Scotland's Higher Activity Radioactive Waste Policy Consultation 2010

A response from Friends of the Earth Scotland

Introduction and Summary

Friends of the Earth Scotland welcomes the opportunity to comment on this consultation and associated documentation. This response has been prepared by Duncan McLaren, with helpful input from external advisors.

We do not believe that the new policy set out in the consultation is fit for purpose. We urge the Scottish Government to revert to a policy of long-term storage based on maximum monitorability and retrievability for these wastes. While clarification of the policy is desirable in principle, the proposed definitions for terms such as 'near-site', and 'near-surface' are neither reasonable nor acceptable.

While there is a logic in seeking to apply a waste hierarchy, the proposed application is unhelpful. In this context a meaningful application would prioritise waste minimisation, and minimise interventions such as treatment and transport to those essential to the safe interim storage of wastes pending the development of acceptable long-term management techniques.

Our responses to specific questions follow. However we are gravely concerned that the consultation does not pose the single most fundamental question: whether consultees agree or disagree with the proposed new policy. Instead it appears to seek to present an effective policy u-turn as a minor technical shift. This is poor consultation practice.

Question CD1. Have we explained what Waste we have in Scotland and how it is managed?

A: Not adequately

The materials offer significant amounts of information, but typically in aggregate and summary forms. As a result the information provided is **inadequate** to provide a detailed understanding of how existing and committed waste streams would be redirected as a result of the new policy.

For example, a detailed explanation of what waste falls into the category of "less-radiotoxic" longer-lived ILW is required. We have been informed that the phrase "less radiotoxic" ILW in the context of this policy refers to certain types of longer-lived ILW. This should have been made clear in the consultation documents. There is a big difference between near-surface disposal of short-lived ILW which will decay into LLW after about 300 years, and such disposal of long-lived ILW irradiated graphite.

Irradiated graphite waste accounts for around 40% of the relevant wastes by volume. The principal radionuclides contained in long-lived waste graphite are Carbon-14 (C-14) which has a half-life of 5,730 years, and chlorine-36 (Cl-36) which has a half-life of 301,000 years.

A March 2006 EPRI study[1] concluded that: "…*the presence of isotopes such as C-14 and Cl-36 in graphite could significantly complicate the safety case for a waste site if graphite was disposed there. This is because the isotopes concerned are chemically labile* [unstable] *and difficult to confine over long periods of time*". The Environment Agency's November 2005 review[2]

1 Graphite Decommissioning: Options for graphite treatment, recycling or disposal, including a discussion of safety related issues, EPRI, March 2006. p 11-2 http://mydocs.epri.com/docs/public/000000000001013091.pdf

2 Review of Nirex Report: 'The Viability of a Phased Geological Repository Concept for the Long term Management of the UK's Radioactive Waste' Version 3.1 NWAT/Nirex/05/003 November 2005

of Nirex's deep disposal plans[3] identified a number of 'viability threatening issues'. In particular, it expressed concern about Carbon-14. Nirex had predicted that this carbon (in the form of 'carbon dioxide') would react with the cement in the disposal facility and be retained underground. However the EA stated: "*In our view, more confidence is needed that complete reaction of carbon dioxide will occur in cracked backfill or that the gas pathway would not lead to unacceptable consequences were this not to be the case*". (Part 6, page 10). Subsequently in February 2006[4] Nirex identified a case for research on the potential for significant exposures to radiation due the production and release of methane gas from decaying radioactive waste emplaced in a backfilled repository, because of the possibility that Carbon-14 may actually escape from the facility as methane gas (CH_4), travelling rapidly through fractures and pores in the overlying rocks until finally reaching the surface and entering the food chain. In this scenario Nirex estimated the impact on risk may reach a figure as high as *one in a thousand* (i.e. one person in a thousand contracting a fatal cancer, a non-fatal cancer or inherited genetic defect as a result of such exposure as opposed to the target of no more than one in a million). Furthermore, this particularly high risk could occur just *40 years* after the burial facility had been backfilled and closed. It was concluded that if these calculations were confirmed, then there may be a need to adjust the site selection criteria for a geological disposal site.[5]

This suggests significant incentives to keep graphite waste out of a geologic disposal facility. But it is not clear at all from the information available why anyone should consider near-surface disposal to be a better alternative, other than to assist in making the safety case for the deep disposal of the remainder of the radioactive waste inventory. For a country like Scotland which is not planning a deep geological disposal facility, this offers no advantage, and raises serious concerns about the development process and rationale for the proposed Policy.

We would concur with CoRWM which suggests that greater detail on radioactivity levels would be useful, along with specific identification of which waste would be considered suitable for near surface disposal under the proposed policy. CoRWM points out that 98% of the ILW at Dounreay would be unsuitable.[6]

Question CD2 Have we explained why we need to define the terms used in the Policy?

A: Not adequately

The documents imply (para 3.01.03) that the case for detailed definition of the terms used in the Policy is to help ensure that owners and producers of waste properly reflect Scottish Government Policy in their activities and planning. We would agree that such a case requires better definition of the terms. However it does not merit the opposite approach of changing the policy to reflect the activity and planning of those stakeholders!

In that context we would note that Section 3.02 of the Consultation Document ("*Why has the policy been extended to include disposal*?") does not provide an appropriate explanation of the

3 The Viability of a Phased Geological Repository Concept for the Long Term Management of the UK's Radioactive Waste. Nirex Report N/122, November 2005. http://www.nda.gov.uk/documents/upload/The-viability-of-a-phased-geological-repository-concept-for-the-long-term-management-of-the-UK-s-radioactive-waste-Nirex-Report-N-122-November-2005.pdf

4 "C-14: How we are addressing the issues" Nirex Technical Note Number: 498808, February 2006.

5 NWAA Issues Register: Outstanding Scientific Issues Relating to the Production of a Robust Safety Case for the Deep Geological Disposal of radioactive waste. http://www.nuclearwasteadvisory.co.uk/uploads/66526652NWAA%20ISSUES%20REGISTER%20COMMENTARY%20letterhead.doc

6 Issues for CoRWM Plenary Discussion on Scottish Government Higher Activity Waste Policy Consultation Documents, by Andy Sloan, Draft 18th Feb 2010 http://www.corwm.org.uk/Pages/Plenary%20Meetings/2779%20draft%202%20CoRWM%20SG%20Policy%20Issues%20Paper.pdf

reasons for including disposal. It merely says "stakeholders" have suggested changing the policy to include disposal, but doesn't give a satisfactory explanation of the reasoning behind this change. Notes of meetings suggest that it was the NDA, British Energy and Magnox Electric (Energy Solutions) which have suggested near surface disposal[7].

A detailed technical, scientific and political explanation is required of how including disposal as an option meets with the Scottish Ministers' requirement for monitorable and retrievable storage facilities with minimal need for transporting waste. Political justification is required because of the government's manifesto commitment to "say no to new nuclear dumps"[8]

Question CD3 Do you agree with the definition of 'Long-term'?

A: Partly.

We would broadly agree with the definition of long-term for 'storage' facilities, but not for 'disposal' facilities. It is in part because of the inherent challenges in designing and managing a 'disposal facility' in the long-term, that Friends of the Earth Scotland believes that a policy of storage, not disposal, is the correct approach.

The definition provided is however, confusing. Is the relevant period 100 years (CD para 3.03.04) or 300 years (CD para 3.03.05)? Long term storage should also include the possibility of a long-term store with a life of around 300 years. Sellafield Ltd has been investigating the potential of constructing a long-term ILW Store with a potential life of 300 years or more.[9] The concept was developed precisely because of the uncertainties associated with deep geological disposal highlighted in the recommendations to government by CoRWM.[10]

CoRWM also recommended a programme of interim storage which gives due regard to ensuring security, the longevity of the stores themselves, passivity of waste forms with minimum need for repackaging of the wastes, together with the implications for transport of waste. This remains an important statement of principles for indefinite storage also.

Question CD4 Do you agree with the definition of 'Near Surface'?

A: No.

We accepted the introduction of the term "near-surface" in the June 2007 policy to allow some flexibility to the idea of 'above ground storage' to offer more protection against, for example, terrorist attack, without compromising monitorability or retrievability. But the several tens of metres discussed in this consultation challenges the credibility of the definition, and compromises retrievability. It could mean up to 100 metres deep or 320 feet below the surface. A disposal facility might even be constructed under the seabed, but accessed from shore. (ER Figure 8, p52).

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7 Note of Meeting with Scottish Government, 20 May 2009, CoRWM doc 2621 http://www.corwm.org.uk/Pages/Other%20Meetings/2621%20-%20Scottish%20Government%20HAW%20Policy%20Note%2020%20May%20Final.pdf

8 The 2007 SNP Holyrood Manifesto said: "No to Nuclear. As a starting point a Scotland led by the SNP will say no to new nuclear – power stations or dumps. An SNP government will make clear that Scotland does not require a new nuclear power station". http://www.snp.org/node/13534#attachments

9 Above Ground Storage of Waste, Presentation by Peter Wylie, BNG http://www.lut.ac.uk/departments/cm/research/LTNWM/Above%20ground%20storage%20of%20waste%20-%20Peter%20Wylie%20(BNG).pdf

10 Managing our Radioactive Waste Safely: CoRWM's recommendation to Government, July 2006. http://www.corwm.org.uk/Pages/Current%20Publications/700%20-%20CoRWM%20July%202006%20Recommendations%20to%20Government.pdf

We would argue that 'near surface' should mean exactly that, i.e. only down to a few metres deep. To provide an analogy, even ten metres is a long way to fall for a human being – so in common English 'near the surface' would be assumed to mean less than this height or depth.

However we would accept that the critical factors are monitorability and retrievability, and depth *per se* may be only a secondary factor. For example it is entirely possible to conceive of a facility built into a hillside with easy level access for monitoring and retrieval operations, but which, because of the slope of the ground, is technically more than ten metres below ground level. However this would appear to us to be a justifiable exception, rather than a reason to allow a general rule defining 'near-surface' as up to 100 metres deep. We would also note in passing that if the foundations of a facility were eleven metres below the surface – as in the case as Dounreay, the subsequent emplacement of the waste would not be more than ten metres deep.

Question CD5 Do you agree with the definition of 'Near Site'?

A: No

We would understand the term '*near-site'*, as opposed to the phrase "*at the site of production*" to mean including land adjacent to a licensed nuclear site, or in such close proximity as to not require transport on public roads or railways. Transporting waste from one site to another is likely to arouse opposition from people living along transport routes and even from people living near nuclear sites who are prepared to countenance the storage of waste produced on that site, but not waste imported from elsewhere.

To interpret it so loosely as in the current draft, to imply that anywhere in Scotland could be used as a central site for disposal or storage is an unacceptable abuse of common English. We believe 'at or near existing sites' should be clearly defined to mean <u>on or directly adjacent</u> to the site where the waste was produced.

Question CD6 Do you agree with the definition of 'Storage'

Question CD7 Do you agree with the definition of 'Disposal'?

A: While the definitions are not actively misleading (unlike those for 'near-site' and 'near-surface'), we believe that it is unacceptable to seek to place waste in a facility defined as for 'disposal' in these terms.

From a radiological protection point of view it is the monitorability and retrievability of the waste which is important, provided it is in a secure, terrorist resistant facility. These are non-negotiable principles in the achievement of the basic paramount aim of the policy 'the protection of people and the environment' (section 1.04.01). Placing waste in a facility where there is no intention to retrieve it (i.e. the consultation document's definition of disposal), will inevitably compromise retrievability at some point.

It possible to envisage a storage facility, which is monitored by CCTV as well as by radiation monitoring equipment and allows any leaking waste to be retrieved in a rapid and controlled manner by, for example, fork lift truck. If all goes according to plan, it may be that the waste in such a facility (particularly if it is short-lived ILW) never requires removal and after some time, maybe even as soon as 300 years, it could conceivably be declared a disposal site.

It appears that the Scottish Government and SEPA may not be comfortable with such an approach because such a store would not require a disposal safety case. It would be regulated as a store by the Health and Safety Executive rather than by SEPA. On the other hand just the

term ‘disposal’ has important negative connotations and implications both for affected stakeholders (such as local communities) and for the attitudes and planning of site managers. We believe it would be a profound error to permit ‘disposal’ simply in order to ensure that proposed facilities are required to make a ‘disposal safety case’. It would be far more effective to insist that the safety case required for a waste storage facility was functionally equivalent to that required for disposal.

Within the categories of waste discussed in this consultation the complication arises with the long-lived ILW. We would recommend that all longer-lived ILW (even that which is defined as less radiotoxic) should be stored with the intention to retrieve at some point in the future.

Moreover the phrasing of the text on retrievability with respect to disposal facilities is not clear (see answer to question CD9 below).

Question CD8 Do you agree with the definition of monitorable?

A: The definition is inadequate.

The consultation document gives very little information about what is required to meet regulatory requirements as far as monitoring is concerned. The policy appears to not be prescriptive. In our view this is dereliction of responsibility by the policy makers. The Government should give the regulators and operators appropriate direction. Obviously radiation monitoring of stores would be required, but in a sense when a leak is picked up this could be too late. Monitoring of package corrosion, water ingress, placement of CCTV cameras etc should all be required to be considered in the licensing process. Such monitoring inside the facility is an important difference between storage and disposal, and a further reason why disposal routes should not be considered for these wastes at this time.

Such an approach, specifying categories and approaches to monitoring that must be considered, and an explicit justification required should they be rejected would help avoid any risk of regulatory capture by the operators, and ensure that the public interest remained paramount.

Question CD9 Do you agree with the definition of retrievable?

A: The definition is vague and inadequate.

With respect to disposal facilities, it leaves open the prospect that having considered retrievability (3.03.26), the operator may not design for it; and even if they design for retrievability it could be through a process of ‘reversal and recovery’ (3.03.25) including mining techniques (3.03.28). Such engineering operations carry inherent and unacceptable risks for the operator’s ability to control and manage the process of retrieval in a timely fashion should either unforeseen problems arise, or society’s standards for radiation exposure or leakage be altered in line with scientific understanding or democratic agreements.

The documents make no attempt to give any indication of how easy or how quickly recovery has to be. It may involve, for example, several years of digging out a cementatious backfill or going into a cavern with a fork-lift truck and picking up the waste package in question.

The June 2007 Scottish Government policy described deep geological disposal of waste as “*out of sight, out of mind*”. Scotland, it said, would support a policy where “*the waste is monitorable and retrievable*”. There are two main reasons for such opposition to deep disposal. Firstly, making a safety case for deep disposal relies on computer models which purport to show that radionuclides will only leak from the disposal site at a sufficiently slow rate to limit the doses to members of the public living nearby to an acceptably low level. These predictions are currently

uncertain. The rate of leakage may turn out to be much faster than expected. If the waste has been irretrievably buried, the problem of radionuclides leaking at a faster rate than expected could not be rectified. This means a GDF could create a leaking nuclear waste dump which represents a significant but unquantifiable burden for future generations rather than removing a burden from them through disposal. It would be far better to leave them the option of managing the waste the way they see fit.

Secondly, even if the predictions turn out to be correct, there is no 'safe' dose of radiation, and there are huge uncertainties involved in deciding what dose members of the public actually receive and what the health impact of those doses might be. The methodology used in deciding the dose of an individual is quite complicated, and is derived using computer models. The cumulative uncertainty in dose estimates could be large as recognised by the Committee Examining Radiation Risks of Internal Emitters (CERRIE) in 2004.[11]

Both of these problems could also apply to near surface disposal unless a high level of monitorability and retrievability is built in. However the Policy fails to make such guarantees, and therefore remains inferior to a policy which requires storage, not disposal, as the appropriate response to current levels of knowledge.

Para 3.03.23 states that storage is an interim stage in the management of the waste which will require further handling before disposal. However there is no reason given why other alternatives have not been considered, such as indefinite storage, or in certain circumstances, as suggested above, of a storage facility which has made the equivalent of a disposal safety case so that at some point in future it might – through a further application and licencing provision – be converted into a 'disposal facility' with no further handling of the waste.

Question CD10. Do you agree with the definition of 'the need for transport over long distances is minimal'?

A: No.

The documents fail to define this term. The case for allowing waste to be transported with the UK or abroad for treatment has not been made. The original June 2007 policy should remain in place.

Question CD12. Have we explained the implications of the Policy?

A: No.

In particular this section of the consultation fails entirely to explain the potential practical outcomes of the changes in Policy and definitions set out in the preceding section. Nowhere does it explicitly say that under the new policy more waste will travel further distances; that existing or approved storage facilities may now receive waste from other sites, not just the one where they are located; that waste may now be stored or dumped in locations remote from existing nuclear facilities at depths underground that might hamper monitoring and retrieval operations should they be subsequently required; and that waste may be less well monitored in 'disposal' facilities than in stores; etc.

These are the sort of implications of grave concern to non-industry stakeholders, and in particular to communities, and which should therefore be set out in such a consultation. The section does not even explain the implications of the proposed application of the waste hierarchy

11 CERRIE (2004) Report of the Committee Examining the Radiation Risks of Internal Emitters. http://www.cerrie.org/

in such basic and intelligible terms.

Question CD13 Do you agree with the application of the Waste Hierarchy?

A: The proposed application is not appropriate

Insofar as the waste hierarchy is applicable to such wastes, we believe it is being misinterpreted in at least two ways: first, in the introduction of disposal as an option (and indeed the explicit preference for disposal – which precludes later application of approaches higher in the hierarchy); and second in the advocacy of treatment or 'recycling' procedures which may result in the generation of larger volumes of lower activity secondary wastes (in breach of the waste prevention or minimization principle at the top of the hierarchy).

In managing radioactive wastes the ALARA (as low as reasonably achievable) principle and the 'concentrate and contain' rather than 'dilute and disperse' principles should take precedence over the recycling of contaminated materials and treatments of materials which can result in increased volumes of waste or unnecessary discharges of radioactivity into the environment.

Question CD14. Do you agree with transport of the Waste for treatment?

Question CD15. Do you agree with export of the Waste for treatment?

A: No

The proposed approaches generalize inappropriately. They make no distinction between the essential preparation of wastes for storage and other forms of treatment such as smelting. In the former case no transport or export is necessary. There appears to have been no or inadequate consideration given to the health and environmental implications of secondary wastes or releases which may be created by treatment.

In our view the proposals are a breach of the proximity principle, which should retain priority. Even if transport were to be considered feasible in principle, before agreeing such a policy, the Government must consider the "*sensitivities associated with transport corridors"* as CoRWM has suggested.[12]

We would also note that in accepting export of waste for treatment, the Scottish Government and regulators could not then guarantee that such treatment would be undertaken in line with the standards we would expect to protect people and the environment in Scotland. This is unacceptable.

Question CD16 Do you agree with the need to develop a Strategy to implement the Policy?

A: While it is appropriate to develop strategy so as to implement policy, the proposed Policy is not fit for purpose, and the development of a Strategy would be premature.

Any strategy (and indeed the policy that precedes it) must take a system level perspective. Having rightly rejected Geological Disposal, If Scotland now introduces a disposal option to HAW management, there is a distinct possibility Scotland could dispose of some types of HAW

12 Issues for CoRWM Plenary Discussion on Scottish Government Higher Activity Waste Policy Consultation Documents, by Andy Sloan, Draft 18th Feb 2010 http://www.corwm.org.uk/Pages/Plenary%20Meetings/2779%20draft%202%20CoRWM%20SG%20Policy%20Issues%20Paper.pdf

in a near surface facility, while in England and Wales the same types of HAW would be required to be disposed of in a Geological Disposal Facility (GDF). For the nuclear operators in England and Wales disposing of short and long-lived ILW in near-surface disposal facilities could be expected to be much cheaper than disposing of this waste in the GDF. As a result, Scotland would become the guinea pig for this type of disposal, and then used as an example for a change of policy South of the border. Or, even worse, Scotland could face pressure, under future administrations, to import such wastes from England and Wales.

The Scottish Government should re-focus and develop a strategy to implement its June 2007 policy of near-site, near-surface storage which can set an example to a world which is struggling with the question of what to do with its nuclear waste.

Question CD17 Do you agree that the NDA should be responsible for developing the strategy to implement the policy?

A: n/a

Once a Policy fit for purpose has been (re)established, it would be reasonable for the NDA should develop a strategy. But as a considerable portion of waste is not on NDA land, Scottish Ministers would need to take control of the process and make sure it follows the Policy.

Question CD18 Do you agree with the proposal to review the application of the detailed statement of policy 10 years after it is published?

A: No

As previously noted we do not regard the proposed statement of Policy as fit for purpose. It is therefore premature to set a date for review.

Question CD19 Have we adequately explained the Regulatory framework for managing the waste in Scotland

A: No

The document makes no effort to assess the risks and current degree to which the regulatory processes outlined are, or may be, within the lifetime of the policy, subject to regulatory capture by the industry. Unfortunately there are good reasons to believe that some of the agencies concerned may already be compromised by the lack of effective regulatory tools and legal sanctions.

Given the non-prescriptive nature of the detailed policy statement its implementation is critically dependent on the continued independence and rigour or regulators. This oversight is thus crucial.

Question CD20 Does the proposed detailed statement of policy include all relevant issues?

Question CD21. Should the proposed detailed statement of policy include anything else?

A: As noted above we do not believe the detailed policy statement is fit for purpose.

It fails to deliver on its own aims and objectives, and risks subjugating the protection of the public

and the environment to the convenience and financial interests of the nuclear industry.

The detailed policy statement should be fundamentally revised to remove reference to disposal, to prioritise waste minimisation, and to minimise interventions such as treatment and transport to those essential to the safe interim storage of wastes pending the development of acceptable long-term management techniques.

The policy must include prescriptive standards for retrievability and monitorability of stored wastes which “avoid foreclosing future options”. It is entirely inadequate to merely require that the risks of such foreclosure are recognised (but not necessarily acted upon), and equally inappropriate to give costs similar weight in the policy aim.

Question ER1 Do you agree that the Environmental Report has captured the significant environmental effects of the policy?

A: No

See, for a detailed example our response to question CD1 above. These issues are not considered in the ER.

Moreover we are concerned that potential environmental risks associated with disposal options may not have been captured because of a misplaced categorisation of the differences between storage and disposal as ethical rather than technical questions. The practical implications of disposal for ongoing monitoring are not adequately considered for example.

Question ER3 Do you agree with the proposed arrangements for mitigation and monitoring identified in the Environmental Report?

A: No

Because of the shortcomings of the ER and the proposed Policy, the mitigation and monitoring measures proposed are inappropriate. They fall well short of what might be required to mitigate for the flaws in the proposed policy, and by definition do not capture the measures that may be required to mitigate for a policy exclusively based on storage.

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3. Permissions

I am responding as a Group/Organisation

Do you agree to your *response* being made available to the public (in Scottish Government library and/or on the Scottish Government web site)? Yes

We will share your response internally with other Scottish Government policy teams who may be addressing the issues you discuss. They may wish to contact you again in the future, but we require your permission to do so. Are you content for Scottish Government to contact you again in relation to this consultation exercise? Yes