

Nuclear Free Local Authorities **RADIOACTIVE WASTE POLICY** **Briefing No.49 – Management of UK NORM Waste**

Prepared for NFLA member authorities, April 2014

Model response to Joint Governments Consultation on a ‘Strategy for the management of Naturally Occurring Radioactive Material (NORM) waste in the UK’.

“Since Ra [Radium] and Rn [Radon] are **among the most radio-toxic substances existing**, causing bone and lung cancer at relatively low concentrations, special attention must be devoted to their appearance in nature” [emphasis added] (1)

1. Overview of policy briefing

This edition of the NFLA’s Radioactive Waste Policy Briefing provides member authorities with background and a model response to the Governments’ consultation on a strategy for the management of naturally occurring radioactive material (NORM) waste across the UK. It has been developed jointly by the UK Government, Scottish Government, Welsh Government and the Northern Ireland Department of the Environment.

The Governments’ joint policy is to facilitate the sustainable and efficient management of Low Level Radioactive Waste in line with the waste hierarchy. This requires a policy framework which enables and encourages waste producers to avoid the production of unnecessary waste, and to manage arisings in the most environmentally appropriate way. This NFLA model response to the consultation has been developed by its Policy Advisor in discussion with the NFLA Secretary.

The Scottish Government has led on the development of this consultation and is coordinating the consultation process. Member authorities are encouraged to send their own adapted local version of this model response to the Scottish Government before the consultation closes on **8th May 2014** by emailing it to: NORMstrategy@scotland.gsi.gov.uk or posting it to: Radioactive Waste and Nuclear Decommissioning Policy, Environmental Quality Division, Directorate for Environment & Forestry, The Scottish Government, 1-D North, Victoria Quay, Edinburgh, EH6 6QQ

2. Introduction to NFLA model response

Natural background radiation is not safe. (2) In the UK it has been estimated that it causes, on average, about 6,000 to 7,000 future cancer deaths per year. (3) Consequently when naturally occurring radioactive materials (NORM) are concentrated through industrial activities, they need to be treated with extreme caution.

Current policy for Solid Low Level Radioactive Waste was set out in a joint UK policy document published in 2007. (4) This policy expects waste producers to avoid the production of unnecessary waste, and to manage arisings in the most environmentally appropriate way. This means facilitating the “sustainable and efficient management of Low Level Radioactive Waste in line with the waste hierarchy”.

The 2007 policy statement for the whole UK covered solid low level waste. The NDA went on to produce a strategy for the nuclear industry, (5) and DECC published the first part of the joint UK strategy for the non-nuclear industry (covering anthropogenic waste, for example from hospitals and universities) in 2012. (6)

While this consultation on Naturally Occurring Radioactive Material (NORM) is intended to be the final strategy document in this series, it is not restricted to solid waste. It also covers liquids and gaseous wastes too. And while there is no evidence of NORM waste arisings with a level of activity higher than low level waste (LLW), it is at least a theoretical possibility, so this consultation is not restricted to LLW. (7)

The NFLA has difficulty with the application of the waste hierarchy to nuclear waste management, preferring instead to rely on a clear set of environmental principles. The use of the waste hierarchy tends to be used to promote 'recycling' or other forms of waste management, such as incineration, which can result in dilution and dispersal of radioactive substances, rather than its concentration and containment.

Environmental Principles

The NFLA Steering Committee agreed a set of clear environmental principles which should be used for the management of nuclear waste in October 2004 at its Annual General Meeting in Hull. These are:

- **The idea that radioactive waste can be "disposed" of be rejected in favour of radioactive waste management;**
- **Any process or activity that involves new or additional radioactive discharges into the environment be opposed, as this is potentially harmful to the human and natural environment;**
- **The policy of 'dilute and disperse' as a form of radioactive waste management (i.e. discharges into the sea or atmosphere) be rejected in favour of a policy of 'concentrate and contain' (i.e. store safely on-site);**
- **The principle of waste minimisation be supported;**
- **The unnecessary transport of radioactive and other hazardous wastes be opposed;**
- **Wastes should ideally be managed on-site where produced (or as near as possible to the site) in a facility that allows monitoring and retrieval of the wastes.**

3. Waste Minimisation

Where NFLA does agree with the waste hierarchy is on the policy of waste prevention and waste minimisation. However, NFLA believes this should be applied more rigorously than simply just "...encourage[ing] waste producers to avoid the production of unnecessary waste ..."

The whole ethos behind this consultation appears to be to create a framework which removes barriers to the growth of industries which create NORM waste, which means that although more efficient waste management practices may be promoted, the overall quantity of waste produced will be increased, and ultimately an increased risk to health. Instead NFLA argues the Governments' should be asking whether these new activities which produce emissions of radioactive substances into the environment are justified, and can show that the benefits outweigh the potential health risks. If there are alternative ways of producing the same outcome e.g. providing our energy, without harmful radioactive emissions, then the NFLA argues the Governments' should be asking whether it wants these industries to grow at all.

4. Gaseous waste

One particular area of concern is that of industrial sectors which generate gaseous NORM wastes. Currently the only industrial sector which requires permitting is the iron and steel sector. All three UK iron and steel facilities have permits with appropriate limits and conditions to dispose of these wastes directly to the atmosphere.

Chapter 6 of the consultation document discusses longer-term developments and monitoring, and has a section on shale gas, but no mention of gaseous NORM discharges.

There is evidence from Queensland in Australia of high levels of radioactive radon gas, up to three times above normal from coal bed methane gas fields. (8) There has also been increased interest in the possible human exposure to radon as a component of natural gas in household settings after a report by Marvin Resnikoff in 2012. (9)

Radon gas is highly mobile in the environment. Radon and its decay products are highly radiotoxic. For example, polonium-210 was the radionuclide used in the death of the Russian dissident Alexander Litvinenko in London in 2006. Radon travels in gas pipes and decays to stable lead and the longer-lived radioactive lead isotope Pb-210, which has a half-life of 22 years. This builds up in thin layers in gas extraction equipment. Radon gas is also readily soluble in the water extracted from gas wells. (10)

If the exploitation of unconventional oil and gas onshore is to go-ahead in the United Kingdom, more work will need to be done to understand the scale of the radioactive gas problem. Firstly, baseline radon gas levels will need to be established before any drilling begins. Then subsequently there will need to be continuous monitoring. The potential health effects of radon gas emissions from the exploitation of unconventional oil and gas will need to be examined on a case-by-case basis.

The Government's advisory body Public Health England has recommended that "*Baseline environmental monitoring is needed to facilitate the assessment of the impact of shale gas extraction on the environment and public health. There should also be consideration of the development of emission inventories as part of the regulatory regime.*" (11)

5. Liquid Waste

The consultation document says: there is "*large uncertainty regarding the quantity and radiological characteristics of liquid waste (known as flow back waters) that will be generated from shale gas extraction that uses hydraulic fracturing.*" But it also says that if the market for extracting unconventional gas expands as predicted, it is likely to increase the volume of liquid NORM waste generated. On site treatment options may be feasible, but there may also be a need for some liquid NORM to be sent to specialist NORM wastewater treatment service suppliers. After treatment, the water may still retain some natural radioactivity when disposed to rivers, estuaries, sea or groundwater.

To give an idea of the scale of the problem Dart Energy is proposing to discharge a total of 1.68 GBq (billion becquerels) per year via produced water in outflow streams and pipelines into the river Forth from its proposed Coal Bed Methane extraction at Airth near Falkirk. This would be about three times the level of radioactivity discharged into the Forth by Rosyth Dockyard in 2012. So it is a very large amount of radioactivity. Such levels of radioactive contamination would be a high price to pay for the methane gas produced. The NFLA argues the question that the Governments' should be asking is whether it is really necessary to do this? Are there alternative and more environmentally sensitive ways of satisfying energy needs in the UK? In the NFLA's view there is – a combination of a wide renewable energy mix, a concerted local authority led energy efficiency programme and the development of community-orientated microgeneration projects.

6. Health Impacts

The European Commission recommends that a higher level of human exposure should be allowed from NORM in comparison to anthropogenic sources of radiation. The Commission cites the ubiquity and variability of background radiation as the reason for a higher exposure limit for NORM radiation. Given the thousands of deaths caused every year by background radiation this makes very little logical sense. In NFLA's view the UK should stick to the same dose criterion used for regulating anthropogenic practices.

7. Response to Consultation Questions

Question 1: Do you have any comments on chapter 1, which includes discussion of the background, scope and objectives for the proposed NORM waste strategy?

NFLA does not agree with the objective of “predict and provide” which is what is being proposed. Instead NFLA argues that the question the Governments’ should be asking is whether new activities which produce radioactive discharges into the environment are justified and can show that the benefits outweigh the potential health risks. If there are alternative ways of producing the same outcome e.g. providing our energy, without harmful radioactive emissions, then the Governments’ should be asking whether it wants these industries to grow at all.

Question 2: Do you have any comments on chapter 2, which includes discussion of the current regulatory framework in the UK for NORM wastes, including the land use planning system?

Given the thousands of deaths caused every year by background radiation, it makes very little logical sense to NFLA to allow a higher level of human exposure from NORM in comparison to anthropogenic sources of radiation. In NFLA’s view the UK should stick to the same dose criterion used for regulating anthropogenic practices.

It is difficult to see how the UK could meet its commitment under the OSPAR Treaty to achieving a progressive and substantial reduction of discharges into the marine environment whilst implementing a ‘predict and provide’ policy for industries which generate discharges of radioactivity.

Question 3: Do you agree Chapter 3 adequately describes UK NORM waste arisings and routes for treatment and disposal? What additional information can you provide?

This consultation claims to be developing a strategy for NORM waste up to the activity of Low Level Radioactive Waste and above. This mean up to an activity of at least 12,000 Bq/gram beta/gamma. However, according to the consultation document there are four landfills which can accept NORM waste, but these impose activity limit of 200 Bq/g. In the NFLA’s view, there should be an explanation about what would happen to higher activity waste at the current time, or it should be stated that such waste is not currently being produced.

Question 4: Do you agree with the Key Themes for the NORM waste strategy set out in Chapter 4? What different or additional themes should the strategy address?

The consultation document talks about the need for proportionately regulated waste management routes, but the NFLA believe it is not clear what is being proposed for wastes above 200Bq/g.

The NFLA also believe it is not at all clear why disposal of wastes above the Very Low Level Radioactive Waste category (4Bq/g) is allowed in ordinary landfill sites. (12)

Question 5: Do you have any comments on how NORM waste producers are performing with respect to the roles and responsibilities set out in Chapter 4?

No.

Question 6: Do you agree that the various values underpinning NORM waste regulation should be reviewed? If yes please provide any information you feel would be appropriate to take into account including how best the outcome of the review can be implemented.

NFLA does not believe that the case has been made for using different criteria when considering regulation of NORM compared with those used for practices dealing with anthropogenic radionuclides. The idea that the ubiquitous nature of NORM somehow backs this argument is nonsense and conflates natural background radiation, which there is very little state agencies can do anything about (apart from dealing with radon gas in some houses); and natural radiation which has been concentrated by unnatural industrial processes.

Question 7: Do you have any comments about the implementation of Article 37 requirements in the UK with respect to the management of NORM waste?

NFLA will keep this under review, but paragraph 5.9 of the consultation document does make it sound as if the producers of NORM waste are attempting to achieve lighter regulation than the producers of anthropogenic radioactive waste. This concerns NFLA greatly.

Question 8: Do you have any comments about the regulation of the import and export of NORM waste in the UK?

In general NFLA would support the application of the same environmental principles to NORM waste as it believes should be applied to anthropogenic radioactive waste. This means that under the proximity principle, where possible, waste should be managed as close to the site where it is produced as is possible.

Question 9 – 19.

No further comments.

8. Conclusion

NFLA rejects the idea that NORM waste should be treated differently to anthropogenic radioactive waste. The same environmental principles should be applied to the management of both. NFLA does not wish to see Low Level Radioactive Waste, whether NORM or anthropogenic, distributed around the country in landfill sites, and NFLA are disturbed by the blurring of the distinction between Low Level Waste and Very Low Level Waste.

Most importantly, NFLA rejects the idea that disposal facilities should be provided to order so as to allow the expansion of industries which produce NORM waste. NFLA believe instead that where there are alternative ways to carry out the task without producing NORM, that alternative should be implemented.

9. References

- (1) Hoppin, G. Rydberg, J. Liljenzin, J.O. Radiochemistry and Nuclear Chemistry, Butterworth, Heinmann, Oxford 1995
- (2) Edwards R (1996) Natural Radiation May Kill Thousands. New Scientist, May 4 1996, p4. <http://www.newscientist.com/article/mg15020280.300-natural-radiation-may-kill-thousands.html>
- (3) Robb JD (1994) Estimates of Radiation Detriment in a UK Population. NRPB Report R-260. National Radiological Protection Board. Chilton. Oxon.
- (4) <http://www.scotland.gov.uk/Resource/Doc/30701/0048172.pdf>
- (5) UK Strategy for the Management of Solid Low Level Radioactive Waste from the Nuclear Industry, NDA August 2010 <http://www.nda.gov.uk/loader.cfm?csModule=security/getfile&pageid=41241>
- (6) Strategy for the management of solid low level radioactive waste from the non-nuclear industry in the United Kingdom Part 1 – Anthropogenic radionuclides https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48291/4616-strategy-low-level-radioactive-waste.pdf

- (7) In the UK LLW is defined in as radioactive waste having a radioactive content not exceeding four gigabecquerels per tonne (GBq/te) of alpha or 12 GBq/te of beta/gamma activity.
- (8) Tait, D et al, Enrichment of Radon and Carbon Dioxide in the Open Atmosphere of an Australian Coal Seam Gas Field, Environmental Science and Technology, 2013, 47, 3099–3104. http://www.fraw.org.uk/files/extreme/tait_2013.pdf
- (9) Resnikoff, M., 2012, Radon in natural gas from Marcellus Shale: NEOGAP, Network for Oil & Gas Accountability and Protection, 14 p., available at http://www.neogap.org/neogap/2012/01/18/radon-in-natural-gas-report-resnikoff_1-10-12/
- (10) See for example Precognition by Dr Ian Fairlie on behalf of Concerned Communities of Falkirk, March 2014 [http://faug.org.uk/sites/default/files/\(2\)%20Dr%20Ian%20Fairlie%20\(IS1\)%20-%20CCoF%20Precognition.pdf](http://faug.org.uk/sites/default/files/(2)%20Dr%20Ian%20Fairlie%20(IS1)%20-%20CCoF%20Precognition.pdf)
- (11) Public Health England. 2012. Review of Potential Public Health Impacts of the Exposure to chemical and radioactive pollutants as a result of shale gas extraction. PHE, London <http://www.hpa.org.uk/Publications/Environment/PHECRCEReportSeries/PHECRCE002/>
- (12) See http://www.environment-agency.gov.uk/static/documents/Business/LLW_FAQ_April_2011.pdf which states that the 2007 policy has introduced a new category of waste: 'high volume very low-level waste' (VLLW). This is a subset of LLW, with very low activity levels. The policy states that it can be disposed of to landfill, providing it is controlled in ways that we specify.