



ENVIRONMENTAL PRINCIPLES FOR RADIOACTIVE WASTE MANAGEMENT

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Introduction

The UK nuclear industry, its regulators, government agencies and policy advisory bodies have in recent years attempted to change policies and activities related to nuclear waste management. Many of these have failed in gaining public support. This lack of confidence is, Greenpeace believes, due primarily to the fact that the policies and their implementation are not based on clear environment principles.

Current policy on nuclear waste management is based on a 1995 document¹ - this assumed a deep geological repository would proceed. That in itself (as will be discussed below) would have breached a number of key principles that the environment movement, with public support, has been arguing for i.e. the dump was an attempt at a 'solution' without the principle of waste minimisation/avoidance being discussed. The whole process behind the NIREX dump proposal was not informed by environmental principles. Had it been, a clearer path for dealing with radioactive waste may have emerged that may have gained public support.

As it is, at present the UK's nuclear waste system is in disorder, with policy being made 'on the hoof'.² In an effort to break some of the impasse, the Radioactive Waste Management Advisory Committee (RWMAC) has called for a review of the principles underlying the regulatory system.³ But policy is slowly being re-written, without underlying environmental principles. Proposals are appearing piecemeal, objectives are contradictory, priorities unclear, and policy often so vague that regulators and nuclear operators can take from it what they wish.

The decisions in the last two years put RWMAC in abeyance, establish the Nuclear Decommissioning Authority (NDA), continue with NIREX (with its very limited remit) and set up the Committee on Radioactive Waste Management (CORWM) underline the scatter gun approach to nuclear waste issues by Whitehall. At the time of writing at least five other consultations are ongoing, all dealing with small parts of policy, revealing a lack of 'joined-up government'. Westminster is not well-served by this

Ministers refusal to include underlying environmental principles in the Energy Bill, which will establish the Nuclear Decommissioning Authority (NDA) adds to concerns about the Government's real agenda on this issue – are financial considerations, or nuclear revival, really driving the nuclear waste agenda rather than protection of human health and the

¹ Review of Radioactive Waste Management Policy: Final Conclusions. HMSO (1995). Cm2919.

² RWMAC (March 2003) Management of Low Activity Solid Radioactive Wastes within the United Kingdom. Para A3.21

³ RWMAC 23rd Annual Report para 3.13

environment? Similarly, accommodating future plans for waste creation under military activities (to which these principles should also apply) means that best environmental practice is not being followed.

If new policies are to inspire public confidence, and have the affect of protecting human health and the environment there should be a clear set of environmental principles underpinning all future activities. Once these are agreed, discussions on updating the regulatory system and nuclear policies can take place. It is in this spirit that GP offers the following for discussion. These principles are not set in stone, but are, we believe, a start in laying the foundations upon which any good nuclear waste policy and programmes should be based. The principles are not in a particular order of priority - priorities will differ depending on the wastes being dealt with.

Environmental Principles – the key objective

This document outlines the environmental principles Greenpeace believes should underlie all Government policy, nuclear regulation and activities. The combined objective of these principles is:-

to maximize protection of human health and the environment from the harmful effects of radiation in all operations involving the production or management of radioactive materials and waste.

(1) The Waste Minimization/Avoidance Principle

Definition: The creation of radioactive waste (solid, liquid and gaseous) should be minimized.⁴ First and foremost this means we need to stop producing more nuclear waste; nuclear power stations need to be phased-out as quickly as possible, and reprocessing, which magnifies the waste problem, should end. Existing waste management and the decommissioning of nuclear facilities needs to minimise the production of new waste during their operations.

Example of current policy failures: The NDA will allow the continued operation of waste-producing facilities e.g. the THORP reprocessing plant at Sellafield. It should instead get on with the job it was originally thought of for which is to focus “squarely on [dealing with] the nuclear legacy”⁵, not on generating new nuclear waste which will exacerbate current problems.

(2) The Passively Safe Principle.

Definition: Radioactive material in existing waste should be immobilized in a stable chemical and physical form utilizing Best Available Technology (BAT), so that the need for maintenance and human intervention is minimized. Waste stores should be monitored and

⁴ From DEFRA (2000) Statutory Guidance on the Regulation of Radioactive Discharges into the Environment from Nuclear Licensed Sites: Consultation Paper.

⁵ DTI (July 2002) Managing the Nuclear Legacy: A Strategy for Action, para 1.12

waste should be capable of being retrieved from storage for further remedial action or repackaging if necessary.⁶

Example of current policy failure: RWMAC says 88% of Intermediate Level Waste (ILW) is stored in a potentially dangerous condition - some in 40-50 year old buildings.⁷ ILW remained largely untreated prior to 1997 because it was thought best to delay treatment and packaging in case a particular form of treatment proved incompatible with the characteristics of a future underground dump.⁸ Although a dump is unlikely to happen (if ever) within decades, ILW continues to be stored in hazardous conditions.

(3) The Reversibility Principle.

Definition: Allied to the passively safe principle is the principle that any waste management technique needs to be reversible. Given the uncertain state of scientific knowledge of the way radionuclides behave in the environment and their impact on the health of humans and other biota, it is important to be able to retrieve radioactive waste to take account of any unexpected changes in conditions and prevent detrimental impacts on the environment.

Example of current policy failure: Plutonium discharged to the Irish Sea from Sellafield was expected to remain bound to sediments mainly within the Irish Sea region. However, recent studies have shown that this plutonium is potentially more bioavailable than hitherto believed.⁹ Plutonium is now being found on the Eastern Scottish and Norwegian coasts.¹⁰

(4) The Concentrate and Contain Principle

Definition: Where possible gaseous and liquid radioactivity should be trapped instead of being discharged from a nuclear facility, and then concentrated, immobilised, and stored as a solid waste. This is far preferable to releasing gaseous or liquid radioactive wastes into the environment – the so-called dilute and disperse approach. If possible, advantage should be taken of radioactive decay to reduce levels of radioactivity by keeping wastes in storage as an alternative to increasing or continuing discharges.

Example of current policy failure: Draft Guidance to the Environment Agency (EA)¹¹ says “*the unnecessary introduction of radioactivity into the environment is undesirable, even at levels where the doses to both humans and non-human species are low, and on the basis of current knowledge are unlikely to cause harm*”. However, the UK Strategy for Radioactive Discharges 2001-2020 accepts that some discharges may increase as a

⁶ See for example: HSE Nuclear Safety Directorate (13/03/01) Guidance for Inspectors on the Management of Radioactive Materials and Radioactive Waste on Nuclear Licensed Sites. Appendix 4.

⁷ RWMAC & NuSAC (June 2002) Current arrangements and requirements for the conditioning, packaging and storage of Intermediate Level Radioactive Waste.

⁸ Environment Agency Guidance on the Conditioning of Intermediate Level Waste

⁹ SNIFFER (August 2003) “Studies on the solid speciation and remobilisation of plutonium in northern Irish Sea waters” AIR(99)01 <http://www.sniffer.org.uk/>

¹⁰ New Scientist 27th February 1999. By Rob Edwards; Sellafield waste poisoning the east coast, says study. Sunday Herald 4th April 1999. By Rob Edwards; Now you see it... It's official: some of Sellafield's plutonium is missing. New Scientist 24 April 1999. By Rob Edwards

¹¹ DEFRA (2000) Statutory Guidance on the Regulation of Radioactive Discharges into the Environment from Nuclear Licensed Sites: Consultation Paper. The Scottish Executive has yet to publish a similar draft document for the Scottish Environment Protection Agency.

consequence of decommissioning. At Springfields Nuclear Fuel Fabrication Plant, BNFL is planning to 'decontaminate' some equipment, and scrap metal¹² leading to totally unnecessary increases in discharges. Decommissioning should not automatically lead to, or be used as an excuse, to increase radioactive discharges into the environment.

(5) The Hazard Prioritisation Principle.

Definition: The magnitude of the radioactive hazard should influence the timing of the implementation of passive storage and immobilisation. High Level Waste (HLW) in a liquid form represents one of the most significant radioactive waste hazards in the UK (if not the most hazardous) and should be placed in a passively safe state as soon as possible.¹³

Example of current policy failure: Solidifying the liquid, heat-generating HLW at Sellafield and Dounreay is the most urgent step required to reduce the hazard of existing waste. Extremely dangerous liquid HLW must be constantly cooled. If just 50% of the HLW stored in tanks at Sellafield were to escape due to an accident or malicious act, the radioactive plume could be equal to 44 Chernobyls in terms of radioactive release.¹⁴ The Nuclear Installations Inspectorate (NII) has ordered BNFL to reduce stocks to a buffer level by 2015.¹⁵ This timetable is too lengthy, as is the UKAEA's plan to deal with Dounreay's HLW around 2010.^{16, 17}

(6) Sustainable Development and Intergenerational Equity

Definition: Development which meets the needs of the present without compromising the ability of future generations to meet their own needs and that of environmental protection.¹⁸

Example of current policy failure: Nirex's sustainability principles¹⁹ say that we should seek to minimise the further burdens imposed on this, and future generations for the management of radioactive waste. Our scientific understanding is not sufficiently advanced to be able to predict the impact of underground nuclear waste dumping on human health or the environment. The concept relies on diluting and dispersing waste in groundwater, rivers and the sea – it is not nuclear waste containment. It would be more responsible to bequeath future generations a well-managed, monitorable retrievable waste store than a waste dump from which radioactive materials will eventually return to the surface. A nuclear waste dump with all its potential problems is, therefore, not a way to protect future generations from problems arising with radioactive wastes. The most sensible way to reduce further burdens on present and future generations would be to stop creating more nuclear waste now by closing existing facilities as soon as possible.

¹² BNFL submission to the Environment Agency's Review of Springfields Radioactive Discharge Authorisations. Sect. 3

¹³ HSE Nuclear Safety Directorate (13/03/01) Guidance for Inspectors on the Management of Radioactive Materials and Radioactive Waste on Nuclear Licensed Sites. Appendix 4.

¹⁴ European Parliament, Scientific and Technological Options Assessment (November 2001) Possible Toxic Effects from the Nuclear Reprocessing Plants at Sellafield (UK) and Cap de La Hague (France). Para 5.5

¹⁵ HSE (Feb 2001) Progress on BNFL's Response to Three Reports issued by HSE on 18th February 2000.

¹⁶ RWMAC (September 2001) Advice to Ministers on the Restoration of the UKAEA Dounreay Site.

¹⁷ RWMAC (December 2003) 23rd Annual Report.

¹⁸ See http://www.sustainable-development.gov.uk/what_is_sd/what_is_sd.htm

¹⁹ Nirex (December 2000) Managing Radioactive Waste.

(7) The Polluter Pays Principle

Definition: Nuclear operators producing waste should pay for its management. Because much of the waste doesn't arise until after the facility has closed and stopped producing an income and because of the longevity of the wastes created during operations (e.g. spent nuclear fuel), operators need to accumulate adequate funds, in a segregated account, over the lifetime of the facility for long term management. Private sector problems should not become public sector problems - taxpayers should not be expected to shoulder the ever-increasing financial burden of wastes from the private nuclear sector. Similarly, Government owned entities should not assume that the taxpayer should continue to fund the management of their ever-increasing waste stockpiles.

Example of current policy failure: BE's segregated fund proved insufficient to fund its liabilities. The Government is taking financial responsibility for around £3.3bn of its waste management & decommissioning costs. The Energy Bill, currently passing through Parliament, would be an ideal opportunity to ensure the taxpayer doesn't end up paying for similar liabilities in future. Unfortunately the Government is refusing to do this. The provisions in the Bill to allow the BE rescue are written generally so if "... a private sector operator cannot meet its nuclear obligations [the Government] retain[s] the possibility of ... meeting such costs."²⁰ Further, the Government has also said that other private nuclear operators may need to be bailed out for their liabilities and decommissioning and has provided for this in the Energy Bill.

(8) The Precautionary Principle

Definition: Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.²¹

Example of Current Policy Failure: Uncertainties in estimates of radiation doses and the risks associated mean a precautionary approach to discharging radioactivity into the environment should be followed. The Draft Guidance on Radioactive Discharges to the EA says:-

"The principle of 'progressive reduction' is a central tenet of the way in which radioactive discharges should be controlled. It takes primacy over other considerations, apart from safety ..."

Yet the EA's proposed authorisations for Sellafield will allow BNFL to increase discharges, compared with 1998, (apart from Technetium-99), so that BNFL can increase the throughput of its two reprocessing plants until around 2010.²²

(9) The Proximity Principle

²⁰ Lord Whitty, House of Lords, 15th January (Column GC170)

²¹ Nearly 180 countries met at the 'Earth Summit' in 1992 (UN Conference on Environment and Development) in Rio de Janeiro to discuss how to achieve sustainable development. The Summit agreed the [Rio Declaration on Environment and Development](http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm) (<http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>)

²² See for example Figure 7 in Appendix 1 of the UK strategy for radioactive discharges.

Definition: Radioactive waste should, as far as is compatible with the safety of the management of such material, be managed in the State in which it was generated. There should be no international trade in waste. Within States waste should be managed as close as possible to where it is produced to avoid unnecessary transports.²³ This, however, should not be taken to condone the Government's policy of substitution.

Example of current policy failure: The Environment Agency's (EA) policy is that waste with an authorised disposal route should be disposed of as soon as possible.²⁴ Yet the 1995 policy²⁵ says waste should be "*disposed of at appropriate times and in appropriate ways ... in a manner that commands public confidence*", and the Government's proposed decommissioning policy accepts that waste may need to be stored until long-term solutions are available.²⁶

This EA policy, which is also being applied by the Scottish Environment Protection Agency (SEPA) and the Nuclear Installations Inspectorate (NII), is leading to, for example, the unnecessary transfer of low-level waste from Dounreay to Drigg in Cumbria. This may well set an unhealthy precedent for the future management of intermediate and high-level waste on the Dounreay site.²⁷

(10) The non-proliferation principle

Definition: All plutonium and highly enriched uranium stocks should be declared wastes and all necessary steps should be taken to prevent their use in, or availability for use, in nuclear weapons. These wastes should be immobilised in waste forms that would make their recovery for use in weapons virtually impossible. This should take into account not just diversion to nuclear weapons programmes by government, but also the threat of terrorism. Real security cannot be achieved by armed guards, but requires removal of the threat by ending the further separation of plutonium and the production of enriched uranium.

Example of current policy failure: BNFL has contracts to supply plutonium (MOX) fuel to utilities in Germany, Switzerland and Sweden, and is seeking contracts with Japanese utilities. This will involve transporting weapons-useable plutonium over long distances. Plutonium can be separated from MOX relatively easily.²⁸ BNFL is researching various plutonium immobilisation technologies, but this work may stop when the NDA is established. Work on immobilising all stocks of civil and military plutonium should be one of the priorities of the NDA when it is established.

(11) International Best Practice.

Definition: The most effective processes (including clean technology) and long-term containment of existing nuclear waste should be used to prevent radioactive pollution of

²³ See Article 130R(2) of the Single European Act

²⁴ Environment Agency (September 2002) Decommissioning Of Nuclear Installations: The Environment Agency's Role And Objectives.

²⁵ HMSO (July 1995) Review of Radioactive Waste Management Policy Final Conclusions.

²⁶ DTI et al (November 2003) A Public Consultation on Modernising the Policy for Decommissioning the UK's Nuclear Facilities.

²⁷ RWMAC (2003) para 6.14

²⁸ US DoE Office of Arms Control and Non-proliferation (January 1997) Non-proliferation and Arms Control Assessment of Weapons-Useable Fissile Material Storage and Excess Plutonium Disposition Alternatives. P84

the environment. This should not be about end-of-pipe solutions, but should investigate whether the industry is using the right products and processes in the first place. Decisions on waste management should be based on an assessment of alternative options and should involve the public in their evaluation – this cannot be left to scientists and regulators alone.²⁹

Example of current policy failure: *The UK Government has failed to look at clean technology (for example dry storage) for spent fuel management as an alternative to reprocessing. Over its remaining life the throughput of the Sellafield Thermal Oxide Reprocessing Plant (THORP) will be dominated by reprocessing spent fuel from BE's reactors. This fuel can readily be dry stored – it does not have to be reprocessed. BE has previously called for an end to its reprocessing contracts³⁰, but the Government has chosen instead to subsidise BE's contracts with BNFL, thus allowing for continued reprocessing.³¹*

²⁹ RCEP (1998) The Twenty First Report, Setting Environmental Standards.
(<http://www.rcep.org.uk/studies/standards/s-chap9.htm#top>),

³⁰ Nucleonics Week (2001) BE Blames Reprocessing Charges for Higher UK Operating Costs. Vol. 42 No. 46. 15th November.

³¹ See for example “Taxpayers pick up reprocessing bill in £2 billion British Energy bail-out” ENDS Report December 2002