corrosion resistance – (at temperature?) – there appears to be no differentiation between a highly corrosion resistance nickel based alloy and most of the other stainless grades. This seems most unlikely to anyone with a corrosion background.

SSC – again no questions with regard to stainless grades – has this important factor been properly considered.

Weldability – all the grades mentioned will require cleaning prior to welding. Nickel alloys score 0. They are used in welded fabrication in all manner of applications and should rank as ++ as per other stainless grades.

However, the welding of duplex – in order to maintain the careful balance of ferrite and austenite has to be questioned and yet this does not appear to have been considered.

Logistics of manufacture – nickel alloys appear to score lower than stainless. Why?

Hydrogen Embrittlement – duplex appears to get the same score as for fully austenitic materials. The author of the report has clearly made no proper assessment of their research in this regard.

Toughness – see temperature query earlier in the above notes. Clearly this is a ++ for Nickel alloys but is reduced (dependent on temperature) for duplex.

Technical support – scores of 0 for Nickel alloys. Why ? There are several manufacturers all of whom offer technical support if required and there are also numerous knowledgeable independent consultants.

Fraction recycle – it would be most foolish to recycle stainless grades and not recycle Nickel alloys? So logic would dictate at least as high a scoring for Nickel alloys as all stainless grades.

I would be most happy to supply you technical papers on Microbiologically Induced Corrosion, Assessing Corrosion Performance of High-Level Nuclear Waste Containers (NACE) as it is clear that a fundamental review of this work needs to be carried out if a huge error of judgment is to be avoided. This error could have devastating environmental consequences in the future. I feel that you need to address this matter at the highest level within your organization.

I look forward to hearing from you that you will take the appropriate action with regard to this important matter.

Best regards,

Rob.

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2. Nuclear Legacy Advisory Forum (NuLeAF)

Dear CoRWM,

I write in response to your invitation to submit views on the interim storage part of your work programme, as described in doc 2403.

One of NuLeAF's concerns is that NDA should take steps to ensure timely and appropriate engagement with local authorities on the possibility of consolidating storage of ILW at a smaller number of sites.

Thus in April 07, the following was reported to the NuLeAF Steering Group:

As reported to previous meetings of the SG, the NDA has a long-standing commitment to engage stakeholders in its review of options for rationalising the interim storage of intermediate level wastes (ILW). This review could impact on the location of the site or sites for storing operational ILW from Berkeley, Bradwell, Culham, Dungeness, Harwell, Oldbury, Sizewell, Winfrith and Wylfa, which amounts to about 5% of the NDA's ILW inventory.

Although the Executive Director has previously offered assistance to the NDA to facilitate local authority involvement in the review, little progress appears to have been made. There is now a risk that the NDA will revert to a more traditional style of consultation on a developed set of proposals, without prior involvement of potentially affected local authorities in options assessment. This runs counter to recent trends towards early, participative forms of engagement.

Concerns about the lack of involvement of local authority stakeholders in the review of ILW storage options have been fed into the NDA review of stakeholder engagement.

A year later the NuLeAF Steering Group was briefed as follows:

In its published strategy NDA committed to investigate opportunities for optimisation of ILW storage at a smaller number of sites. It is understood that the proportion of ILW that might be involved amounts to about 5% of the ILW inventory that will arise at NDA sites before 2040. Although subject to further discussion and potential change, it is understood that provisional recommendations are that:

- NDA should continue to encourage waste minimisation opportunities to help reduce the overall number of ILW packages and storage requirements.
- The main focus of investigating storage consolidation opportunities should be southern Magnox and UKAEA sites.
- The current baseline plans for ILW stores at Dounreay, Hunterston A, Sellafield, Trawsfynydd and Hinkley Point should be pursued.
- Local site-to-site opportunities should be investigated for the relatively small quantities of ILW at Chapel Cross and Wylfa.
- Opportunities should be pursued for five Magnox sites (Oldbury, Dungeness A, Bradwell, Sizewell and Berkeley) to consolidate ILW at NDA sites with an existing or committed store (if volume minimisation initiatives free up capacity), OR to transfer ILW to a separate regional store located at one of the NDA sites with an existing or committed store.
- UKAEA should be encouraged to pursue opportunities for three sites (Harwell, Winfrith and Culham) to consolidate 'Magnox compatible' ILW packages at NDA sites with existing or committed stores, or to transfer ILW to a separate regional store located at one of those NDA sites. The fallback position is to have an ILW store at one, two or all three of the UKAEA sites. A separate solution is needed for 'non-Magnox compatible' packages.

As the transfer of ILW between sites will be of particular interest to local communities and their local authorities, CoRWM may consider it appropriate to discuss with NDA how it intends to engage with those stakeholders to ensure that its proposals for transfers are acceptable.

Yours sincerely,

Fred Barker, Executive Director, NuLeAF

3. Greenpeace

To: Prof Robert Pickard,

Chairman, Committee on Radioactive Waste Management

Dear Prof Pickard

I am writing to you and CoRWM on behalf of Greenpeace with a preliminary response to the CoRWM invite to comment on its work plan. We welcome the opportunity to make comments on this matter.

As part of its response to CoRWM, I attach a copy of Greenpeace's submission to the consultation by the Environment Agency on '*Deep Geological Disposal Facilities on Land for Solid Radioactive Wastes - Guidance on Requirements for Authorisation: Draft for Public Consultation 15 May 2008 (GRA)*'.

This paper was also prepared with CoRWM in mind. It is fortuitous that an opportunity arises for Greenpeace to present this to CoRWM as part of the Committee's consideration of stakeholder comments on its programme of work.

In particular the submission raises major questions over the lack of:

- clear definitions on what constitutes disposal, storage and waste; and
- firm policy decisions and plans on legacy nuclear materials (spent fuel, plutonium and uranium) and new build spent fuel and wastes.

The submission explores the potential impact of some of the different 'proposals' currently being considered as part of potential management plans for both legacy waste/nuclear materials and new build wastes. These proposals, drawn from Government, industry and agency papers, are presented in a condensed form on page 7 of the main submission.

As part of the submission Greenpeace has also attached an email from the NDA (sent in response to a Freedom of Information request) on its latest views on disposal and storage.

As the submission and attachments are self explanatory I will not go into any further detail in this letter.

Once again, on behalf of Greenpeace I would like to thank the Committee for inviting comment on its work and look forward to discussing this further at the stakeholder meeting on 30th October. We would be grateful to receive feedback on this submission. Finally, I would also like to request an acknowledgment of receipt of this email

Yours sincerely
Jean McSorley
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8th September 2008

Ms Naomi Davidson
Environment Agency
Block 1
Government Buildings
Burghill Road
Westbury-on-Trym
Bristol, BS10 6BF

BY E-mail TO: GRA@environment-agency.gov.uk

Dear Ms Davidson,

I am writing to you on behalf of Greenpeace UK with reference to Greenpeace's response to the Environment Agency's document '*Deep Geological Disposal Facilities on Land for Solid Radioactive Wastes - Guidance on Requirements for Authorisation*' *Draft for Public Consultation*.

This response makes a number of comments on the above-named document and also offers amendments on key definitions relating to the disposal and storage of radioactive waste - and on the definition of waste itself.

The comments and proposed amendments have come about because of a number of statements made in recent months, by parties central to the oversight and management of radioactive wastes, that reveal that previously 'accepted' policies may no longer apply. Indeed, the statements (covered in the response) indicate a potential for significant deviation in 'accepted' policy on the disposal and storage of wastes/nuclear materials.

In brief, Greenpeace considers that it is premature to settle this guidance: there is too much uncertainty and even contradictions around fundamental concepts such as, for example, the meaning of "disposal".

Greenpeace understands that policy shift can and will happen, but at present there is too much fluidity in the relevant policy field to be covered by one set of guidance. There is a risk that the Guidance, as worded, could be used to cover activities which the EA did not intend it to cover. It is understood the EA's Guidance document is aimed at a very specific activity - some of which will have irreversible consequences. It is therefore essential that the Guidance is strictly worded and closely focused on what truly constitutes disposal, storage and wastes. If additional guidance is needed to cover other eventualities then this should be undertaken by the appropriate regulator.

In its response Greenpeace has sought to explain to the EA the main areas of concern on the possible changes to policy and how the current guidance could be misconstrued if it is not very clearly defined. Given this, it is to be expected that the EA will take these matters on board , make changes to the draft guidance and re-issue for further consultation.

Yours sincerely

Jean McSorley

on behalf of
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07 801 212 959



September 2008

[CoRWM secretariat note – the footnotes to this Greenpeace response to the Environment Agency are at the very end of this document]

Greenpeace welcomes the opportunity to comment on the Environment Agency's document '*Deep Geological Disposal Facilities on Land for Solid Radioactive Wastes - Guidance on Requirements for Authorisation: Draft for Public Consultation 15 May 2008 (GRA)*'.ⁱ

Introduction

Greenpeace notes that this consultation is taking place at the same time as a number of highly complex and related consultations on new nuclear build, radioactive waste and nuclear materials. All of these consultations will lead to decision points, many of which will have an impact on the application of the GRA. There are also aspects of the Guidance which can not be fully commented on in the absence of:

- a set of finalised environmental principles on radioactive substances regulation;
- firm policy decisions and plans on legacy nuclear materials (spent fuel, plutonium and uranium) and new build spent fuel and wastes;
- clear definitions on what constitutes disposal, storage and waste; and
- responses on the most up to date recommendations on radiation protection from other agencies.

Due to the lack of clear and set policy on key issues and definitions it is Greenpeace's view that this consultation is premature. In light of this, Greenpeace believes the EA should make changes to the draft GRA and re-issue it for further consultation when the appropriate policy matters have been settled, definitions have been clearly defined, principles established and advice from other agencies has been received.

Greenpeace does however offer the following comments on the issues it has highlighted above.

Definition of disposal

Greenpeace does not believe that 'disposal' is a foregone conclusion - indeed the very definition of disposal - what it really constitutes - is open to question. This could have major implications for a disposal programme for radioactive waste. Even the GRA's definition of disposal (and that in the Radioactive Substances Act 1993 (RSA)ⁱⁱ differ on this matter and in turn are different from the views of other parties key in the disposal of radioactive waste.

The lack of a clear definition on disposal makes the issue of 'disposal' open to misinterpretation. Documents recently issued by various parties e.g. the Nuclear Industry Association's Justification application on new build, the Strategic Siting

Assessment (SSA) and Strategic Environmental Assessment (SEA) documents from the Department of Business, Enterprise and Regulatory Reform (BERR) and other communications show that some ideas are being floated which will certainly blur the lines between 'disposal' and 'storage' (e.g. underground storage in a 'repository' may be put forward - but will that be seen as a legitimate part of a disposal programme or can that only ever constitute interim storage?).

As will be explained in more depth later in this response, the different views put forward are particularly relevant to spent nuclear fuel (legacy and new build) and plutonium and uranium (legacy) which - along with high level wastes - have not been covered before by a waste disposal programme.

Comment [nathana1]: In the above documents? Who's views are they?

The possible future 'use' of spent fuel in reprocessing - and the use of plutonium and uranium from past and current reprocessing operations - has not been ruled out by the Government/NDA/owners of the materials. Nor has it been finally decided if spent fuel from new build will be reprocessed or not. All of these issues relate not only to the efficacy of the GRA, but also to the application of the EA's Environmental Principles for Radioactive Substances Regulation (REPs).ⁱⁱⁱ There are also problems with the definitions of storage and wastes which need to be resolved before the GRA to be finalised and the REPs appropriately applied. Greenpeace offers a clearer definition of 'disposal' for the GRA, as well as for 'storage' and 'waste'.

Policies, principles, and powers

Policy, no matter how well-intentioned, can be worthless if not based on a sound principles. On policy, present, "ownership" of different aspects of policy and policy implementation by different organisations involved in the deep geological of radioactive wastes/materials, as well as the actual ownership of the wastes and materials, makes it almost impossible to determine a policy. For example, the companies which own spent fuel have the final say over its disposition i.e. whether it is reprocessed or disposed of directly. If they opted for reprocessing this would undermine some of the EA's REPs (which cover both wastes and materials) and any actions based on them.

The started purpose of the REPs is: *To provide a consistent and standardised framework for the technical assessments and judgements that Environment Agency Radioactive Substance Regulators have to make. To provide technical guidance that underpins all of the decisions that we make relating to radioactive substances regulation, including those about permitting and compliance where we regulate directly and those where we are consultees or have influence.*

So, for example, if the prevention of waste was a principle in the GRA (as raised in some of the REPs), the fact that nuclear companies/organisations which own spent fuel might want to opt for below ground storage in a 'repository' followed by reprocessing would be negated by such a principle applied to a disposal programme.

As it is the lack of clear policy decisions on 'legacy' plutonium and uranium and spent fuel (whether legacy or new build) impacts on the application of the principles. That the GRA principles are focused on disposal - and not even cross referenced to the higher-ranking REPs, which the EA is still consulting on, calls into question the validity of this exercise at this time. The next version of the GRA should include the

relevant REPs and show where it is guided by them (Note: Greenpeace will be commenting on the REPs and where they could be improved also).

The EA's application of its powers, relevant to developers of a facility and other agencies is not clearly explained, particularly in light of what appears to be proposed changes to earlier policy 'decisions' e.g. the Government's view on non-reprocessing of new build spent fuel.

Greenpeace recognises the EA is attempting to set guidance in a situation in which there are no clear policies and in an environment in which proposals (albeit some of them tenuous) are being raised which could conflict with and challenge its work on nuclear waste disposal. However, it is hard to reconcile the GRA's contents with the EA's other consultations because of the different content in other documents and the timelines for signing off on each relevant document. No proper explanation has been provided as to the hierarchy of the EA's documents relating to waste disposition nor where the GRA sits within the overall framework of EA's role in radioactive waste management. This adds to the confused nature of the overall view of Government and regulator work on legacy and new build nuclear waste and materials. The EA should move to rectify this situation. It should also clearly explain exactly why the GRA was put out for consultation before the REPs - which are meant to guide all relevant activities on radioactive substances - were finalised.

Radiological Protection

The position on protection of human health and the environment in the GRA is not helpful. The REPs themselves (RPDP1-4) are lacking in key areas of radiation protection information and seem to rely on the Health Protection Agency (HPA). Unfortunately the HPA has not yet issued its response to ICRP 2007, which the GRA recognises is a problem and notes:

1.10.8 The environment agencies are considering with HPA how the relationship between our regulatory guidance documents and HPA's advice might be made clearer in the final versions of these documents, and how they might be better aligned.

That it has recognised this is however not good enough - it shows a lack of forward thinking and joint effort by all relevant agencies. It reveals that they have not set about a logical and timely consultation process for all relevant documents (e.g. the REPs being consulted on at the same time as the GRA but both before the HPA response to ICRP 2007 is published)

Greenpeace does not accept the premise that the EA can - or should - decide how the public in the future might be, or should be, protected from waste disposal by this generation. The EA's approach assumes a willingness by future generations to accept risks from activities which this generation has 'benefited' from. This raises major concerns over intergenerational equity.

1. Definitions: disposal, storage and waste - in detail

As the GRA notes under '1.3 History of this guidance'

1.3.3 This draft guidance is issued by the Environment Agency and EHS. For deep geological disposal facilities, it is intended to supersede the 1997 guidance. It covers not only low and intermediate level wastes, but also any other wastes that might be disposed of to a deep geological facility, including high level waste, spent fuel and any other waste nuclear materials. We shall consider any application for authorisation of disposal of solid radioactive waste to such a facility on its merits, taking into account this guidance and any representations made at the time by consultees, other interested parties and members of the public.

See also (3.4) *Radioactive waste suitable for disposal in deep geological facilities:*

3.4.2 Types of solid radioactive waste that could be disposed of in deep geological facilities include high level waste (HLW) and intermediate level waste (ILW), together with some low level waste (LLW) that is not suitable for near-surface facilities because of the quantities of specific radionuclides it contains or because of its physical/chemical properties. There are also some radioactive materials that are not currently classified as waste but that could be disposed of in deep geological facilities if it were decided that they had no further use. These include spent nuclear fuel and nuclear materials such as plutonium.

As noted earlier, because of the addition of spent fuel and nuclear materials to the remit of the EA's work (if designated as wastes) the situation has become much more complicated. We note that there is a definition of disposal in the RSA 93 which states:

“disposal”, in relation to waste, includes its removal, deposit, destruction, discharge (whether into water or into the air or into a sewer or drain or otherwise) or burial (whether underground or otherwise) and “dispose of” shall be construed accordingly (our emphasis),

(Greenpeace has highlighted the word 'deposit' in the RSA definition of waste for, as will be seen later, it is particularly relevant to emerging views on what might happen relevant to the disposal (or storage?) of spent fuel and nuclear materials underground).

In The GRA disposal is however 'defined' as follows:

Disposal

Disposal is the Emplacement of waste in a specialised land disposal facility without intent to retrieve it at a later time; retrieval may be possible but, if intended, the appropriate term is storage. We shall regard the time of emplacement as the time of disposal, even if the facility is eventually closed many years later.(our emphasis)

Greenpeace understands why there is a difference between the RSA and GRA definition of disposal - and that it has been altered to reflect changed views on 'absolute disposal' as opposed to accommodating the possibility of retrieval of waste for monitoring or repackaging (following on from the debate on retrievability at the NIREX RCF Inquiry in 1996). We note the REPs do not contain a definition of disposal, nor do the Nuclear Installations Inspectorate's (NII) Safety Assessment

Principles (SAPs) for Nuclear Facilities (2006).^{iv}

The difference in definitions of disposal is further complicated by the absence of definition in primary legislation covering other the other key organisations involved in radioactive waste disposal (i.e. the Nuclear Decommissioning Authority) and legislation which covers the funding for waste disposal. For example, the Energy Bill (2008) does not contain a definition of disposal.^v Section 65 (on interpretations) of the Energy Bill refers however to Section 37 of Energy Act (2004) on "cleaning up" and "decommissioning". It states:

- (5) *The technical matters, in relation to a site, are—*
(a) *the treatment, storage, transportation and disposal of hazardous material (within the meaning of section 37 of the Energy Act 2004 (c. 20)) during the operation of a nuclear installation on the site,*

Unfortunately there is no definition of disposal in relevant section of the Energy Act 2004. The interpretation (section 37, (1) a) notes:

"cleaning-up" and "decommissioning", in relation to a site or installation, includes:

- (a) *the treatment, storage, transportation and disposal of hazardous material and of other matter and substances that need to be dealt with or removed in or towards making the site or installation suitable to be used for other purposes;*

The EA may not be a position to challenge the absence of a definition of disposal in the Energy Bill (2008) or the Energy Act (2008). However, it can act to ensure clarity in its own documents and that its definitions are those used to cover 'disposal'.

The lack of precise definition in EA documents and relevant legislation on waste disposal - and the possibility of re-interpretation of the EA's definition(s) in the GRA and/or RSA 93 could lead to significant problems. In relation to this it is worth noting disposal has a physical meaning and a financial and ownership meaning too. The different aspects of what constitutes 'disposal' are inextricably linked and, in turn, are of issue for both the application of the GRA and REPs.

The issue of costs may become even more central to the debate on the NDA's role in the disposal - or not - of spent fuel and nuclear materials. For example, when the Government/NDA takes 'title and liability' to spent fuel^{vi} then the utilities will presumably also 'dispose' of their legal and financial obligations (by transfer of ownership of the spent fuel and the necessary funding for disposal) but the waste itself will not necessarily have been physically disposed of. That the NDA has raised issues around disposal - or deposit/storage (in a repository - which could represent a half-way house between storage for spent fuel - pending possible reprocessing) is important as this form of 'disposal' could be covered by the EA's definition in the RSA 93. On this point we refer you to the (attached) email from the NDA, which notes:

It may be useful to clarify that by Disposal we mean disposed of without intent to retrieve. Although disposal facilities are likely to be designed so as to not preclude retrieval, retrieval would be something done exceptionally and not included as part of the design requirement for routine operations. Disposal is quite different, therefore, from interim storage, where recovery is designed in as a routine operation, even if

the periods of time under consideration are very long.

However, the NDA then goes on to note:

The means of storage of spent fuel would depend on the period of storage and the purpose of storage. I refer to the importance of distinguishing long term storage from disposal. It is possible that a long term store may be a “repository” with recovery designed in.

Thus, in practical terms some of the NDA's 'ideas' could, if acted on, undermine the concept of a 'true' disposal programme because it could entail the 'deposit' of spent fuel in a repository - with the intent to retrieve for reprocessing. This may not be specifically ruled out by the RSA definition - except and unless the definition of waste is extremely clear, along with that of storage and also the intent of the organisation undertaking this work is set in stone. We note again the, the GRA definition of disposal which states:

We shall regard the time of emplacement as the time of disposal, even if the facility is eventually closed many years later.

Which definition applies - and whether it is appropriately worded - may be vital in this debate.

In respect of the above we note the GRA's definition of disposal:

Storage (of waste)

*Placing waste in a suitable facility with the intent to retrieve it at a later date.
(our emphasis)*

On Storage facilities the GRA notes

3.5.4 This guidance applies only to facilities for the disposal of waste and not to facilities for the storage of waste. 'Disposal' means placing waste in a facility without intent to retrieve it later. Retrieval from a waste disposal facility may be possible but, if retrieval is intended, the facility is a waste 'storage' facility. This distinction is important for the following reasons:

- The relevant environment agency is the regulator for disposals of radioactive waste. If a facility is on a nuclear licensed site, and is to be used for storing waste, then the HSE's Nuclear Installations Inspectorate (HSE/NII) is the regulator. HSE/NII consults the relevant environment agency on its regulatory requirements for storage on nuclear sites.*
- For a storage facility where the waste either (i) will still be a significant radiological hazard at the end of the design life of the facility, or (ii) has non-radiological hazardous properties which will still be significant at the end of the design life of the facility, it has to be feasible to recover the waste at the end of facility life, to be able to continue to control the radiological or non-radiological hazardous properties of the waste.*

The GRA's explanation of what constitutes storage only serves however only to

confuse when it states:

Retrieval from a waste disposal facility may be possible but, if retrieval is intended, the facility is a waste 'storage' facility

Surely, if there *any* intention to retrieve waste then it cannot have been placed in a waste *disposal* facility - because a waste disposal facility is just that: a facility with no intention for the retrieving of wastes. Also, if the radioactive materials placed in a deep geological repository is truly 'waste' which there is no legal power or intention to reuse then this too should also be clearly stated *and* defined.

In this respect the EA's earlier mention (GRA 3.4.2) that the GRA will cover nuclear materials and spent fuel (not previously covered by guidance) also adds to the potential for misunderstanding. In any instance where the retrievability of spent fuel, nuclear materials or indeed waste is intended then it is the NII and not the EA which is the regulator. The EA taking the lead on what could be viewed as a *storage* facility simply compounds problems of public understanding and acceptability of any real *disposal* plans. The NII's role in the storage of waste and/or nuclear materials, as set out in the Safety Assessment Principles, should have been noted at this point in the GRA.

On Retrievability the GRA notes

3.6.2 This guidance considers placing waste in a disposal facility as 'disposal', even though later actions may be needed to establish the environmental safety case – for example, the actions needed to close the facility. After it has been disposed of, the waste can still be retrieved, but this tends to become more difficult as time goes by, as further actions are taken and as closure approaches. Even after the facility has been closed, it is still possible in principle to retrieve the waste. However, this guidance does not require the waste to be capable of retrieval after the act of disposal (i.e. emplacement of the waste). If provisions for retrievability are included, they should not damage the environmental safety case, for example due to potential degradation of waste packages during any extended period for which a facility is kept open. (our emphasis).

Perhaps instead of saying *'this guidance does not require the waste to be capable of retrieval after the act of disposal (i.e. emplacement of the waste)'* it should say *'this guidance requires the waste not to be capable of retrieval after the act of disposal (i.e. emplacement of the waste).'*

Of course, totally excluding the possibility of retrieving waste is something that, for many reasons, society is not willing at present to accept (this is because there are many questions around the technical ability of those responsible to safely dispose of waste as well as uncertainty over the environmental and health impacts). That notwithstanding, the above definitions will only be clear if they are for wastes and materials legally designated as wastes. If they are left 'as is' it will be much less clear in terms of regulatory cover for some of the newly raised possibilities for nuclear materials and spent nuclear fuel (e.g. placing spent fuel in a 'repository' with the potential for recovery built in).

In relation to the above Greenpeace also refers the EA to the following set of 'possibilities' which cover options on spent fuel from new build (this is based on currently available documents). The various options raised, and the potential combination of options (see following), makes the process of disposal look far less clear and far less straightforward than many would believe the case to be.

- Spent fuel is to be kept on site at reactors^{vii}
- However pending a (minimum?) period of on-site storage it could be stored on-site or in a regional or central store^{viii}
- It may be stored for only five years^{ix} but possibly 50 years, or 100 years (on or off-site).^x Or, depending on outcome of MRWS process it may be stored longer.
- Stores may or may not need to be replaced^{xi}
- Stores may be above ground or underground^{xii}
- The expectation is that it will be disposed 'in tact' in a deep geological facility(ies)^{xiii}
- Title and liability stays with owner until it leaves the site or, if no geological facility eventuates, the Government/NDA would take title and liability^{xiv}
- Spent fuel may go to repository for storage or disposal or reprocessing plant and then disposal^{xv}

On the last point we refer the EA again to the attached email from the NDA, where it notes:

The means of storage of spent fuel would depend on the period of storage and the purpose of storage. I refer to the importance of distinguishing long term storage from disposal. It is possible that a long term store may be a "repository" with recovery designed in.

Coming from the organisation charged with developing the geological facility this is a somewhat confusing, even disconcerting, statement. In fairness, in its email the NDA does re-iterate the current view on non-reprocessing for new build spent fuel and has said there are no proposals to reprocess. However, it has also stated there are options involving reprocessing which could be discussed too. Greenpeace has met with the NDA to discuss in more depth what might happen with spent fuel and nuclear materials (in particular plutonium disposition). Whilst it is welcome that the NDA was prepared to outline the various possible options - which confirmed the views in the email - it could do nothing to clarify the situation. In short the discussions revealed that all options are still on the table - it appears that 'stated' positions are open to change.

Within the context of the discussion on the GRA - its principles and definitions - Greenpeace believes it is wholly appropriate to raise these 'other options' now so that guidance is clearly worded against different interpretations. With regard to this, there is no definition of waste in the GRA - and no reference to other places where a definition might be found. The REPs refer to the RSA 93 and for the NII's SAPs for definitions on radioactive materials and wastes).

The RSA 93 gives meanings for radioactive materials (Preliminary, section 1) and radioactive wastes (Preliminary, Section 2).

In addition to changed definitions on disposal and storage which are needed for the GRA, Greenpeace also believes there needs to be a definition of waste which is specifically applicable within the context of a disposal plan. In particular, the definition should tie any parties concerned with waste disposal to a legally binding definition - and intention - of keeping 'wastes' as wastes without the option of reverting to identifying them as 'nuclear materials'. Combined in the GRA, these definitions should offer more clarity and certainty for waste disposal.

A firmer definition on waste links also to requirement R14: *Waste acceptance criteria* and would help in addressing concerns, in particular on security, over the potential ability to retrieve *and* reuse some nuclear materials. Current security concerns would demand that this is done. The designation of nuclear materials as wastes would determine its packaging and final form. Material so designated as waste would also have a legal caveat on it (i.e. this is waste) and be packaged so as to make retrievability virtually impossible for reuse.

Greenpeace is aware that in terms of who has the final say over spent fuel and reprocessing, the regulators and Government may not actually have the final say (although the Government could move to block reprocessing). However, the Radioactive Waste Policy Group (RWPG) Rolling summary of the current components of the radioactive waste management policy in the UK Version: September 2007 (Defra) notes:

UK's position on spent fuel management and reprocessing

The Government's policy on reprocessing, remains as set out in the White Paper "Review of Radioactive Waste Management Policy" published in July 1995 (Cm 2919). Namely, that the question of whether to reprocess or hold the spent fuel in long term storage is a matter for the commercial judgement of the owner of the spent fuel subject to meeting the necessary regulatory requirements.

There are two issues that follow from this. Making it very clear what is disposal and storage and what constitutes waste should make discussions between the owners of nuclear materials have a more honest dialogue with all parties concerned, and leave less room for maneuvering between storage and disposal and all the confusion that could bring about. It would also mean that any organisation intending to consign spent fuel to a 'repository' for storage would not be able to point to that as disposal.

As noted earlier, by the time the 'store and reprocess' options becomes a live issue the title and liability to spent fuel could have passed to the Government/NDA. This is important for the EA for, the GRA is specifically designed to talk to the developer - in this case the NDA. In 1.6.1 the EA notes:

1.6.1 Our main audience, the developers of deep geological disposal facilities, is a specialist one. We need to make our requirements as clear and unambiguous as possible for them. This guidance therefore contains a large number of specialist terms that have a precise meaning. We recognise that this may make the document less accessible to a wider audience, but we have tried to avoid this as much as possible. In particular, we have provided an introductory section to each chapter, so that everyone can understand what the chapter is about. We have also included an

extensive glossary of significant specialist terms. (our emphasis)

Obviously Greenpeace is of the view that some of the wording in the GRA is not precise enough. It is within this context that the NDA's current thinking - and its understanding of the definition of disposal - has to be considered. This is why there is such a pressing need for the GRA be clear on the definition of disposal. Of course, it is acknowledged that any final decision on disposal of spent fuel and nuclear materials might be a long way off. However, if the guidance is to apply from late 2008 or early 2009 and is meant to guide the developer it is crucial this settled as soon as possible.

If all higher activity wastes/nuclear materials come under this guidance then the declaration of all relevant radioactive substances as legally 'designated' waste for disposal has to also be part of the the starting point. Otherwise the guidance becomes (at the worst) irrelevant as different organisations take different actions which undermine it and the REPS - or at the very least the guidance will be used to 'cover' different actions due to its lack of definition of what is being dealt with and how.

The developers - the NDA and any subsidiary Site Licence Company which will construct and operate the facility (which may itself be contracted out to other operators as per other NDA facilities) need to be clear on what is storage, what isn't, who oversees storage versus disposal, what can or can't be 'stored' or disposed of and what might be allowed for retrieval under a disposal programme as opposed to retrieval and reuse under a storage plan.

Greenpeace proposes that the EA considers a different definition of disposal for the GRA

Disposal

Disposal is the Emplacement of (insert: radioactive substances designated as) waste in a specialised land disposal facility without intent to retrieve it at a later time unless exceptional circumstances require retrieval for the monitoring and repackaging of wastes in order to ensure safer disposal. (delete); retrieval may be possible but, if intended, the appropriate term is storage. We shall regard the time of emplacement as the time of disposal, even if the facility is eventually closed many years later.

On waste Greenpeace proposes:

For the purposes of this guidance, waste is any radioactive substance deemed appropriate for disposal in a deep geological facility, which has been designated as wastes and for which retrieval for reuse is not permitted.

If the two definitions offered above are in put in the GRA definition on storage could stay the same. Retrievability may require its own definition (or rather the conditions which would attach to it).

The above questions around definitions also relate to the EA's preferred authorisation process. If not acted on, the lack of clarity could cause difficulties

during the authorisation process. The GRA notes:

5.5.5 Staged authorisation incorporating these provisions would allow a development programme to proceed with a greater degree of regulatory certainty than under a voluntary agreement. This would provide a developer with a better basis for investment decisions and could help in controlling timescales for developing the facility.

The progress of a staged authorisation process without a clear policy on storage and disposal, would become even more complicated than originally envisaged. The variations possible between 'disposal' and 'storage' (seemingly allowed for at present) do not provide the necessary degree of regulatory certainty the public looks to on these matters.

If the Guidance were however targeted at materials and wastes legally 'designated' as wastes (based on the *right* REPs) - then it would separate more effectively the issues of disposal and storage..

EA officials (and others from different organisations) have all admitted off the record that the current 'fluid' state of play makes it virtually impossible to make any hard and fast decisions. However, if a decision is made on what defines wastes and how to designate nuclear materials as wastes this would help narrow down the scope of the problems (issues around the viability of disposal itself notwithstanding). But if these other materials/spent fuel are to be kept as materials and spent fuel then they should be dealt with separately.

Thus in answer to question 3

Are the principles set out in the guidance clear, sensible and complete with respect to the disposal of solid radioactive waste to land? If not, what changes and/or additions would you suggest?

The answer is no. See Greenpeace's comments on definitions as an example of where the GRA is not complete or clear enough. Also, in reply to question 4

Are the requirements set out in the guidance clear and sensible and do they sufficiently cover all the areas that need to be addressed in the disposal of solid radioactive waste to land? If not, what changes and/or additions would you suggest?

Again, the answer is no - otherwise Greenpeace would not be submitting this response.. However, in reply to question 7: *Would additional supplementary guidance be useful? If so, in what areas and when should it be issued?* The answer may be yes, but it might also be answered by greater clarity within the GRA itself.

In addition the EA should make clear what its role is, if any, in below or above ground storage. For example, the document: *Towards a Nuclear National Policy Statement - Applying the Proposed Strategic Siting Assessment Criteria: a study of the environmental and sustainability effects (BERR, 2008)* notes:

F.30. The site specific environmental and amenity issues associated with interim

stores cannot be assessed in the absence of a specific site. This also includes assessment of flooding, coastal erosion or sea-level rise which may be an issue with stores located in coastal locations. Further detail and assessment will be undertaken once sites have been nominated in the Environmental Report. Furthermore, there are numerous designs of interim store which could be taken forward including both above and below ground designs. The alternative designs would have different effects upon the environment and different safety and security characteristics. (our emphasis)

Because of the confusion which could arise on 'below-ground stores' being seen as a repository/geological facility - at least in the public mind - supplementary guidance on this, from the NII and EA, may be necessary.

Principles, policies and powers - in detail

The GRA notes:

5.8.2 Generally, we expect the developer to take the lead in dialogue although we recognise that we also need to be involved at an early stage. Both the developer and the regulator should aim to work together to make sure that dialogue with potential host communities is open, inclusive and constructive. Technical, social or economic issues that might affect development of a disposal facility should be discussed openly with explanations of what the operator or regulator is doing to deal with these issues. Potential host communities and others should also be able to challenge the views of the developer and/or regulator on technical and other issues

See also para 3.7.4 where the GRA states:

3.7.4 We describe how we expect a developer of a deep geological disposal facility to communicate with us, with people living near a potential site and with others early on when selecting a site. We describe the type of agreement we would expect a developer to have with us so we can give advice on environmental matters at an early stage when a site is being selected.

As noted earlier, the developer (the NDA) could be part of the problem e.g. because of its lack of clear intent on nuclear materials, on reprocessing and its potential part in new build. All of the options expressed in the different documents (see page 7), including a potential central store for new build spent fuel, could give rise to more waste. If there were a central store - particularly at the site of repository (as raised by the NDA in informal discussion with Greenpeace and implied in the NDA's email) - then this could impact on the public acceptance of a repository for legacy waste.

In such a situation it should not be the role of the regulator working with the developer on dialogue with the public. In fact this could be viewed as a promotional role with the developer rather than if the EA stands back as the regulator. That should not, however, stop the regulator(s) from being part of a discussion with relevant communities or the broader stakeholder community on this matter.

On the EA's 'Environmental Principles for Radioactive Substances Regulation

(Environment Agency Initiative for England and Wales)'. These should have been finalised before this document was published. It should have been clear where the REPs influence the 'principles' in the GRA document. ^{xvi} Yet we note the GRA states:

1.8.1 The Environment Agency is developing Environmental Principles for Radioactive Substances Regulation (REPs). The principles contained in the REPs will provide the underlying basis for the technical assessments and judgements that Environment Agency staff must make when regulating radioactive substances. The Environment Agency intends to carry out a public consultation on the REPs in the near future. We may choose to supplement the REPs with guidance for situations in which we regulate and also in which we are consulted or have influence. This regulatory guidance for deep geological facilities for the disposal of solid radioactive waste is technical guidance relating to a specific type of facility, to support the consistent application by the Environment Agency's regulators of the principles contained in the REPs.

The EA's explanation (sent in an email to Greenpeace 13th August 2008 on the timing of the different consultations was not convincing and indeed lacked a real explanation as to why the timetable is as it is. It has led to a disjointed process which may fuel suspicions that some actions are being taken 'out of step' as part of the new build push. The EA could rectify this by demonstrating to people to how the REPs will be applied to the authorisation process and through amending the GRA accordingly.

On the matter of storage v. disposal of spent fuel and reprocessing v. direct disposal and waste creation versus minimisation and avoidance - and how the REPs are applied in these situations (or not) - will be crucial in public acceptance, or otherwise, on legacy waste and new build waste management.

Disposal is something the EA must not only have a legal right to influence but a moral right in terms of protecting the environment from increased (and continued) radioactive discharges and massively increased volumes of waste.

Unfortunately, a number of current proposals, if followed through on, could undermine a series of the REPs and, on the Radioactive Substance Regulation Fundamental Principles could directly breach RSRs 16, 18, 19 and 21.

With reference to issues around accumulation of wastes we note in para 8.9.3.

'HSE must consult the relevant environment agency about creating, accumulating or disposing of radioactive waste. We have Memoranda of Understanding with HSE to make sure regulatory activities on nuclear sites are effectively co-ordinated.(our emphasis)

It is to be hoped the EA's and NII's work on the accumulation of waste (and which regulator has charge of what area) is done using clearer definitions than those currently provided. In this respect, the EA has to remember that although it has designed the GRA with the developer as its main audience, this is also a public document and therefore one which has a responsibility to be as clear as possible - at

present it fails that crucial test.

On the policies and processes of developers, the GRA notes:

2.1.3 The developers of deep geological facilities for solid radioactive waste disposal have to demonstrate to us that the facilities will properly protect people and the environment. To do this, they will need to show that the approach to developing and operating their facilities, and also the location, design, construction, operation and closure of the facilities, will meet a series of principles and requirements. This guidance sets out these principles and requirements, and indicates how we are likely to interpret them. It also provides information about the associated framework of legislation, government policy and international obligations.

To reiterate, the policy situation is incoherent, lacking in clarity, poorly structured and some might say, deliberately confusing. Basically the door is being left open on all and any options. It is this kind of situation which creates confusion and mistrust. Importantly for the EA, it undermines its perceived role and responsibility to protect the environment and raises serious questions over its ability to influence the Government or industry in its waste plans. The failure to identify the appropriate parts of the REPs which apply to the GRA is an example of a lack of cohesive approach by the EA.

We also note that there may be a conflict of interest between the NDA and any repository Site Licence Company (SLC) which will develop and operate a repository inasmuch that the NDA is directed by Government policy (but which the NDA heavily influences). For example, a SLC should seek to dispose of waste at a cost which minimises or avoids the burden on the taxpayer (this is particularly true for new build waste) and avoids the creation of waste. If the NDA takes title and liability to new build spent fuel - it may be attracted to non-disposal options (including storage in a repository pending reprocessing), whereas the SLC may want direct disposal. That the NDA will remain the 'controlling mind' financially, could give rise to undue pressure on a SLC. How the EA will cope with such a situation is not clear.

On the following

2.1.4 We are able to attach any limits and conditions relating to the accumulation and disposal of radioactive waste we think fit to the authorisations we issue under the Radioactive Substances Act. These limits and conditions are binding on operators and are the main means we shall use to regulate the development and operation of any deep geological disposal facility that receives radioactive waste. In setting appropriate limits and conditions, we shall take into account the responses the developer/operator of such a disposal facility makes to the principles and requirements set out in this guidance.

This paragraph seems to give the impression that the accumulation of spent fuel in stores (of any type - and if declared as waste) may come under the EA's remit. If this is not the case then the EA should say so more clearly. Given the possibility of a series of spent fuel stores at reactor sites, or even regional or centralised stores - perhaps containing a life-time's worth of spent fuel (or a number of reactors spent fuel) then the EA has to make clear what its policy is on this and what powers it has

to intervene.

On this, Greenpeace also asks if the EA has powers to limit the amount of spent fuel going into a repository? How would its powers be used? Could it order a second or third repository? Has it been consulted on this as part of the fixed unit price discussion on waste disposal for new build? Will it publish any advice it has provided to Government or the NDA on the issue of Fixed Unit Price apart from the submission it made on this matter?

Greenpeace does acknowledge the EA's recognition of the complex nature of the 'disposal' policy situation:

3.2.6 This is simplified guidance based on complex and changing policy and legislation. It does not constitute legal advice or provide a complete statement of all the legislation that may be relevant. It provides a broad overview as at May 2008 and shall not constrain the environment agencies' regulatory independence at any future time. We cannot be held liable for errors and omissions. Compliance with the law remains the responsibility of the reader. If you have concerns relating to legal or regulatory compliance, you should seek independent legal advice or contact your regulator.

However, for the EA to say that to whoever the guidance applies they must still comply with the law, when the law (and guidance and regulations can be changed because of policy changes - in fact changes in policy have forced the hand of regulators on matters of nuclear waste management) looks suspiciously like a get-out clause for the Agency. In addition, if the EA is part of the problem through having unclear definitions then it has to accept this and rectify the situation.

On Figure 3.1 - and the principles listed - surely a principle on waste avoidance and minimisation would be appropriate. Why is the relevant Fundamental Principle (D) not used here or somewhere in the text? As the EA may be asked to comment on proposals for facilities to reprocess spent fuel or reuse plutonium in MOX fuel (which would eventually become spent fuel) it would be useful to know at what point the EA says if a proposal is within its REPs?

On (4.2) *Fundamental protection objective* the GRA states

4.2.1 The fundamental protection objective is to ensure that all disposals of solid radioactive waste to facilities on land are made in a way that safeguards the interests of people and the environment, now and in the future, commands public confidence and is cost-effective.

Without clarity on what truly constitutes disposal then there can be no public confidence in the development of a disposal facility. Further, it is not the EA's job to be concerned about the costs of a repository unless the developer attempts to reduce costs: the results of which could impact on the environment and human health.

We also note that under Principle 6: Role of the relevant environment agency the GRA quotes the IAEA that a regulator body must:

be effectively independent of the licensee and of any other body, so that it is free from any undue pressure from interested parties;

The EA, which has to take into account Government policy, is not as free from any 'undue pressure from interested parties' as it makes out. Indeed there is a risk in attempting a catch-all guidance on legacy and new build wastes - which does not fully reflect CoRWM 1 recommendations. The EA seems to be following all policy let alone and failing to questioning it. On such an important issue the public looks to the regulators to challenge the Government and industry.

On the EA's note on 'Capable and forward-looking organisation' (the developer of a repository) it states:

6.2.6 The organisation should be capable and forward-looking so as to secure and maintain the environmental safety of the disposal system for the whole of the lifecycle of the disposal facility. Roles, responsibilities, accountabilities and performance standards for environmental safety at all levels should be clear and not conflict with other business roles, responsibilities, accountabilities and objectives. Training will be needed to acquire and support the necessary understanding and skills. The organisation will also need an 'intelligent customer' capability in its use of external suppliers. (emphasis added)

There are already significant conflict of interests and objectives under the remit of the NDA. These could well be added to by the Authority seeking to maximise value of assets e.g. by leasing land for new build and taking payment based on reactor performance or by being a party to allowing an extension or expansion of reprocessing because of socio-economic demands. These in turn could also conflict with the REPs. That the developer of the repository (albeit a ostensibly separate SLC) will be financially controlled by the NDA, gives rise to significant potential for conflict of interest at a number of levels. How will the EA deal with this?

6.2.7 The policies of the organisation and decisions at all levels that affect environmental safety should be rational, objective, transparent and prudent. All relevant considerations need to be taken into account whenever a policy is established or a decision is made. New policies and decisions need to relate properly to, and build on, policies already established and decisions already made. Active challenge should be part of policy and decision making throughout the organisation. Policy and decision making implies choice: whenever a policy is established or a decision is taken, all the reasons and evidence for the choice made need to be published, consulted on, responded to and be recorded. (words underlined are Greenpeace's additions)

What if the 'policies' of others e.g. a utility deciding to reprocess, changed the practical steps being taken by a developer and public acceptance by having to deal with a much larger volume of waste? What if the developer - the NDA - decided on a course of action (e.g. reprocessing spent fuel from new build) which impacted on the repository design, public acceptability etc? How can the EA effectively respond in these situations in the absence of firm and binding policies?

Protection - radiological hazards

On this Greenpeace, observes areas where principles are not being followed or there seems to be contradiction between the EA and other agencies on radiological protection. In general we support the views of Wilkinson Environmental Consultation in its response to the GRA (submitted 1st August 2008) and so will not repeat the same comments and criticisms here. The GRA notes:

1.9.1 In 2007 the International Commission on Radiological Protection (ICRP) issued its latest recommendations in ICRP Publication 103 (ICRP 2007), superseding its recommendations in ICRP Publication 60 (ICRP 1991). In this consultation document we still refer to the dose/risk relationship set out in ICRP 60. This is because the UK's Health Protection Agency (HPA) has not yet issued its advice on the recommendations contained in ICRP 103.

1.10.8 The environment agencies are considering with HPA how the relationship between our regulatory guidance documents and HPA's advice might be made clearer in the final versions of these documents, and how they might be better aligned.

It is unfortunate that the HPA has not yet published its response to the ICRP 2007 recommendations. The lack of a response from the HPA to ICRP 2007 again raises questions over the timing of the various consultations on radioactive waste disposal. The HPA's response to ICRP should have informed the GRA and in doing should have been part of informing the public. As it is there is a gap in the GRA which the HPA and EA should have moved to ensure was filled before consultation. That notwithstanding there are matters GP would like to comment on. On 4.4 Principle 2: Optimisation (as low as reasonably achievable) the GRA notes:

4.4.1 Both at the time of disposal and in the future, the radiological risks to people and the environment from a disposal of solid radioactive waste shall be as low as reasonably achievable under the circumstances prevailing at the time of disposal, taking into account economic and societal factors and the need to manage any non-radiological hazards.

ALARA is a questionable 'concept' much open to interpretation. The EA should strive for 'as low as technically achievable' which should equate to 'best available techniques' (see REPs - RSM DP3, 4, 6 and 7). However, once again the decision on BAT is not yet fully finalised and so it is unclear how exactly this will be applied within the context of the GRA.

Most importantly, the very issue of exposing future generations to risks - as a result of the actions of earlier generations which enjoyed the 'benefits' is something the EA cannot be the arbiter on. Society may feel it has to act to dispose of legacy wastes - for security or environmental reasons - but that such actions may put people in the future at risk raises many ethical issues. That risk and harm may arise in the future from wholly unavoidable new build waste disposal is unacceptable.

Sadly, the GRA does not appropriately recognise the moral and ethical problems its

catch-all guidance covers. In particular that it attempts to cover new build waste (without there having been the separate discussion CoRWM1 called for on ^{xvii}) is a glaring omission. It is on these issues the trust put in the EA is most at risk of disappearing. To leave any risk from disposal to future generations is unethical and the EA should support a broad debate on the issues surrounding the creation, let alone disposal, of new build waste. It should do this as a regulator acting in good faith to protect human health and the environment. As it is the GRA is just another facilitation mechanism which risks showing the EA as a follower of Government policy not an independent body.

On 4.5 Principle 3: Protection (radiological hazards) the GRA notes:

4.5.1 Both at the time of disposal and in the future, the standard of protection to people and the environment against radiological hazards from a disposal of solid radioactive waste shall be no less stringent than the nationally acceptable standard at the time of disposal.

This seems at odds with the HPA's document^{xviii} which, under 6.1 Radiological Protection Principles notes:

from a radiological viewpoint the most important principle for radioactive waste disposal is that of protecting future generations to the standard that we accept today.

Which standard is to be applied - the one which might exist or the one used now? Surely international best practice should apply (but even if this applies 'only' to risks from legacy wastes then that in itself is questionable - for new build wastes it would be not acceptable).

On Requirement R6: Dose constraints during the period of authorisation, the GRA notes:

6.3.1 During the period of authorisation of a disposal facility for solid radioactive waste, the effective dose from the facility to a representative member of the critical group should not exceed a source-related dose constraint of 0.3 mSv / year. Also, the effective dose from the site as a whole to a representative member of the critical group should not exceed a site-related dose constraint of 0.5 mSv / year.

Yet in the REPs (Radioactive Substance Management (including Waste Disposal, p 15)

there is the *Principle RSMDP6 – Application of BAT*:

49. In all matters relating to radioactive substances, the “best available techniques” means the most effective and advanced stage in the development of activities and their methods of operation.

A consideration under this is that:

There is no threshold to dose, or any other detriment including environmental risk or contamination, below which no further consideration of what are the best available techniques is required.

The idea of a constraint seems to negate the issue of any developer or operator striving to go below the constraint in the GRA - which appears to accept a threshold for dose which the REPs do not. We note the issue of dose constraint is repeated again in the GRA under para 9.4 Basic Safety Standards Directive 1996 (9.4.4. and 9.4.5).

As with so many other areas of the GRA, lack of linkage to the REPs and other omissions seem to have led to an approach which contradicts the views expressed in other EA publications.

If the EA starts the process of issuing guidance on radiological protection from a deep geological facility which is less than its most stringent criteria then it will fail to gain public confidence. That it might do so for new build waste without their being a proper debate on its creation is not acceptable.

From: Hollands, Judith [mailto:judith.hollands@nda.gov.uk] **On Behalf Of** foi
Sent: 08 July 2008 09:26
To: Jean McSorley
Cc: Simper, Adrian
Subject: 8202043 - NDA response
Importance: High

Dear Jean,

I am writing in response to your Freedom of Information request to Richard Waite on 23 June in relation to Spent Fuel Storage and Richard's presentation at the 17th June Cumbria County Council seminar on the recent Managing Radioactive Waste Safely white paper.

It is perhaps useful to recap that the NDA last year completed a Study of the options for spent fuel management, and the process and outcomes were shared with an NSG sub-group, of which I believe you were a member. The three bounding scenarios considered were the "immobilisation and disposal" of spent fuels, the "maximum recycle" of the spent fuel, and also a "store" option for up to three hundred years (in line with CoRWM recommendations), which would enable future generations to switch to dispose or recycle at a future date as appropriate. The NDA is in the process of advancing the output from that Study to a position where NDA policy options, preferences or recommendations can be made to Government in the short term.

In saying that "we need to think very carefully about whether we want to dispose of spent fuel" Richard was illustrating the store option described above. He was also reflecting on the fact that around the world many countries, France for example, take the view that spent fuel has, in certain circumstances, value as an energy resource either through recycle as MoX in thermal reactors or for use in fast neutron reactors. Disposal forecloses the use of spent fuel in this way. Similarly there are arguments that by recycling the transuranic elements of spent fuel, the radio toxicity burden that the disposal facility has to safely manage is reduced. These factors need to be carefully considered.

It may be useful to clarify that by Disposal we mean disposed of without intent to retrieve. Although disposal facilities are likely to be designed so as to not preclude retrieval, retrieval would be something done exceptionally and not included as part of the design requirement for routine operations. Disposal is quite different, therefore, from interim storage, where recovery is designed in as a routine operation, even if the periods of time under consideration are very long. This is an important distinction to bear in mind when interpreting Richard's statement that we need to think carefully about whether we want to *dispose* of spent fuel.

Richard was not indicating that a decision has been made on this, nor was he particularly indicating a direction of travel but was openly sharing the thinking that NDA is duty bound to engage in. Of course, such a decision on the management of spent fuel will be subject to significant stakeholder engagement and debate and a final decision would be for government. As Richard indicated, NDA is not the only player since the spent fuel from a new nuclear programme will also have to be considered and this is not a matter for NDA.

In respect of your specific questions:

- 1) I am not aware of any approach by potential reactor vendors or operators with a view to the storage of spent nuclear fuel followed by reprocessing from new build rather than the direct disposal option in the white paper. NDA is certainly not pursuing business opportunities in this area.
- 2) I assume that by "proposal" you mean Richard's indication that long term storage might be an option. As indicated above, this is no more than sharing that the management of spent fuel needs proper consideration. It is not the floating of any specific proposal.
- 3) The means of storage of spent fuel would depend on the period of storage and the purpose of storage. I refer to the importance of distinguishing long term storage from disposal. It is possible that a long term store may be a "repository" with recovery designed in.
- 4) If, and I reiterate there is no proposal, there is to be long term storage rather than disposal of spent nuclear fuel then an appropriate location would have to be chosen. It would be disingenuous to claim Sellafield would not be a candidate, but there is not a foregone conclusion (and indeed can't be since there is no proposal)

5 NDA will not be actively progressing the matter of 200 year storage of spent fuel from new build. This is entirely a matter for Government. The current position in the new build white paper is clear – that the fuel would be stored on site pending disposal. Any changes to this policy position would be managed by Government. NDA will remain focussed on its mission of decommissioning and clean-up of legacy wastes and facilities and implementation of the Geological Disposal Facility. We do of course share thinking with government policy makers.


6 As we discussed when we last met NDA needs to consider all options for the fuel from the AGR fleet. We already know that the entire AGR fuel stocks cannot credibly be reprocessed through the existing Sellafield reprocessing capability (THORP) and so something else will have to be done with the fuel. The current plan is that this will involve some form of longer term storage pending disposal in the GDF. Such storage would not preclude a future change in policy for the management of the fuel but ,again, this would be subject to wide consultation and ultimately Government approval.

In short, Richard was sharing with the group some of the thinking that needs to happen as we (the sector collectively) consider the back end of any new nuclear programme and was not making any definitive statement of new policy. There is no explicit proposal (at least that NDA is aware of) to move the policy position in respect of spent fuel arising from new nuclear generation from that in the white paper of storage at site pending disposal. Similarly the position in respect of AGR fuel remains as it was when we last spoke, that a certain amount will be reprocessed and a certain amount will necessarily require some form of storage pending disposal.

As always I would be happy to discuss this with you.

Dr Adrian M Simper

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From: Jean McSorley [mailto:Jean.McSorley@uk.greenpeace.org]
Sent: 23 June 2008 16:18
To: Waite, Richard; Hollands, Judith
Subject: FOI spent fuel storage 200 years

Dear Richard

I am writing to you on behalf of Greenpeace to request the following information under the Freedom of Information Act and the Environmental Information Regulations.

The information requested concerns responses to questions - by you - following your presentation on 17th June at the seminar for Cumbria County Council on the White Paper on Managing Radioactive Waste Safely.

In reply to a question concerning whether or not new build spent fuel should be disposed or reprocessed you replied "we need to think very carefully about whether we want to dispose of spent fuel."

You then raised the issue of the possibility of dry storage of spent fuel from new build for 200 years - in safe and secure storage.

You said the matter would be taken to Government rather than the NDA just using the baseline assumption (for wastes for disposal). Can you please clarify exactly what is meant by this?

In addition to seeking clarification on the above points, there are a number of other questions on this matter. These are:

1. Has the NDA been approached by any potential reactor vendors/operators with a view to storage of spent fuel from new build (for 200 years) - followed by reprocessing - rather than the direct disposal option in the White Paper on nuclear power?
2. If not, where has this 'proposal' come from?
3. It is envisaged that the possibility of 'storage' of spent fuel from new build be in above ground stores or in a repository?
4. Would 200 year storage be at a central store (e.g. at Sellafield) or at reactor sites?
4. Exactly when and how will the NDA progress the issue of 200 years storage of spent fuel? At what point in the new build process would this be discussed and at what point in the repository process? How will the matter be consulted on nationally and with local stakeholders (at reactor sites
5. Is the NDA now also considering longer term storage of uncontracted spent fuel from British Energy's current operation pending possible reprocessing?

Many thanks for your attention to this matter.

Regards

Jean McSorley
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4. David Lowry

Comments on Radioactive waste storage proposals

"We should welcome your views on any aspects of the interim storage of radioactive waste. It would be particularly helpful to have your ideas about what constitutes a "robust" storage programme. For example, is it one in which stores are designed and built to have longer lives and bigger capacities than are expected to be needed, even if a geological disposal facility is somewhat delayed? Or is it one which is more flexible and in which it is planned to build more stores only if it is found that they are really needed? We would welcome your views by 30 September so we can take them into account in the first draft of our report."

My comments are made in the context of the paragraph below.

"The role of storage as an integral element in the recommendations is extremely important. Storage is the only available option in the short and even medium term and the NDA is responsible for the safe and secure management of the majority of existing stores. It has recently published its Strategy and is actively considering storage options, including the balance of advantage between local and more centralised versions of storage. The NDA is consulting widely on this and other issues. CoRWM's concern is with the development and location of stores that will form part of the interim management on the way to geological disposal. The Committee has explored a number of storage options and combinations including those with and without enhanced protection against terrorist attack, surface and underground, local and central. It has also looked at storage in relation to different waste streams. Among the factors affecting the location of new stores will be the desire to minimise transportation and double handling of wastes, the public acceptability of maintaining stores at existing locations or finding new locations and the vulnerability of sites to sea level rise and other factors. In principle, CoRWM's proposals for implementation, including willingness to participate and the development of partnerships supported by Community Packages, should apply to new central or major regional stores at new locations. The extent to which they should be applied to other new stores and changes to existing stores is a matter for further consideration."

CoRWM 1 final report, paragraph 21, p10.

1. Process:

The first aspect of robustness on which CoRWM needs to reach a conclusion is on how, in what detail, covering what issues, over what timetable the general public should be consulted on the generic concept of storage of radioactive waste (RW). Information needs to be made available setting out for how long, justifying shortest and longest time periods for which RW might be stored on each site or sites, what types of RW will be stored, including materials not yet allocated as a potentially recyclable nuclear material or a RW, what security arrangements will be in place, and what alternative options have been assessed, and the reasons for the rank ordering of the options. Interested parties need to be properly resourced from funds provided by the RW generators, and capacity built up to allow full engagement. Only in such an inclusive and transparent process will the outcome attain legitimacy and robustness.

2. Physical Protection:

Secondly, in a post 9/11 insecure world, the single most important aspect of RW storage is how is it to be secured against determined adversaries who may want to steal RW material for a dirty bomb or if spent fuel is stolen, a crude fission bomb, depending on access to separation facilities, violate the integrity of the store in a terrorist spectacular, using high energy weapons or else a plane deliberately crashed into the store to cause widespread public fear and panic, or to economically disrupt nuclear operations. This prospect was recognised in CoRWM 1 final report, recommendation 2, which stated:

A robust programme of interim storage must play an integral part in the long-term management strategy. The uncertainties surrounding the implementation of geological disposal, including social and ethical concerns, lead CoRWM to recommend a continued commitment to the safe and secure management of wastes that is robust against the risk of delay or failure in the repository programme.

In particular, it drew attention to the importance of:

i. reviewing and ensuring security, particularly against terrorist attacks.

I acted as one of several consultants invited to participate in CoRWM1's specialist workshop on security issues. As security specialists we collectively stated:

"...it is our unanimous opinion that greater attention should be given to the current management of radioactive waste held in the UK, in the context of its vulnerability to potential terrorist attacks.

We are not aware of any UK Government programme that is addressing this issue with adequate detail or priority, and consider it unacceptable for some vulnerable waste forms, such as spent fuel, to remain in their current condition and mode of storage. We urge the Government to take the required action and to instruct the NDA, in cooperation with the regulators, to produce an implementation plan for categorising and reducing the vulnerability of the UK's inventory of radioactive waste to potential acts of terrorism, through conditioning and placement in storage options with an engineered capability specifically designed to resist a major terrorist attack."

I would recommend all members of CoRWM2 read the full report, as referenced in full below, to learn of the vulnerabilities we identified.

(source: CoRWM Specialist Workshops – Scoring 6th,7th,8th,13th & 14th December 2005, Report: COR004, 11th January 2006

<http://www.corwm.org.uk/PDF/1502%20-%20Overall%20Specialist%20scoring%20report%20V1.1.pdf>)

3. Engagement:

In line with the CoRWM 1 concept of voluntarism for RW "disposal", as accepted in principle by government, and to ensure consistency and fairness, CoRWM2 should seek at first volunteer communities for a central national store, or multiple regional stores, and should prepare equivalent involvement and community compensation packages for host site communities, as well, very importantly, as all those affected communities, on transport routes

4. Cost:

In line with consistent ministerial insistence that the generators of the RW will pay their "full share" of the costs of RW management, CoRWM 2 should apply 100% cost recovery from RW generators for all preparatory work including

technical R&D, and contracted policy analysis. Unless this is done fully and transparently, it will constitute a subsidy, and will be contrary to stated UK Government policy promising no subsidies.

Dr David Lowry
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I am submitting these comments in my personal capacity

5. Phil Davies

CoRWM Storage Consultation 30th September

You ask for views on the interim storage proposals by 30th September. This is a brief response, as I was not previously aware of this Consultation.

My main response is to maintain **the clearest possible distinction between existing and newbuild wastes**. With regard to Geological Disposal, CoRWM did previously maintain this clear distinction, referring to different social political and ethical issues, and that newbuild would extend the scope of operations over unknowable time-frames. CoRWM's Principles include fairness to future generations. The response of Government was blatantly and conspicuously to overrule this opinion, stating that newbuild waste could be put in the same repository as existing wastes, with no acknowledgement of the issues raised by CoRWM.

Currently, for newbuild the Government is insisting on 100 year stores, but maintains that the question of how long spent fuel stays in them is a matter for the commercial judgment of the operators.

This cannot be allowed to pass without comment.

Before the public can decide whether to support or oppose any given proposal, it needs to know whether the proposal will make matters better or worse. Can any time limit be placed on the necessity for these stores to be there? In the absence of a "disposal" route, it may not be possible to place a time-limit on the stores for existing wastes. This is therefore all the more reason to insist on time-limits for new wastes, otherwise the problem will just get worse. This information is not forthcoming from the Government. I refer to the following Parliamentary answer.

15 Sep 2008 : Column 2137W

Radioactive Wastes: Waste Management

Mr. Dai Davies: *To ask the Secretary of State for Business, Enterprise and Regulatory Reform what estimate he has made of the length of time spent nuclear fuel discharged from the reactor cores of the new nuclear reactors planned would remain in store at the respective reactor site or sites prior to removal for long-term management. [220446]*

Malcolm Wicks: *The management of any spent fuel arising from the operation of new build reactors in the UK is a matter for the owners of that material, namely the operators. However, the current assumption is that any fuel would remain in storage at the reactor site through life pending disposal. We believe that interim storage provides an extendable, safe and secure means of containing waste for as long as it takes to site and construct a geological disposal facility.*

This is not just a matter for the operators, but for the regulators and the public as well. The reactors have not yet been built, the waste has not yet been produced, and the question of how long the spent fuel is likely to have to be stored before "disposal" is a matter of great public importance, pertains directly to the acceptability of current newbuild proposals, and falls squarely within CoRWM's responsibility of upholding fairness to future generations. I request that CoRWM reports back on the technical limitations (eg effect of increased burn-up on heat decay time) which may affect these time-periods.

Yours sincerely

Phil Davies

6. Pete Wilkinson

Submission to CoRWM2 on storage issues

Note: I recognise that this submission is presented after the closure date of the 30th September but given the large number of consultations and engagements currently being conducted on nuclear issues, I would welcome the Committee's indulgence.

1 October 2008

A lack of progress

'The security Specialists appointed to the CoRWM Specialist Security Workshop recognize that CoRWM is not responsible for the priority that is being given to the conditioning and mode of storage of nuclear waste forms prior to their transportation to the selected storage/disposal facility that may not occur for some decades into the future. However, it is our unanimous opinion that greater attention should be given to the current management of radioactive waste held in the UK, in the context of its vulnerability to potential terrorist attacks.

'We are not aware of any UK Government programme that is addressing this issue with adequate detail or priority, and consider it unacceptable for some vulnerable waste forms, such as spent fuel, to remain in their current condition and mode of storage. We urge the Government to take the required action and to instruct the NDA, in cooperation with the regulators, to produce an implementation plan for categorising and reducing the vulnerability of the UK's inventory of radioactive waste to potential acts of terrorism, through conditioning and placement in storage options with an engineered capability specifically designed to resist a major terrorist attack.'

This statement remains as true today as it was when it was agreed unanimously in 2006. As far as I am aware, there is no intention to undertake the sort of review of storage envisioned by CoRWM two years ago. The NDA is reportedly undertaking a 'review' but at the last National Stakeholder Group meeting, information about its progress and structure was scant. Moreover, to have the cash-strapped NDA lead a review of its own storage arrangements is an insult to the intent of the CoRWM recommendation on storage which was made by way of recognizing that disposal is far from a foregone conclusion and that as interim storage may be an option forced upon the industry due to a lack of societal consensus over its scientific, technical and ethical acceptability, it is imperative to ensure that storage arrangements are '9/11' proof. The NDA is not the body to undertake this work. It must be carried out by an independent body of security experts such as the one appointed by CoRWM in 2006.

Legacy waste, new build waste or both?

CoRWM1 spent a lot of time looking at storage options for legacy wastes. This included the management of spent oxide fuel as well as residual amount of spent Magnox fuel given the likelihood that not all of this type of fuel will be reprocessed. Thus the variants for storage – above ground, below ground, at site, centralized, protected, unprotected – are well established and should aid any review of storage. What CoRWM1 did not consider was any new build waste as it was not in its remit and therefore the recommendations it arrived at do not, in fact, extend to new build wastes. In fact, CoRWM1 went so far as to make it clear on several occasions that its recommendations were restricted to legacy wastes and that the management of new build wastes should be subject to an entirely separate process of evaluation given the different technical, scientific and ethical issues raised by the generation of these wastes which are far hotter and which contain far more fission products than the sort of wastes we have

been used to dealing with hitherto. Given the fact that the Environment Agency has yet to have the disposability of new build spent fuel satisfactorily demonstrated, the need to store rather than dispose of new build spent fuel assumes a new imperative. In any case, this new build waste will be so hot that it will require storage for at least 50 years after its removal from the reactor core regardless of the availability of a repository. It is, however, very disappointing to those engaged in the nuclear debate to be faced with what appears to be a lack of criticism of government policy which deliberately and purposefully conflates legacy waste with new build wastes and asserts that the CoRWM1 'solution' (disposal) covers both categories of waste. This is not the case and government should be required to explain and justify its position.

When is disposal actually storage?

There seems to be a lack of clear definition of disposal, or, at least, a clear definition on which all parties can agree. The definition of disposal used by CoRWM and subscribed to by most parties involved is 'the intention not to recover or retrieve the waste' and this allowed the recommendation for disposal (in the current state of knowledge and other conditional recommendations attached) to garner some sort of credibility as it was based on the (still questionable) attributes of removal of burden to future generations and additional security afforded by removing the waste from the need for institutional control or access. In short, disposal must be prompt if it is to enjoy the putative justification afforded it by CoRWM's process. The NDA talks in its recent draft R and D consultation paper of 'deep underground storage'. This demonstrates a worrying lack of understanding about the CoRWM process and its recommendations and should not be allowed to go unchallenged. If the NDA wish to pursue this as a policy, then they must publicly acknowledge that:

- they are contradicting CoRWM recommendations
- they are contradicting government policy
- 'deep underground storage' for the purposes of retrievability fundamentally undermines the basis of the CoRWM recommendations and therefore they either:
 - publicly acknowledge that the policy they are pursuing is a departure and in fact represents storage, or
 - they accept the CoRWM and government position and pursue a policy of prompt disposal

Similarly, CoRWM should make this distinction clear. It must ask the NDA and other agencies involved to make a statement about what it is pursuing and how closely or loosely that policy reflects the CoRWM and government position.

Public attitudes to storage

Storage is what most people interviewed by CoRWM1 sought in terms of management of waste. A paper which I wrote at the time showed quite clearly that most people require the ability to retrieve waste. To argue that retrievability is compatible with a disposal option not only gives a false impression to the public but is also highly unrealistic and contrary to the findings arrived at after the three years of work CoRWM undertook between 2003 and 2006. If you build retrievability into the design of the repository to accommodate the ability to retrieve, then it is not disposal but storage and CoRWM1's recommendation should have been for that method of management if the justification for its recommendation for disposal is that most people supported 'phased deep geological disposal'. Phased disposal removes the putative attributes which support disposal. Either the option being pursued is disposal in which case you eliminate retrievability and close the repository promptly and rely on the

adequacy of the safety case or you store. If it is the latter, in the form of a phased 'disposal', CoRWM1's recommendation should have been for storage and not disposal.

Where are we after two years since CoRWM1 reported?

It is tempting to accuse the NDA and other agencies of deliberately allowing and indeed encouraging the confusion between the definitions of disposal and storage. The reason may be that the NDA is caught between the rock of CoRWM1's recommendation for disposal (i.e. prompt closure to, primarily, 'remove a burden to future generations' - itself a questionable attribute as disposal simply alters the nature of the burden instead of removing it) which has putatively become government policy and the hard place of a government which cannot decide if lethal plutonium stocks are an asset or a liability and if it will revive the bankrupt practice of reprocessing spent fuel or not. The net result is that two years on from CoRWM1's report, its recommendation for disposal has been cherry picked, extended with no justification whatsoever to cover new build waste and, hence, used as a justification for new build. In addition, the NDA has seen fit to ignore the detail and foundations of the disposal recommendation and quite blithely ignored all the work CoRWM did as well as government policy by arguing for 'deep underground storage'. Quite frankly, it seems as though the entire process has been subject to a slow but persistent process of corruption and that CoRWM1 may just as well have not written its report nor have gone through what was a genuinely open and transparent attempt to do something positive. It has seen its work used as part of a programme of obfuscation and sleight of hand in order to justify a new build programme, the waste for which will be dealt with not by disposal as CoRWM recommended, but by a means – phased deep disposal – which CoRWM regarded as an inferior and politically motivated option and which, to boot, fundamentally undermines the CoRWM recommendations. Deep underground disposal is not a recognized storage variant for the management of waste as it falls between two stalls: it is neither easy to monitor or to recover from a kilometer deep but neither is it above ground or near surface storage which allows ease of access and monitorability.

Pete Wilkinson

Footnotes to Greenpeace response to the Environment Agency (see above)

- i http://www.environment-agency.gov.uk/commonddata/acrobat/gd_consultation_2052368.pdf
- ii http://www.opsi.gov.uk/acts/acts1993/ukpga_19930012_en_1 Clause 47
- iii http://www.environment-agency.gov.uk/commonddata/acrobat/updated_2068897.pdf
- iv <http://www.hse.gov.uk/nuclear/saps/saps2006.pdf>
- v <http://www.publications.parliament.uk/pa/ld200708/ldbills/052/2008052.pdf>
- vi The Energy Bill 2008 Consultation on Funded Decommissioning Programme guidance for new nuclear Power Stations <http://www.berr.gov.uk/files/file44486.pdf>
- vii The Future of Nuclear Power, 2007 (para 12.16) <http://www.berr.gov.uk/files/file39197.pdf>
Towards a Nuclear National Policy Statement: Applying the proposed Strategic Siting Assessment Criteria: a study of the potential environmental and sustainability effect, July 2008 (para F.31) <http://www.berr.gov.uk/files/file47137.pdf>
The Energy Bill 2008 Consultation on Funded Decommissioning Programme Guidance for New Nuclear Power Stations p 65
- viii Towards a Nuclear National Policy Statement: Applying the proposed Strategic Siting Assessment Criteria: a study of the potential environmental and sustainability effect, July 2008 (para F.36) <http://www.berr.gov.uk/files/file47137.pdf>
- ix Nuclear Industry Association, Justification Application Vol 2 Application Appendices Nuclear Nuclear Power Stations, June 2008. Para 2.13 page 9.
- x On 50 years, in email from NDA 9th January 2008. On 100 years, see The Energy Bill 2008 Consultation on Funded Decommissioning Programme Guidance for New Nuclear Power Stations para 4.2.42
- xi The Energy Bill 2008 Consultation on Funded Decommissioning Programme Guidance for New Nuclear Power Stations p 46
- xii Towards a Nuclear National Policy Statement: Applying the proposed Strategic Siting Assessment Criteria: a study of the potential environmental and sustainability effect, July 2008 (para F.31) <http://www.berr.gov.uk/www.berr.gov.uk/files/file47137.pdf> Para F.30
- xiii The Energy Bill 2008 Consultation on Funded Decommissioning Programme Guidance for New Nuclear Power Stations p 46- The size of a programme of new nuclear power stations and the specification of the site chosen for the geological disposal facility may impact on whether all of the spent fuel from new nuclear power stations could be stored in the same disposal facility as legacy waste.
A White Paper on Nuclear Power, para 41. <http://www.berr.gov.uk/files/file43006.pdf>
- xiv The Energy Bill 2008 Consultation on Funded Decommissioning Programme Guidance for New Nuclear Power Stations para 2.15
- xv Nuclear Industry Association, Justification Application Vol 2 Application Appendices Nuclear Nuclear Power Stations, June 2008. Para 1.15 pp4. See also attached NDA email re. options
- xvi http://www.environment-agency.gov.uk/commonddata/acrobat/updated_2068897.pdf
- xvii Re-iteration of CoRWM's Position on Nuclear New Build doc 2162.2 September 2007
- xviii HPA Advice on Radiological Protection Objectives for the Land Based Disposal of Solid Radioactive Wastes.