Nuclear Free Local Authorities
RADIOACTIVE WASTE POLICY
Briefing on the Government Review

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DECOMMISSIONING AND LOWER LEVEL RADIOACTIVE WASTE

LOWER-LEVEL WASTE POLICY GAP

In 1999, the House of Lords Science and Technology Committee recommended that plans should be made for the establishment of a new low-level waste (LLW) disposal facility to open before the existing facility at Drigg, near Sellafield in Cumbria closes.[1] Large volumes of lower level wastes are expected to arise during the decommissioning of the UK's existing nuclear facilities. The former head of the Government's Liabilities Management Unit, Alan Edwards, estimates that these volumes could be sufficient to fill 15 facilities the size of Drigg.[2] Yet the priority for the new Committee on Radioactive Waste Management (CoRWM) is to look at options for high and intermediate-level waste, and will only look at low level waste if it is unsuitable for disposal at Drigg.[3]

Given these large volumes of lower level wastes, there is likely to be pressure to increase the amount of wastes going to landfill sites, as well as pressure to lower standards for site remediation in an attempt to reduce the volumes of waste generated and their associated disposal costs. With significant quantities of potentially valuable metals arising from decommissioning, there could also be pressure to allow increases in discharges of liquid radioactive waste into the marine environment, as a consequence of decontamination processes for metals earmarked for recycling.

These issues will be of great concern to local authorities. This briefing argues that the management of lower level wastes arising from decommissioning should be dealt with in a holistic manner involving consultation with all relevant stakeholders and not in the piecemeal fashion we have seen so far. It is also argued that tough standards will not only benefit the environment and achieve widespread public support, but will also drive innovation and the development of waste minimisation techniques.

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DEFINITIONS

Government policy defines two categories of waste which together are called lower activity wastes (LAW):

Low Level Waste (LLW): Radioactive materials which cannot be disposed of with ordinary refuse, but not exceeding 4GBq/te (gigabecquerels/tonne) of alpha or 12 GBq/te of beta/gamma activity; ie wastes that can normally be disposed of at Drigg.

Very Low Level Waste (VLLW): waste that can be disposed of with ordinary refuse. Each 0.1 cubic metres (m^3) of material containing less than 400kBq (kilobecquerels) of beta/gamma activity or single items containing less than 40kBq.

Source: RWMAC (March 2003) Management of Low Activity Solid Radioactive Wastes within the United Kingdom. Para 3.1

WASTE VOLUMES

The 2001 Radioactive Waste Inventory recorded holdings of LLW at 1st April 2001 of 15,700m^3 and predicted future arisings of 1,490.000m^3. But these estimates are highly speculative for several reasons:

(1) The Government has yet to clearly define the standards of clean-up required for nuclear sites following decommissioning. Until this guidance is in place, it will be impossible to accurately estimate the lower level waste arisings from decommissioning.[4] The differences in volumes of wastes arising from excavating contaminated soils, for example, could vary significantly depending on the standards for final clean-up required.

(2) Accurately estimating the wastes arising also depends on the timing of decommissioning and clean-up work. For example, delaying the decommissioning of some nuclear facilities by 100 years could almost halve the level of LLW that needs to be managed.[5]

(3) It is currently accepted practice not to record VLLW in the Radioactive Waste Inventory. Nuclear operators are generally hoping that a non-Drigg disposal route will arise, so do not submit information about wastes at the lower end of the lower activity wastes. But this is probably wishful thinking. For example, large volumes of contaminated soil from Sellafield, possibly in excess of a million cubic metres, are not in the Inventory, because BNFL believes that the volumes are so large that some form of in situ management will ultimately be necessary.[6] The total amount of this type of material could be as much as 4 million cubic metres.

Altogether 950,000 m^3 of waste has so far been buried at Drigg, and the facility has a remaining capacity of around 800,000 m^3. [7] According to estimates available to the House of Lords Select Committee, 70% of the LLW inventory will arise after 2060. It is currently assumed that Drigg will not be full until around 2050. But this date is subject to uncertainty. The Health and Safety Executive (HSE) told the House of Lords that Drigg could well close in the period 2030-50. The Environment Agency is carrying out a new authorisation process for Drigg. This involves

scrutinising the Operational Environmental Safety Case and the Post Closure Safety Case submitted by BNFL. The Agency must convince itself that the facility can meet a risk target of 1 in a million per year. The agency has confirmed that after scrutinising these plans its view of the lifetime capacity of the facility could prove to be quite different.[8]

WASTE MANAGEMENT POLICY

Government policy for lower activity waste is that if a suitable disposal route exists it should be disposed of as soon as possible: "…*in order to prevent the unnecessary accumulation of waste requiring storage and surveillance at production sites*".[9] However, it should also be noted that the 1995 Review of Radioactive Waste Management Policy said that waste should be "…*safely disposed of at appropriate times and in appropriate ways ... in a manner that* ***commands public confidence*** …" (emphasis added).[10]

Whilst in theory non-Drigg disposal options do exist, including landfill and incineration, these options are not widely available to the nuclear industry. VLLW, for example, can be disposed of with ordinary refuse. But only a very small percentage of VLLW arisings from nuclear sites is sent to landfill. VLLW from BNFL's Springfields and Capenhurst plants is disposed of at the Clifton Marsh landfill site near Preston, and VLLW from the two nuclear sites operated by Rolls Royce in Derby was sent to Hilts Quarry, in Derbyshire, until October 2002, when the practise was ended due to public opposition.[11] Amersham plc and Devonport Royal Dockyard are also authorised to send small amounts of VLLW to burial at other sites.

The 1995 Review of Radioactive Waste Management decided not to encourage greater use of landfill because of opposition from local authorities and the public.[12] The Environment Agencies (EA and SEPA) have indicated an unwillingness to allow this practice to be extended because the definition of VLLW is inconsistent with disposal of the large volumes of waste generated by the nuclear industry. Clive Williams of the Environment Agency told the Local Government Association Special Interest Group on Radioactive Waste Management & Nuclear Decommissioning in May 2004 that:

"*The Agency's current policy is that this route will be used only for those nuclear sites which are already authorised for disposal of VLLW – there is no intention to offer this as a new disposal route for other nuclear sites … Any nuclear site application for a new disposal route, such as VLLW to landfill, would need to be subject to public consultation."*

Public opposition has also prevented the commissioning of LLW incinerators at Bradwell and other nuclear sites. This has resulted in the near cessation of incineration operations by the nuclear sector, although some forms of low activity waste, for example contaminated waste oil, are still transferred to commercial incinerators, and a new incinerator is planned for the Dounreay nuclear site for contaminated oils and solvents.

The Radioactive Waste Management Advisory Committee has expressed concerns that unless alternative disposal routes become available, and disposal at Drigg remains the only option, then the volumes involved would fill the Drigg facility several times over.[13] This could mean extremely large quantities of site clean-up wastes being excavated and transported across the UK at very great cost, and using up 'valuable space' at the Drigg facility. Disposal at Drigg costs about £5,000 per cubic metre, so the cost of disposing of the currently estimated future arisings will be around £7.5bn.[14]

PIECEMEAL POLICY APPROACH - CLIFTON MARSH

Despite the Environment Agency's policy of not extending the use of landfill sites for further disposal of lower activity wastes, concern has been expressed that the Agency may be attempting to turn the Clifton Marsh site into a new category of radioactive waste dump by stealth. As part of a discharge re-authorisation process for BNFL's Springfields Nuclear Fuel Fabrication Plant, the Agency has been consulting on proposals to allow the disposal of waste up to one tenth of the upper limit for disposal at Drigg.

Initially BNFL did not request any increases in disposal limits for Clifton Marsh, but the Agency appears to have persuaded BNFL to apply for authorisation to dispose of larger amounts of uranium bearing waste to Clifton Marsh.

This proposal requires far more discussion. Policy of lower activity wastes should not be set in this piecemeal way by the regulators, but should be part of an overall strategy decided by the government in consultation with the local authorities and the public.[15]

PIECEMEAL POLICY APPROACH - DOUNREAY

At Dounreay in Caithness, whilst the plant was in operation and until recently, all low activity waste above what the UK Atomic Energy Authority (UKAEA) defined as Very Low Radioactive Material (VLRM) was disposed of in the Dounreay pits. UKAEA has now applied to the Scottish Environment Protection Agency (SEPA) to transfer LLW to Drigg while it investigates a longer-term management strategy. There is also concern that the waste already disposed of in the Dounreay pits may have to be excavated because the condition of the waste might not sustain a rigorous post-closure safety assessment. Not only does all this put further pressure on Drigg, but there is also a worry that by beginning the transportation of waste to Drigg, the UKAEA is effectively pre-empting the Best Practicable Environmental Option Study on the longer-term management of LLW from Dounreay, and may in fact set a precedent for the transfer of higher activity wastes from Dounreay to Sellafield.

The policy of transferring LLW from Dounreay to Drigg is driven by the recommendations of the 1998 HSE and SEPA Safety Audit, which in turn was driven by the most recent government policy on the subject set out in 1982.[16] Both Environment Agencies appear to be sticking rigidly to the 1982 policy of compulsory disposal if a suitable disposal route exists, despite a growing consensus that waste should be managed as close to the site of production as possible (the proximity principle).[17]

The Radioactive Waste Management Advisory Committee (RWMAC) has complained that this gives the impression of policy being made 'on the hoof' by the regulators and not, as it should be, in the context of an appropriate UK radioactive waste management strategy, backed up by national debate.[18]

DECIDING ON ACCEPTABLE STANDARDS

Apart from deciding how to manage lower activity wastes, decisions also need to be taken about how we define what is waste. Choosing an acceptable standard for the de-licensing of nuclear sites, and for the release of materials for re-use and recycling will be central to this debate. On the one hand environmentalists will call for tough standards and reduced risks, whereas on the other hand

industry will want to limit the costs of decontamination, and increase income from recycling. It will point to the huge costs involved if large quantities of slightly contaminated material is disposed of as radioactive waste. But former Environment Agency Inspector, Ian Jackson, encourages us to view the problem in a different way. He says that tough standards will drive innovation, reduce waste generation and ultimately reduce overall life-cycle costs.

DECONTAMINATION STANDARDS TOO FLEXIBLE

The Government's proposed policy on Decommissioning says that:-

"*…the future use of the site will be an important factor in determining the decommissioning operations*." Potential uses will range from industrial and commercial use to unrestricted use. "*…restoration to unrestricted use may not always be the Best Practicable Environmental Option* [BPEO] *... the policy needs to be flexible enough to allow for a range of possible outcomes*."[19]

Whilst a policy of not necessarily returning a site to a green field state clearly allows the flexibility to implement a nuclear waste management programme based on monitorable, retrievable storage of waste at the site of production, and avoids the need to transport waste around the country, it could also mean quietly giving up on the idea of ever fully cleaning up the nuclear legacy, and different standards of decontamination depending on the intended future use of the site – with lower standards for sites likely to be developed for commercial or industrial use for example.

In essence this would be throwing out the baby with the bathwater. Because waste is left on a nuclear site in a monitorable, retrievable store, this should not preclude decontaminating the remainder of the site to a level which would allow unrestricted use.

Ian Jackson warns:-

"*…if UK nuclear sites are never finally cleaned up to a standard allowing unrestricted use, then the lifecycle cost might potentially remain open-ended and liabilities continue for ever [and] sites must remain under some degree of public sector control … There will be environmental drawbacks too, as contamination can spread increasing the size of the eventual clean-up problem and increasing costs*."[20]

Jackson points out that clean-up standards which might be acceptable to the generation that has benefited from employment on the nuclear site may well not be acceptable to subsequent generations. Setting tough but transparent standards for clean-up would have two clear advantages. Firstly they would provide a driver for innovation because clean technologies don't just happen by themselves and secondly they would reduce lifecycle costs by establishing a common end-point for site decommissioning.

Both NFLAs[21] and the Local Government Association Special Interest Group (SIG)[22] point out that while the draft policy lays great stress on the need to undertake decommissioning in a manner which represents the BPEO, it does not offer any guidance on how the BPEO should be identified, and that there is an urgent need for guidance on the nature, role, scope and content of BPEO assessments for decommissioning, and how relevant factors should be weighted. Both organisations call for further stakeholder engagement on a range of issues, including site end points.

DEMOLITION WASTE

Decommissioning also produces large quantities of decommissioning rubble. According to the Environment Agency this currently tends to be used to make roads or as infill material on the nuclear licensed site, rather than being released for commercial use off-site. This practise will further damage the prospect of releasing sites for unrestricted use in the future, and because of the large quantities involved there is likely to be pressure to allow the release of contaminated rubble for use off-site.

RECYCLING

Recycling of metals will form a part of the decommissioning process, and indeed has already been carried out at BNFL's Capenhurst plant. There will be a financial pressure to decontaminate metals so that these can be released into the metals recycling market. The decontamination process may involve 'scrubbing' of the metals with various liquids which could result in increases in discharges of liquid radioactive waste. The Draft Statutory Guidance to the Environment Agency on the Regulation of Radioactive Discharges recommends "concentration and containment" of radioactive waste and 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."

Nevertheless, the UK Strategy for Radioactive Discharges (2001 –2020) accepts that some discharges may increase as a consequence of decommissioning. For example, at the Springfields Nuclear Fuel Fabrication Plant, BNFL says that some decommissioning work on site may involve treating some equipment and scrap metal with 'pickling liquors' in order to recover some valuable scrap, and to reduce contamination of other materials so that it can be disposed of at Clifton Marsh. This will cause further liquid discharges. This is a highly controversial method of decommissioning which breaches the important principle of concentrating and containing radioactive waste.

In 1998 at a Ministerial Meeting of the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, Deputy Prime Minister, John Prescott agreed that the UK would make "*progressive and substantial reductions*" in radioactive discharges in order to achieve "*close to zero*" concentrations of artificial radionuclides in the marine environment by 2020.[23] However, the 2003 OSPAR meeting agreed to ask its Radioactive Substances Committee to consider:-

"*…an appropriate method of dealing with exceptional discharges arising either from the decommissioning of nuclear installations or from operations to recover old waste*" [24]

In the event, the Radioactive Substances Committee, which met in January 2004, was unable to come to any agreement, so an Intersessional Correspondence group has been set up to come up with proposals. This group will hold an initial meeting in September 2004. Clearly it would be inappropriate for the Environment Agency (or SEPA) to agree any increases in radioactive discharges (whether within existing limits or not) as a result of decontamination and decommissioning until such time as OSPAR has agreed an appropriate method for dealing with exceptional discharges.

GENERIC STANDARDS

SEPA and RWMAC support the case-by-case approach to decommissioning but say it needs to be done "*within an overall framework that identifies appropriate generic standards for the clean-up of nuclear sites.*"[25]

SEPA says standards for decontamination of soils or metals are not adequately provided for under the Radioactive Substances Act 1993. It advocates amendments to the Government's proposed Decommissioning Policy to make reference to its view on allowing radioactive waste to be cleared for disposal, recycling or reuse on the basis of its radioactivity in order to encourage operators to reduce volumes of radioactive waste. It says this would make the most appropriate use of the limited remaining capacity at Drigg, and reduce decommissioning disposal costs.

SEPA also complains that the absence of a Government view on 'treatment' in the policy document will limit the amount of disposal, recycling or reuse options. Treatment to decontaminate materials does not have to be by the use of liquids which will cause an increase in radioactive discharges to the environment. One method of treatment, for example, could be the storage of the material until radioactivity levels have decayed to a sufficiently low level. Physical treatments could also be permitted, but only on condition they involve capture and concentration of the radioactivity in order to minimise radioactive releases to the environment.

RWMAC says "*supplementary statements*" will be required in order for the policy "*to become of real practical help to those charged with carrying out decommissioning*". It sees the absence of any guidance on the clean-up standards to apply to nuclear sites, or at least the principles by which the required levels of clean-up are to be determined, as a major omission of the proposed policy statement.

PUBLIC TRUST

RWMAC and SEPA ignore a major pitfall in the development of generic standards to assist the clearance, recycling and re-use of decommissioning waste. There is a legacy of public mistrust in the industry that would have to be overcome before even 'clean' waste could be exported from a nuclear licensed site for disposal. For example, in August 2003 public opposition prevented the UKAEA disposing of 'exempt' waste from Dounreay at a landfill site in Falkirk.[26] This could possibly be overcome by the establishment of an independent 'verification' agency which included representatives of the local community. The agency would verify that the waste was what the nuclear site operator claimed it was and did not contain radioactivity above agreed levels.

The other issue that RWMAC and SEPA have failed to address is the difficulty involved in setting agreed standards for the clean-up of nuclear sites; the clearance of waste from sites and a publicly acceptable level of radioactivity in materials to be released for recycling or re-use, or the process by which these levels might be set, and what role public consultation might play in that process.

LEGISLATION

The Radioactive Substances Act 1993 (RSA93) relates to the use of radioactive material and the disposal of radioactive articles and substances. It requires any disposal of a radioactive waste to be carried out only under an authorisation issued by the Environment Agency or SEPA unless it is excluded by the Act itself or exempted by one of its Exemption Orders. These exclusions or

exemptions mostly require the radioactivity concentration of the article or substance to be below specified values. The main Exemption Order is the Substances of Low Activity (SoLA) Exemption Order 1986. This Order gives lower limits below which waste is exempt from the need for authorisation for disposal. There is a range of limits for natural radioactive elements and an Exemption Limit of 0.4Bq/g for all artificial radionuclides.[25]

In the past waste material from nuclear sites has often been sent for disposal as radioactive waste even when it was likely to have been exempt, excluded or even clean. But more recently there has been a shift of emphasis towards clearance of materials as exempt, excluded or clean whenever practicable to permit re-use, recycling or disposal at ordinary licensed waste sites instead of disposal as radioactive waste. However, recent draft advice from the International Commission on Radiological Protection (ICRP) has cast doubt on whether the SoLA limit of 0.4Bq/g set by UK legislation is sufficiently precautionary (see below). In some cases the levels set by ICRP are 40 times lower.

CHOOSING A DECONTAMINATION STANDARD

The Health and Safety Executive (HSE) has published a consultative document on a "Proposal to Publish HSE Criteria for De-licensing Parts of, or Entire Sites Licensed under the Nuclear Installations Act 1965 (NIA65)". This is as an attempt to develop a generic standard for the decontamination of nuclear sites, but does not address the issue of the free release of materials into the marketplace.[26]

NIA65 requires that before de-licensing, the HSE must be satisfied that "*there has ceased to be any danger from ionising radiations from anything on the site or as the case may be, on that part thereof*". In other words, the proposed policy sets out how the HSE can establish that residual radioactivity represents 'no danger'. HSE points out that this is not a straightforward matter since there "*is no threshold below which small doses are harmless*". HSE, therefore concludes that:-

"… *following rigorous decontamination and clean-up, it may be acceptable for there to remain a small but finite radiological hazard, whose further detection and reduction would necessitate a disproportionate effort and cost*".

HSE believes that a fatality of 1 in a million per year would be a broadly acceptable risk to a member of the public, as long as the nuclear operator applying for de-licensing is also able to show that the residual risk has been reduced to As Low As Reasonably Practicable (ALARP). However, the ICRP has recently proposed criteria for both radiation dose and concentrations of radioactivity which imply a somewhat lower risk threshold. In the simplest case the ICRP has proposed a minimum dose constraint of 10 microsieverts which is equivalent to a risk of fatality of one in two and a half million – much lower than HSE's proposed nuclear delicensing criteria. ICRP has also proposed various exclusion levels much lower than those given in the SoLA Exemption Order, which imply even lower risks.

	Concentration of alpha-emitting substance. E.g. Plutonium-239	Estimated equivalent dose	Risk of death	Notes
HSE De-Licensing Criteria.		20-30 μSv	1 in a million (1×10^{-6})	(29)
Current UK Exemption Level	0.4Bq/g	10 μSv	1 in 2.5 million (4×10^{-7})	(30)
ICRP	0.01Bq/g	0.25 μSv	1 in 100 million (1×10^{-8})	(31)
Exemption level EC Directive 96/29 & Draft IAEA proposals	1.0Bq/g			(32)

Setting standards on the basis of dose or risk will involve making assumptions about lifestyles and habits, so will be subject to huge uncertainties. For example, in the case of setting a standard for the release of metals for recycling, estimating the dose to the public might involve assuming the metal is used in a frying pan, estimating the corrosion rate of the metal and the hours spent per year cooking. Estimates would also have to be made of the dose received by the metal workers turning the metal into consumer goods. Could the public be confident that even if the metal was used to manufacture medical instruments or children's toys that doses would still represent an acceptable risk?

TOWARDS A SUSTAINABLE DECOMMISSIONING POLICY

There is clearly a large gap in government policy on the management of lower activity wastes and decommissioning standards which is not going to be addressed by the Committee on Radioactive Waste Management. The Department of Trade and Industry also failed to address this gap in its recent consultation document on decommissioning policy.

Standards set for the decontamination of nuclear licensed sites and the free release of materials for re-use or recycling could have a large impact on the volumes of lower activity waste that will need to be managed. This could have huge implications for local authorities with new searches begun for a replacement to the Drigg low-level waste facility and for landfill sites suitable to take wastes at the lower activity end of the scale.

The pressures to reduce the volumes of radioactive waste which needs to be managed could lead to a lowering of standards for decontamination, and a raising of the levels permitted for the free release of materials for re-use and recycling in the marketplace.

Draft Health and Safety Executive (HSE) criteria for delicensing nuclear sites suggests a minimum requirement of a fatality of 1 in a million per year (1 in10^{-6}/y) supplemented by the 'As Low As Reasonably Practicable' (ALARP) principle. This means that, in making an application for delicensing a site or part of a site, the applicant must be able to demonstrate that all reasonably practicable actions to reduce the residual risk below 1 in a million per year have been taken.

However, new ICRP draft guidelines and public acceptability issues have cast doubt on the use of this proposed risk level as well as existing legal limits for the release of materials. Clearly there needs to be far more local authority and other stakeholder involvement in deciding these issues than has so far been the case.

In the light of ICRP's proposals NFLAs have recommended that HSE should review its policy on delicensing to ensure that interpretation of the no danger requirement in NIA65 aligns with current ICRP thinking on radiological protection minima. This would help to ensure that HSE policy is up-to-date and that any subsequent delicensing decisions made by HSE would be sufficiently robust to withstand legal challenges such as judicial review.

NFLAs also point out that in their submission to HSE that the practical interpretation of ALARP involves risk assessment and that essential to any process of risk assessment are transparency, openness and engagement of stakeholders.

A sustainable decommissioning policy must be based on a clear set of environmental principles, in particular: the polluter pays principle, the concentration and containment principle and the proximity principle. Concerns about rising volumes of lower activity wastes should not be used to distract from the need to implement the BPEO. Guidance on how the BPEO should be identified needs to be developed after wide consultation with local and national stakeholders. Decontamination of nuclear licensed sites to a level, which would allow unrestricted use, (apart from the area used for monitorable and retrievable waste stores) irrespective of the intended use of the site in the short-term, should be considered to be the ideal site end point. Leaving sites only partially decontaminated will result in the dilution and dispersal of radioactivity into the environment and might well cause problems in the future and increase overall lifecycle costs. Setting tough standards for decontamination will drive innovation and waste minimisation.

Setting standards for the free release of materials from nuclear licensed sites, either for disposal with ordinary refuse or for re-use and recycling needs to be done as part of an open and transparent consultation process. The legacy of public mistrust in the nuclear industry needs to be taken into account and methods of verifying that the industry is only disposing or recycling materials which are acceptable to the public need to be developed.

REFERENCES

1. House of Lords Select Committee on Science and Technology (March 1999) 'Management of Nuclear Waste' para 8.20 http://www.publications.parliament.uk/pa/ld199899/ldselect/ldsctech/41/4101.htm
2. Alan Edwards (25th March) Speaking at the 6th Irish and UK Local Authorities Standing Conference on Nuclear Hazards, Glasgow.
3. www.corwm.org
4. RWMAC (October 2002) 22nd Annual Report. Para 6.10 http://www.defra.gov.uk/rwmac/reports/annrpt0102/index.htm
5. RWMAC (March 2003) 'Management of Low Activity Solid Radioactive Wastes within the United Kingdom', para 4.29 http://www.defra.gov.uk/rwmac/reports/lowactivsolid/index.htm
6. RWMAC (March 2003) para 4.5
7. RWMAC (March 2003) Annexe 3
8. RWMAC (March 2003) para A3.11
9. HMSO (1982) 'Radioactive Substances Act 1960: A Guide to the Administration of the Act' para 52.
10. HMSO (1995) 'Review of Radioactive Waste Management Policy: Final Conclusions' Cmnd 2919
11. BBC 4th October 2002 'Quarry Protestors Celebrate Victory' http://news.bbc.co.uk/1/hi/england/2299361.stm
12. HMSO (1995) para 180
13. RWMAC (March 2003) 'The United Kingdom Radioactive Waste Inventory' para 4.20 http://www.defra.gov.uk/rwmac/reports/inventory/index.htm
14. Jackson (21st June 2004) response to 'HSE's Proposed No Danger Criteria for De-Licensing Nuclear Sites. http://www.jacksonconsult.com/downloads/HSC_Delicensing.pdf
15. Environment Agency (November 2003) Explanatory Document to assist public consultation on proposals for the future regulation of disposals of radioactive waste from BNFL Springfields. http://www.environment-agency.gov.uk/yourenv/consultations/622108/?version=1&lang=_e
16. HMSO (1982) 'Radioactive Substances Act 1960: A Guide to the Administration of the Act' para 52.
17. For example at a Workshop on Developing Sustainability Principles for Site Decommissioning held in Manchester on 13th July 2004 with participants from Environmental Groups, local authorities, and the Nuclear and Construction Industries, there appeared to be general support for the proximity principle.
18. RWMAC (March 2003) para A3.21
19. DTI (November 2003) 'A Public Consultation on Modernising the Policy for Decommissioning the UK's Nuclear Facilities'. http://www.dti.gov.uk/nuclearcleanup/pdfs/decomcondoc.pdf
20. Nuclear Engineering International, February 2004, 'Decommission Improbable' by Ian Jackson. http://www.jacksonconsult.com/downloads/NEI.pdf
21. NFLAs (February 2004) Radioactive Waste Policy Briefing No.10 "Government Proposes New Decommissioning Policy"
22. Local Government Association Special Interest Group on Nuclear Decommissioning and Radioactive Waste Management submission to DTI, 27th February 2004. "Public Consultation on Modernising the Policy for Decommissioning the UK's Nuclear Facilities".
23. Ministerial Meeting of the OSPAR Commission, 22-23 July 1998, The Sintra Statement.
24. OSPAR 2003 Summary Record Ministerial Segment para 3.24
25. RWMAC (2004) Response to the Government's Public Consultation on Modernising Policy for Decommissioning the UK's Nuclear Facilities. Para 6. http://www.defra.gov.uk/rwmac/rsa/rwmac-decomm-resp.pdf and SEPA (10th February 2004) SEPA's Response to a UK Government Consultation entitled "A public Consultation on Modernising the Policy for Decommissioning the UK's Nuclear Facilities". http://www.sepa.org.uk/pdf/board/main/2004/papers/0504.pdf
26. Sunday Herald, 13 July 2003, "Falkirk knocks back Dounreay waste" By Rob Edwards
27. The Nuclear Industry Clearance and Exemption Working Group has produced an Interim Nuclear Industry Code of Practice on Clearance and Exemption Principles, Processes and Practices, upon which it is seeking comment. www.ukaea.org.uk/reports/clearance.htm
28. See http://www.hse.gov.uk/consult/condocs/cd-delicense.htm
29. See HMSO (1995) Review of Radioactive Waste Management Policy: Final Conclusions. Cm 2919. para 73, and RWMAC and NuSAC (March 2003) Review of the Regulation of Nuclear Safety and the Management of Radioactive Waste within the United Kingdom. Annex 5 para 16.
30. Jackson (21st June 2004) response to 'HSE's Proposed No Danger Criteria for De-Licensing Nuclear Sites. http://www.jacksonconsult.com/downloads/HSC_Delicensing.pdf
31. Draft ICRP Recommendations subject to public consultation from June 2004.
32. Fairlie, I (7th March 204) Advice note on Draft IAEA Safety Guide on the Application of the Concepts of Exclusion, Exemption and Clearance.