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Scotland's Higher Activity Radioactive Waste Consultation
The Scottish Government
Waste and Pollution Reduction Division
1-J Dockside, Victoria Quay
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Emailed to: radioactivewasteteam@scotland.gsi.gov.uk

Dear Scottish Radioactive Waste Policy Team,

SCOTLAND'S HIGHER ACTIVITY RADIOACTIVE WASTE POLICY CONSULTATION 2010 – SUPPLEMENTARY SEA CONSULTATION: OFFICIAL RESPONSE FROM NUCLEAR FREE LOCAL AUTHORITIES SCOTLAND

I provide an official submission from Nuclear Free Local Authorities (NFLA) Scotland to the supplementary consultation of the Scottish Government on the Strategic Environmental Assessment of Scotland's Higher Activity Radioactive Waste Policy.

For your information, the NFLA's terms of reference and its responses to nuclear policy consultations can be found on the NFLA website - http://www.nuclearpolicy.info. This response will also be placed on the NFLA website and is being emailed to NFLA member authorities.

The NFLA Scotland Forum's overall policy agrees with the Scottish Government's assertion to not support deep geological 'disposal' of radioactive waste and does not consider it to be a 'reasonable' alternative at this point in time. Our response outlines how we support this policy with our analysis of the key weaknesses of deep waste repositories.

1. 'Disposal' or 'repository?

As a point of principle, the NFLA does not agree with the term 'disposal' of radioactive waste. Radioactive waste cannot be 'disposed' of like other materials, it can only be stored and managed as safely as is possible. Deep geological *'disposal'* should be more correctly termed as developing a deep underground waste *repository*. The use of such language should be treated with care. The use of the word 'disposal' in the rest of this response should be read in that context.

2. Scientific problems and uncertainties around building a deep underground repository

2.1 NFLA Scotland agrees with the Scottish Government's concern that there are a large number of scientific problems and uncertainties with developing a deep underground waste repository. This is not simply due to the fact that Scottish radioactive waste contains a large amount of graphite and contaminated metals, but rather due to there being major scientific and technical problems and uncertainties. The NFLA notes the March 2010 report of the Nuclear Waste Advisory Associates (NWAA) – an independent group of consultants with real and in-depth expertise on radioactive waste management

matters - listing over 100 outstanding scientific and technical issues with nuclear waste 'disposal'. (1).

2.2 NWAA extensively quoted the European Commission Joint Research Centre's (JRC) 2009 report on 'disposal'. (2) It was interesting to note that, despite the numerous problems JRC reported, their overall conclusion made in the report was that the technology of geological disposal has developed well enough for programmes to be implemented. However, in the NFLA's and NWAA's view this conclusion was based largely on a description of ongoing research projects – rather their results - and nuclear agency reports, which tend to be collective statements based on views rather than an analysis of scientific literature. Only three papers published in scientific journals are referenced in the JRC report.

2.3 Importantly the JRC report falsely claims that it is mainly due to a lack of public acceptance that repository programmes in Germany and the UK have (temporarily) foundered, rather than because of scientific problems that jeopardise safety. This was clearly the reason why the NIREX attempt to develop a deep waste repository failed in 1997.

2.4 Similarly, the Organisation for Economic Co-operation and Development"s (OECD"s) Nuclear Energy Agency (NEA) states that *"geological disposal is technically feasible"* and that a *"geological disposal system provides a unique level and duration of protection for high activity, long-lived radioactive waste*. (3) Again these statements are based solely on the collective views of its Radioactive Waste Management Committee, not on an analysis of the existing scientific evidence.

2.5 A literature review of papers in scientific journals for Greenpeace International (GPI) (4) provides an overview of the status of research and scientific evidence regarding the long-term underground disposal of highly radioactive wastes. It identifies a number of phenomena that could compromise the containment barriers, potentially leading to significant releases of radioactivity.

2.6 Prior to the burial of radioactive wastes in a deep disposal facility, the nuclear industry must demonstrate that the amount of leakage would not be excessive. The waste would be dangerous for hundreds of thousands to millions of years into the future – and on this basis alone the nuclear industry predictions hardly seem credible. The wastes and the disposal system are expected to behave in an extremely complex manner. In the NFLA's view, many of the processes involved are poorly understood and many of the assumptions made to predict the rate of leakage are impossible to verify. Unless and until these difficulties can be resolved, the data suggests that it is quite likely that a significant release of radioactivity from a deep burial facility could occur, with serious implications for the health and safety of future generations. **This has to be the essential reason why 'deep disposal' should be discounted.**

2.7 There are a number of low-level and intermediate-level radioactive waste disposal sites operating overseas in the last 50 years. Many of these supposedly 'final disposal' sites have already caused unexpected environmental contamination. This highlights how difficult it is to predict what would happen to buried wastes, even over short timescales. Examples include the Centre de Stockage de la Manche storage site in France, where water supplies in the aquifer have become contaminated, (4) and also the Asse II salt mine in Germany where safety problems, including the leaking of saline water into the chambers, persuaded authorities to retrieve and repackage the waste. (5) Despite the fact that nuclear programmes have been in existence for over half a century there is no dump anywhere in the world for high level wastes.

3. Brief summary of some of the technical issues that jeopardise the safety of deep underground radioactive waste repositories

3.1 **Corrosion**: An argument that is absolutely fundamental to the nuclear industry's assumptions concerning dump safety is that the waste containers would last for an extremely long time – and so hold the radioactivity deep underground. However, experimental data indicates that the mechanisms for corrosion are not fully understood. As a result copper and steel could corrode more quickly than expected and so allow faster than predicted release of radioactivity. Three key issues are the role of bacteria; the rate of corrosion occurring in the absence of oxygen; and also the impact of the intense radiation.

3.2 **Backfill**: The material packed into the space between the wastes and the rock wall is known as "backfill". "Bentonite" clay is most often quoted as the backfill material that would be used and it is meant to play an important role in trapping leak radioactivity. However, the intense heat coming from the wastes could seriously jeopardise bentonite's ability to act as a radionuclide trap. Chemical and physical disturbance due to corrosion, gas generation and biomineralisation (the process of bacteria producing minerals) could also affect the properties of the bentonite backfill.

3.3 **Solubility, sorption and transport of radionuclides**: Generally speaking the chemical processes that would occur in a deep disposal facility are very poorly understood. Chemical effects, such as the formation of colloids and the role of microbes, could speed up the transport of some of the more radiotoxic elements such as plutonium. Build-up of gas pressure in a repository could damage the barriers and force fast routes for radionuclide escape through crystalline rock fractures or clay rock pores. Radioactive carbon dioxide and methane could also be released – which would have very serious implications for the dose of radioactivity that people received – due to the fact that carbon is a critically important for biological systems.

3.4 **Bedrock properties and hydrogeology:** Unidentified fractures and faults, or poor understanding of how water and gas will flow through faults, could lead to the release of radionuclides much faster than expected. In addition excavation of a repository could create fast routes for radionuclide escape through the part of the rock damaged by the excavation.

3.5 **Other issues**: There are a number of other issues which need to be considered including human error and human intrusion; future glaciations and earthquakes.

4. Conclusion

4.1 In the NFLA's view, it is clear there are serious problems with proposals for deep burial of radioactive wastes. The vast majority of funding for radioactive waste scrutiny is focussed on the nuclear industry, which have a vested interest in minimising the problems. This is particularly the case in the context of plans for the construction of new nuclear reactors – which would necessarily create more wastes.

4.2 The regulators are responsible for reviewing safety cases and ultimately for licensing facilities. In the UK in the late 1980s / early 1990s "Her Majesty Inspectorate of Pollution" (HMIP), the predecessor to the Environment Agency, invested heavily in a research programme on disposal safety that was independent of the nuclear industry, producing an extensive series of high quality reports. However, at the critical moment, when the initiation of the proposed disposal programme was the subject of a Planning Inquiry the

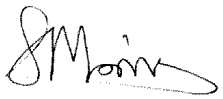
HMIP withheld their research. Friends of the Earth submitted the documents and cross-examined the nuclear industry on the basis of their contents. Greenpeace and Cumbria County Council also opposed the 1990s proposal. Following the scrutiny carried out at the Inquiry, the proposal was rejected by the UK Government in 1997. At the inquiry, it is important to note that the objecting groups had a total budget one hundredth of the nuclear industry but nevertheless succeeded in demonstrating significant problems with the safety case by referring to the HMIP research plus sufficient alternative expertise.

4.3 In 2008 Planning law in England and Wales was changed, so that the cross examination of future proposals will not be possible. The Environment Agency and the Scottish Environmental Protection Agency needs to establish a way in which independent research can be carried out which is quite separate from nuclear industry directed research. The Scottish Government should consider this issue carefully.

4.4 To sum up, the NFLA supports the Scottish Government's assertion that deep geological 'disposal' should be discounted. This though is not simply because Scottish radioactive waste is mainly graphite or contaminated metals as the Scottish Government notes, but because of the long-list of outstanding technical and scientific problems associated with building a deep underground radioactive waste repository. Our submission above outlines this in detail.

If you have any specific queries with any of this NFLA Scotland submission please do not hesitate to contact me.

Yours sincerely,



Nuclear Free Local Authorities UK and Ireland Secretary
(On the delegated authority of the NFLA Scotland Convenor, Councillor Euan McLeod

5. References

(1) NWAA Issues Register, Nuclear Waste Advisory Associates, March 2010.
http://www.nuclearwasteadvisory.co.uk/uploads/6901NWAA%20ISSUES%20REGISTER%20COMMENTARY%20letterhead.doc

(2) W.E. Falck and K.-F. Nilsson "*Geological Disposal of Radioactive Waste: Moving Towards Implementation*", European Union – Joint Research Centre – Reference Report.
http://ec.europa.eu/dgs/jrc/downloads/jrc_reference_report_2009_10_geol_disposal.pdf

(3) OECD/NEA, 2008. Moving for*ward with geological disposal of radioactive waste: An NEA RWMC coll*ective statement. NEA/RWM(2008)5/REV2.
http://www.nea.fr/html/rwm/docs/2008/rwm2008-5-rev2.pdf

(4) Helen Wallace, Rock Solid? A Scientific Review of Geological Disposal of High Level Radioactive Waste, Greenpeace International, Genewatch UK, September 2010.
http://www.greenpeace.org/raw/content/eu-unit/press-centre/reports/rock-solid-a-scientific-review.pdf

(5) ACRO. 2009. Gestion des déchets radioactifs: les leçons du Centre de Stockage de la Manche. Centre sans mémoire, centre sans avenir? Greenpeace France 25th June 2009.

http://www.greenpeace.org/raw/content/france/presse/dossiers-documents/rapport-gestion-desdechets-radioactifs.pdf

(6) Asse II. Website on: http://www.endlager-asse.de/cln_094/EN/1_Home/home_node.html