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Friends of the Earth

Friends of the Earth consultation response to Managing Radioactive Waste Safely

A framework for implementing geological disposal

A public consultation by Defra, DTI and the Welsh and Northern Irish devolved administrations

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Friends of the Earth (England, Wales and Northern Ireland) response to DEFRA Managing Radioactive Waste Safely public consultation 2007

1. Preamble

Thank you for asking for our views about the Government's proposals about Radioactive Waste. Friends of the Earth (England, Wales and Northern Ireland) has long opposed civil nuclear power in the UK and world wide because of the inherent dangers of nuclear power technologies. Dangers include long-term toxic waste generation (storage, disposal, incomplete science), proliferation (lack of UK leadership / hypocrisy on non-proliferation, foreign policy implications), terrorism and other malicious actions (hostile states, individuals, cult), large-scale radiological releases from major accidents, and health impacts from low-level accidental or routine discharges from nuclear facilities.

In terms of nuclear waste issues, Friends of the Earth was closely involved in the Rock Characterisation Facility (RCF) Public Inquiry in 1996 which rejected the proposed RCF put forward by NIREX. The Friends of the Earth case against the RCF was organised by Dr Patrick Green and Dr Rachel Western of Friends of the Earth and featured a co-ordinated set of proofs of evidence presented by seven leading scientific experts [1].

In responding to this consultation we have set out in the overview below what we see as the real-world context to the debate about nuclear waste, followed by more specific responses to the consultation.

2. Overview

Note: throughout this response a 'new-build nuclear programme' refers to the UK Government's preliminary view for a 'replacement' 10 GW of new reactor capacity (be it AP1000, EPR, other) PLUS any associated uranium enrichment and other associated facilities and their overall operational and decommissioning wastes.

2.1 Energy context

Friends of the Earth continues to point out at every opportunity that the contribution of existing or likely levels of energy generation from the UK's nuclear power stations (existing or new build) represents around just 4 % of the UK's current 'final' energy consumption (nuclear's current global contribution is just 3%) [2]. The UK percentage would increase to just 5 % if energy efficiency programmes and lifestyle changes reduced current final consumption by 20% (ie to 1,600 TWh/year and primary supply to around 35% to 1,900 TWh/year).

Such low levels of contribution are simply not worth the disproportionate dangers involved, including those related to the waste arisings, considering the range of alternatives. There is a broad combination of far safer low-carbon technologies and indigenous UK renewable resources with which to safely achieve UK energy security and drive down emissions.

2.2 Global terms

In global terms all future global energy consumption could be generated safely and cost-effectively by a diversity of renewable energy technologies harnessing Earth's abundant renewable energy resources. Efficient low-carbon fossil fuel technologies (eg CHP, possibly CCS) should be used in the transition to renewably powered future (CCS could provide the option of carbon-negative operation if necessary).

For example, the combined electrical output of all nuclear power stations globally (2,635 TWh/year in 2003) could be generated by concentrated solar power (CSP) desert-based mirror schemes covering the combined equivalent of a small fraction (0.1%) of the world's sunny deserts (about 80 miles by 80 miles) [3]. Note also that the richer 'lower-carbon' grade uranium ore resources would supply the current[1] level of nuclear output for around 80 or so years.

Consequently, Friends of the Earth's position is that nuclear power is not needed to address global climate change and should be avoided due to its dangers. Moreover, the controversial nature of nuclear technology is a dangerous distraction from what should be a much wider energy debate, and a diversion of both funds and attention from what needs to be done.

2.3 Security context

Despite the availability of non-nuclear technologies and UK indigenous renewable energy resources (particularly offshore wind), the Government has expressed a preliminary view that there is a role for 'new-build' nuclear power, even at a time of growing international tension with Iran and other states.

The effects of a successful hostile action on one or more of the UK's own existing nuclear facilities, particularly the HLW waste facilities at Sellafield and elsewhere, has been described as 'unimaginable' by the nuclear industry (multiple Chernobyls) [4]. Yet UK waste facilities are a distinct if not obvious target, especially as possible 'tit-for-tat' retaliatory actions in the coming years or decades in response to military actions by 'friendly' administrations (US and or Israel) against Iranian nuclear facilities, probably with bunker-busting bombs.

It should also not be forgotten that there have been claims aired in the media of 'UK hypocrisy' with reference to the UK trying to stop an Iranian civil nuclear programme while promoting a new UK civil nuclear programme. Alarmingly, such considerations have had little apparent effect on the UK Government despite national security being considered a 'prime duty of any government'. Yet 'western hypocrisy' is a recruiting sergeant and prime motivator for some Middle East based terrorist groups. Such considerations should have a significant effect on the debate about nuclear waste

[1] representing only 2% of IEA forecast 2030 global energy consumption

policies as it is the 'interim period' in the next years and decades before any repository could be built, filled, and or isolated in which substantial security dangers exist and which could escalate.

It should also be considered that even after any repository is closed and sealed that the waste would still pose a security risk as just one bunker-busting bomb would probably wreck even the best engineered, best sited nuclear waste repository at any point in the future.

2.4 Timeline

According to one recent NDA letter [5], following discharge from a reactor, spent fuel would be placed in interim storage for a period of about 50 years before it could be packaged and emplaced in a repository. This would allow for cooling and some radioactive decay to ensure it met the waste acceptance criteria for disposal. It would then require a further 50 years in an open repository. Following this period, the repository could then be sealed and closed, which would take of the order 10 years and an additional ten years of monitoring.

So, assuming just legacy wastes were to be dealt with then the repository could begin closure some time around 2140, about 100 years after Sizewell B would have started de-fueling / decommissioning in 2035 (note 8 on page 12 of the consultation document indicates 2120). This is the industry's view. We do not know whether these figures could be met in practice. We are extremely doubtful whether it would be safe to close even a legacy waste repository at this stage without the need for a very substantial period of monitoring. We are concerned that even a period of fifty years before packaging takes the problem squarely on to a future generation, a problem which it would have had no choice in.

If new build programme wastes are included then the time to closure would be greatly extended. This contradicts the argument in the CoRWM Report that delaying closure increases the risk of Loss of Institutional Control. Assuming a final new-build reactor being commissioned in 2025, a reactor operating life of 40-60 years, interim storage of hot spent fuel of 50 years, 50 years in open repository, then closure could start somewhere around 2190, around 50 years, or possibly more, after closure of a legacy waste repository. Other countries propose much longer periods of monitoring, up to 300 years.

2.5 Ethical context

It appears to be accepted by Government that there is an ethical requirement, as well as a security requirement, to safely deal with the UK's long term nuclear waste legacy. Friends of the Earth welcomes this. However, a separate ethical consideration arises in relation to a new-build nuclear programme. The additional volume of any new-build programme wastes could affect both the location and or number of repositories, and most definitely would affect the timeline of storage / disposal / isolation with 'passive safety'. Consequently, the availability of non-nuclear energy solutions raises ethical questions about generating additional nuclear waste in a new-build reactor programme.

The view, expressed in a recently leaked Government document (Guardian 23rd Oct), that a strong drive by the UK to achieve a high contribution towards the EU's 20% by 2020 renewable energy

target would undermine the case for a new nuclear programme clearly indicates that non-nuclear alternatives are perceived to exist. However, any ethical considerations in avoiding new-build waste, or other issues, are currently not regarded as persuasive. Indeed, ministers and some civil servants appear to be basing their preliminary pro-nuclear view primarily on the perceived economic savings compared to the costs of constructing new non-nuclear generating capacity (renewables, CHP, possibly CCS, possibly solar renewable imports). So the Government's perceived economic savings are outweighing the combined ethical, security and proliferation considerations of new-build.

2.6 Economics

The Government's estimated savings from a new nuclear power programme are dependent on numerous assumptions and accounting methods (including insurance costs, decommissioning, repository and interim storage costs) and are unconvincing given the history of nuclear power. There are numerous cost implications arising from uncertainties within this very consultation. The Government's economic assumptions made about CHP and renewables are also questionable (eg the Government's CHP cost assumptions are considered inaccurate by environmental NGOs and energy specialists [6]). In practice, Friends of the Earth considers that the currently estimated nuclear savings would be unlikely to materialise in practice.

3. The MRWS consultation

3.1

Friends of the Earth is concerned that the consultation document implies a number of things that should not be implied. The consultation document implies by content and or line of questioning that:

- significant progress, if not scientific consensus on solutions, has been made on the technical aspects of nuclear waste 'disposal'
- waste 'disposal' in repositories is valid in the UK - yet there are different circumstances pertaining in other countries (in geology, in waste volume, condition and radio-activity, public information and understanding, etc)
- by omission that a new-build programme would not have significant implications for on new waste generation and a repository construction and operation
- by omission that interim storage is not an important issue for public debate . Interim storage was an important part of CoRWM's findings and CoRWM called for a review of the security which has not taken place.
- there are a variety of suitable geological areas of the required repository footprint in the UK which are also not compromised by existing infrastructure, etc (note: the RCF public inquiry identified no such suitable areas in all of the West Cumbrian region). [7]

3.2 Legacy waste and new-build waste scenarios

The consultation document does not draw out the issues and differences between planning repositories for legacy wastes or co-disposal with new build wastes or issues about interim storage before any repository could be built. New-build wastes would add significantly to the quantities of SF waste to be dealt with and they also would be much more radioactive, because of the higher “burn-up” rate. Consequently, there are various issues that we believe should have been drawn out for public debate.

The consultation focuses on disposal in a repository as the issue for public and Government engagement despite the fact that any UK repository is several decades away from being built. The consultation document indicates a repository opening around two to three decades from now (around 2035). Yet the NDA is on record as saying that an ILW repository would not be ready until about 2045 and a HLW / SF section in 2075. So interim storage, particularly of HLW and SF before 2075, is an issue, including the requirement for significant additional SF storage capacity, if a new-build programme were given the go-ahead.

New-build wastes would require an increase in both repository size and interim storage facilities. This would have various additional construction, worker influx and transport implications on any host communities. Workers would be exposed longer to dose limits and the security of the sites would be compromised as they would be required to stay open for much longer (around 50 years longer).

The scale of increase in repository size could be significant. In para 3.14 it estimates that HLW / SF would be of the order of 3 km2 for 9,440 m3 of 'packaged volume (from Table 2 page 12). A NIREX document dated Feb 2007 [8] states that (compared to legacy HLW / SF waste of 9,440 m3):

> The estimated increase in the volume of SF requiring long-term management is 18,000m3 to 130,000m3 (an increase by a factor of 2.3 to 16). The estimated waste volumes for the AP1000, which is often suggested as the most likely reactor design for new build reactors in the UK, are at the lower end of both of these ranges

An NDA report [9] dated October 2006 estimates that new-build SF waste would amount to about 31,900 m3 for a 10 GW AP1000 programme and 21,000 m3 for an EPR programme. This suggests that an AP1000 programme would increase the 'hot wastes' (legacy HLW / SF and SF only in new-build) repository footprint from 3 km2 to 13 km2 or an EPR programme from 3 km2 to 9.7 km2. So, the overall repository footprint would increase from 4 km2 for legacy wastes to 14 km2 including wastes from new-build (AP1000) or 11 km2 (EPR). The NIREX document estimates that the overall footprint would only be 50% (presumably 6 km2 in total) but it is not clear on the assumptions on which this figure is calculated.

If a co-disposal repository is anything like the 11 - 14 km2 scale then this would have even more significant implications than those noted above. It could well mean that possible geological sites are ruled out or require that separate repositories would need to be built. Such factors would have significant implications on new-build costs that have not been sufficiently included in this or the 'in principle' nuclear consultation which finished on 10th October.

The provision of additional SF interim capacity for new-build wastes, for secure storage during the 50 year pre-repository cooling period, would add significantly to costs and would introduce other complications. The current HLW liquid storage ponds at Sellafield are clearly inadequate and an urgent security review is needed to identify what needs to be done and the cost implications of any proposed plan. It would probably require above ground reinforced concrete stores of the necessary thickness (several meters) to withstand major attack.

3.3 Institutional issues

The current institutional arrangements are clearly inadequate. CoRWM recommended an "Oversight Body" (see below), and the House of Lords Science and Technology Committee has repeatedly called for a long term statutory Nuclear Waste Management Commission [10], a stronger body. The Government has accepted neither. This means that there is a complete lack of long term oversight and continuity on an issue which will last for centuries. CoRWM stressed that it had produced an integrated set of measures that should not be "cherry-picked", but the Government has done just that in this instance.

There is also a conflict of interest in the remit of the NDA, because it generates waste from reprocessing to fund clean-up, and is therefore a waste-producer. The NDA has integrated Nirex into its structure, which had its own institutional biases, eg a stated preference for the Sellafield site, and a belief, not shared by the regulators, that enough fundamental research has been done [11]. The NDA also owns the Sellafield ("Longlands Farm") site.

CoRWM defined an Oversight Body as having the characteristics listed below (this was CoRWM's view following the Government's response to CoRWM's recommendations of 31 July 2006, February 2007, Doc. 2135):

- independence from government and implementing body
- clearly defined objectives
- supervisory role for the whole implementation process, including necessary R&D
- ensuring appropriate public and stakeholder engagement
- ensuring openness and transparency of process

Friends of the Earth is also concerned that the new CoRWM does not have the most appropriate skill set (eg environmental policy making / stakeholder engagement). In Sweden we are informed that they value "stretching" ie getting in contrary opinions to explore issues. That is missing from CoRWM 2.

4. Summary

4.1 For the above reasons Friends of the Earth does not regard this consultation as full and fair for the following reasons:

- it tends to lead the consultee to assume that there is consensus that geological disposal can now address the various long-standing problems of what to do with long-term nuclear waste (in both the decade time scale and 100,000 year time scale);

- it does not draw attention to £400m worth of RCF studies or the numerous issues and outcomes of the major 1997 RCF public inquiry which are very pertinent for informed public debate;

- it does not draw out the distinctions and implications of legacy and new-build waste;

- it does not address the immediate issues of secure interim storage of HLW and spent fuel which is surely needed as soon as possible, especially given the security situation;

- it does not even outline the real possibility that the current international tension regarding Iran's nuclear programme and the foreign policy implications of supporting the building of new UK nuclear power programme could increase the risk of terrorist attacks against UK nuclear facilities.

Only when such issues are addressed can the questions of how best to identify potential sites, engage the public and involve nearby communities, be progressed in our view.

4.2

Friends of the Earth concludes that this public consultation, like the 'in principle' nuclear consultation that preceded it, is more an exercise of going through legal consultation procedures as distinct from a process of truly trying to engage, fairly inform, understand and respond to public opinion and knowledge. We believe that this is borne out of a desire to rush through a new nuclear programme because various influential interest groups want new nuclear power stations.

Tony Blair's public comment that 'nuclear power is back on the agenda with a vengeance' is surely a statement and sentiment that should give rise to the greatest of caution, as should Gordon Brown’s presumption that there would be a new nuclear stations at his first PQs. Unfortunately the Government is not showing caution with this inherently dangerous and unnecessary technology.

Yours sincerely

Neil Crumpton, Nuclear campaigner, Friends of the Earth (England, Wales and Northern Ireland)

Acknowledgements: I would like to thank former Assistant Energy Campaigners Phil Davies and Dr Jill Sutcliffe for their assistance in producing this submission.

References

[1] www.foe.co.uk/resource/press_releases/19960130122214.html
(witnesses and their expertise are listed)

[2] Figures from DUKES 2006 and IEA, percentages calculated on the (most relevant and fair) basis on 'final energy consumption' not Primary Energy Supply (PES) which is a measure of the energy content of the fuel (be it coal, oil, gas, uranium) as distinct from the output of the power station which includes significant thermal losses

[3] www.TRECers.net

[4] www.ucsusa.org/news/press_release/ucs-scientists-featured-in-indian-point-film-to-air-on-hbo-september-9.html, www.guardian.co.uk/uk_news/story/0,3604,578949,00.html

[5] NDA letter to question raised by Phil Davies dated (see Annex A for relevant extract)

[6] www.cleanheat.org, CHPA

[7] Article by Professor David Smythe who gave evidence as a witness for Friends of the Earth at the RCF inquiry (see Annex B for relevant extract)

[8] NIREX TECHNICAL NOTE The Gate Process: Preliminary analysis of radioactive waste implications associated with new build reactors Feb 07

[9] Potential Waste Volumes Arising from New Build - Statement Prepared by: Dr Paul Gilchrist, Strategy Manager, Spent Fuel, Nuclear Materials and HLW.
Nuclear Decommissioning Authority 17th October 2006 (www.berr.gov.uk/files/file39386.pdf)

[10] Most recently in Hansard 29.10.2007

[11] Nirex Viability Report, 2005, p91 and Environment Agency Review of this document, p4

Annex A

Extract from letter dated 24 Aug 2007 from John Mathieson, Acting Waste Management Strategies Co-ordinator, NDA to questions posed by Phil Davies:

'In summary, the technical answer to the first question is that following discharge from the reactor, spent fuel would be placed in interim storage for a period of about 50 years before it could be packaged and emplaced in a repository. This would allow for cooling and some radioactive decay to ensure it met the waste acceptance criteria for disposal. The repository is assumed to operate for about 50 years from first waste emplacement, during which time the waste would be monitored. Following this, the repository can then be sealed and closed, which would take of order 10 years. This would then be followed by a period of post-closure institutional control that would ultimately be determined in agreement with the regulators. On a purely technical basis, a period of about 10 years following sealing and closure of the repository would be sufficient to confirm the geological system was restoring to a state consistent with long-term passive safety. Therefore the technically based answer to your first question is that it would take of order 120 years from the time of spent fuel discharge from a reactor for the spent fuel to be disposed of with passive safety such that it required no further monitoring or intervention.

Annex B

Extract from article by Professor David Smythe who gave evidence as a witness for Friends of the Earth at the RCF inquiry:

The evidence presented to the Inquiry showed that the whole of the West Cumbrian region, not just the locality of the RCF, is geologically unsuitable for siting a waste repository. No geological or geotechnical advances have been made since 1997 that might reverse the scientific consensus, which teaches us that:

• The crystalline rocks at depth, the Borrowdale Volcanic Group (BVG), are too complex and criss-crossed by faults to be the host rock for a repository.
• The overlying sediments do not provide the ‘cap’ or seal in case of future leaks, but in fact host a vigorous fluid flow regime.
• There is no BUSC category of repository in the area.
• The BVG itself is too permeable, and the geology of the former volcanic caldera is far too variable on the scale of a repository, ever to be characterised and modelled sufficiently well to serve as a repository host.
• The area is also prone to occasional large earthquakes.
• The Sellafield-A option (disposal in anhydrite beds) is also untenable.