The UK Regulatory Framework for Decommissioning and the Management of Decommissioning Wastes

Information Paper for the SD:SPUR Learning Network

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Marion Hill

FOREWORD

This is the first version of an information paper for CIRIA's SD:SPUR Learning Network. It deals with the UK regulatory framework for decommissioning and the management of decommissioning wastes. It is mainly about nuclear-licensed sites but also covers other sites where both radioactive and non-radioactive wastes may arise during decommissioning. The main text of the paper deals mostly with the regulatory framework in England. Differences in Scotland, Wales and Northern Ireland are summarised in an appendix.

The paper is primarily intended to be a factual summary of the key features of the current UK regulatory framework. It incorporates information from the regulatory agencies for England, Scotland, Wales and Northern Ireland, from central government departments and from the devolved administrations but it is in no way a formal statement of their positions. The views expressed about possible future developments are the author's own.

Guidance on the various aspects of the regulatory framework can be found on the websites of the regulatory agencies and government departments. Guidance on all environmental regulations is available on the NetRegs website (www.netregs.gov.uk), which is sponsored by all the environment agencies. NetRegs is aimed at small businesses but much of the guidance is generally applicable.

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1 KEY FEATURES OF THE REGULATORY FRAMEWORK

1.1 Types of Site, Facility and Wastes Included

This paper deals mainly with decommissioning on nuclear-licensed sites and the management of wastes produced during decommissioning of facilities on these sites. The term 'nuclear-licensed site' is taken to mean (see the Nuclear Installations Act 1965, as amended):

- any site in respect of which or part of which a nuclear site licence is for the time being in force; or
- any site in respect of which, after revocation or surrender of a nuclear site licence, the period of responsibility of the licensee has not come to an end.

The paper also covers decommissioning on non-licensed nuclear sites, that is nuclear sites operated by the Ministry of Defence (MoD), and other sites and facilities where radioactive wastes may arise during decommissioning (non-nuclear defence sites, on-shore and offshore oil and gas facilities, factories, laboratories, hospitals). Decommissioning of nuclear-powered submarines is included in general terms but not in detail.

The wastes included in the paper are solid low level radioactive wastes (LLW) and all types of solid non-radioactive wastes that may arise during decommissioning. The term 'waste management' is taken to include the whole range of activities from preventing or minimising the production of waste to disposal with no intention to retrieve.

1.2 Summaries of Regulatory Regimes

Table 1 shows the current UK regulatory regimes for decommissioning and waste management, by type of site and waste. Table 2 shows the principal regulators. The key features of the regulatory regimes are shown in Table 3 (decommissioning), Table 4 (management of radioactive wastes) and Table 5 (management of non-radioactive wastes). A list of all the relevant legislation is given in Table 6. Table 7 contains a list of the acronyms used throughout the other tables and in the text of the paper.

2 DEFINITIONS

2.1 Decommissioning

2.1.1 Decommissioning of Nuclear Facilities

Current UK government policy on the decommissioning of nuclear facilities states that [DTI, 2004a]:

"Decommissioning is a staged process through which a nuclear facility, at which normal operations have finally ceased, is taken out of service, including full or partial dismantling of buildings and their contents. It may include other operations such as decontamination of buildings which are not to be dismantled and remedial treatment or restoration of the land under and around the facility."

The government policy statement, and hence the definition of decommissioning, covers all nuclear industry facilities on nuclear-licensed sites (eg reactors, reprocessing plants, fuel fabrication facilities, waste treatment plants, laboratories) and facilities on sites owned and operated by MoD, including nuclear-powered submarines [DTI, 2004a].

2.1.2 Offshore Oil and Gas Installations and Pipelines

In this context, offshore oil and gas installations are those not permanently connected to dry land that are used for exploitation of or exploration for oil and gas reserves, for gas storage, or for accommodation of workers. The pipelines included are all those in, on or under the shore or the bed of seas or estuaries that carry oil or gas. Neither the relevant legislation for these installations and pipelines (the Petroleum Act 1998), nor the associated government guidance [DTI, 2006], contain an explicit definition of 'decommissioning'. They refer to a 'decommissioning programme', which has to contain measures for the complete or partial removal of the installation or pipeline, management of the relevant waste and, if necessary, maintenance of any structures that are not removed[1]. (See Section 4.2 below for details of the circumstances under which it may be permissible to leave structures in place.)

2.1.3 Other Facilities

The term 'decommissioning' is used for other facilities covered by this paper, with essentially the same meaning as for nuclear facilities (see Section 2.1.1). Less specialised terminology, such as 'dismantlement' and 'demolition', is also employed.

2.2 Categories of Solid Radioactive Waste

2.2.1 Radioactive Substances Act Definition of Radioactive Waste

The terms 'radioactive material' and 'radioactive waste' are defined in Sections 1 and 2 of the Radioactive Substances Act 1993 (RSA93). This Act specifies that a material is radioactive if it contains [EA, 2002]:

- an element specified in Schedule 1 of Section 1 of RSA93 that is present at a concentration level greater than those given in the adjoining columns of Schedule 1 (see table below);
- any substance not naturally occurring whose radioactivity is wholly or partly due to nuclear fission, or to neutron or ionising irradiation.

Radioelements and Limiting Concentrations in RSA93 Schedule 1

Radioelement	*Limiting Concentration (Bq/g)*		
	Solid	*Liquid*	*Gas or vapour*
Actinium	0.37	$7.40\ 10^{-2}$	$2.59\ 10^{-6}$
Lead	0.74	$3.70\ 10^{-3}$	$1.11\ 10^{-4}$
Polonium	0.37	$2.59\ 10^{-2}$	$2.22\ 10^{-4}$
Protactinium	0.37	$3.33\ 10^{-2}$	$1.11\ 10^{-6}$
Radium	0.37	$3.70\ 10^{-4}$	$3.70\ 10^{-5}$
Radon	-	-	$3.70\ 10^{-2}$
Thorium	2.59	$3.70\ 10^{-2}$	$2.22\ 10^{-5}$
Uranium	11.1	0.74	$7.40\ 10^{-5}$

Thus under RSA93 a material is not classed as radioactive if it contains only the radioelements listed in Schedule 1 and at lower concentrations than are given in that schedule. With one exception, any material that contains man-made radionuclides is classed as radioactive, irrespective of the concentrations in which these radionuclides are present, and is subject to some or all of the provisions of RSA93, depending on whether one of the exemptions under the Act applies (see Section 2.2.5).

[1] The Petroleum Act 1998 uses the term 'abandonment programme' but the preferred and generally accepted term is now 'decommissioning programme' [DTI, 2006].

The limiting concentrations of radioelements in Schedule 1 of RSA93 are absolute values, that is they include natural background. Naturally-occurring concentrations of radionuclides other than those in the uranium and thorium series are not taken into account when determining whether a material is radioactive under RSA93. For radionuclides that occur both naturally and artificially (eg tritium, carbon-14) only the artificial component is relevant [EA, 2005a]. If any artificial component is present the material is radioactive for the purposes of RSA93 unless the exception for man-made radionuclides applies (see below).

Section 2 of RSA93 specifies that 'radioactive waste' means waste that consists wholly or partly of:

a. a substance or article that, if it were not waste, would be radioactive material;
b. a substance or article that has been contaminated in the course of the production, keeping or use of radioactive material or by contact with or proximity to other waste falling within paragraph (a), or this paragraph.

Section 47 of RSA93 defines 'waste' as follows:

- 'waste' includes any substance that 'constitutes scrap material or an effluent or other unwanted surplus substance arising from the application of any process', and also includes any substance or article that 'requires to be disposed of as being broken, worn out, contaminated or otherwise spoilt'.

The exception under RSA93 for man-made radionuclides in materials and wastes is when they are present as a result of past disposals of radioactive waste that were authorised under the Act, or past disposals that did not require authorisation (because they were exempt, occurred from MoD premises, or were from facilities or activities in other countries). The meaning of the relevant sub-clause in RSA93 is not entirely clear but the Environment Agency's view is that it is mainly designed to prevent unnecessarily repetitive regulation. It means, for example, that land remediation wastes that would otherwise be 'radioactive' under RSA93 and that are not covered by an Exemption Order need not be managed as radioactive wastes if the land was contaminated by recent disposals that were authorised under RSA93. On the other hand, if the land contamination occurred many years ago, under what is now regarded as an outdated authorisation regime, then the Environment Agency would wish to regulate the disposal of any radioactive remediation wastes (unless they are exempt) [EA, 2007].

2.2.2 Other Definitions of Radioactive Waste

The definition of 'radioactive waste' outlined above is only used for RSA93 purposes. For more general purposes waste is regarded as radioactive if it has radioactivity levels that are above the ubiquitous natural and artificial background for the area in which the waste arises. This more general definition is the one employed by the Health and Safety Executive (HSE) for its regulatory purposes. It is consistent with the definition of 'nuclear matter' in the Nuclear Installations Act 1965 (as amended). Under this Act, radioactive waste includes all wastes that have been made radioactive by processes on a nuclear-licensed site, regardless of their level of radioactivity and of whether and how they are regulated under RSA93.

There are also other limits in UK legislation that are sometimes quoted as defining what is and what is not radioactive waste. These are:

- the 0.4 Bq/g limit in the Substances of Low Activity Exemption Order (see Section 2.2.5)

- the 0.1 Bq/g limit in the regulations for transport of radioactive materials (see Section 5.4)
- the radionuclide specific limits in Schedule 8 of the Ionising Radiations Regulations 1999, below which work need not be notified to HSE as 'work with ionising radiation'.[2]

All these are activity levels below which a waste (or other material), although legally radioactive, need not be dealt with as such for the purposes of the particular piece of legislation. The reasoning behind these levels is that the radioactive waste or material in question is believed to pose a very low risk to people in the situation to which the legislation refers. None of the levels constitutes a formal definition of radioactive waste for any regulatory purpose.

2.2.3 Low Level Radioactive Waste

Solid low level radioactive waste (LLW) is defined as radioactive waste (see Section 2.2.1 above) that has a radioactive content that does not exceed 4 GBq/t alpha activity or 12 GBq/t beta/gamma activity [Defra et al, 2006a]. These levels are based on the authorisation under RSA93 for disposal of radioactive waste in the national facility near Drigg in Cumbria (the low level waste repository, LLWR). The levels may change when new LLW disposal facilities are established and in the light of changes to the authorisation and procedures at the LLWR (see Section 5.1).

2.2.4 Very Low Level Radioactive Waste

Very low level radioactive waste (VLLW) is LLW that has radioactivity levels well below the maximum for the category. It can be disposed of with non-radioactive waste, rather than being placed in the LLWR or other specialised facility. The standard conditions for authorisation for disposal as VLLW are that the waste should contain only beta/gamma activity at a level not exceeding 400 kBq in any $0.1m^3$ and that no individual item in the waste should have an activity above 40 kBq. These levels can be increased by up to a factor of ten for tritium or carbon-14 (ie 4 MBq in $0.1m^3$ and 400 kBq per item). Authorisations have occasionally been granted for small quantities of wastes to be disposed of as VLLW if they have alpha activity in them at levels less than one tenth of the maximum beta/gamma levels (ie 40 kBq in $0.1m^3$ and 4 kBq per item) [EA, 2004]. It is proposed to change the VLLW levels so that they are in terms of activity per unit mass rather than activity per unit volume [Defra et al, 2006a].

2.2.5 Exempt Radioactive Waste

'Exempt waste' is the term used for LLW that is exempt from some or all of the provisions of RSA93 because it is covered by an Exemption Order (EO). The two EOs that are particularly relevant to the management of decommissioning wastes are [EA, 2002]:

- The Radioactive Substances (Substances of Low Activity) Exemption Order and its amendment, Statutory Instruments 1986 No. 1002 and 1992 No. 647 (known as the SoLA EO or simply SoLA)
- The Radioactive Substances (Phosphatic Substances, Rare Earths etc) Exemption Order, Statutory Instrument 1962 No. 2648 (sometimes referred to as the PSRE EO).

The SoLA EO specifies that solid radioactive waste is exempt from the provisions of Sections 13(1), (3) and (4) of RSA93, provided that it is 'substantially insoluble' in water and has an activity that does not exceed 0.4 Bq/g. Disposal of such waste does not require an authorisation from an environment agency. SoLA also exempts organic liquids that contain

[2] It is also unnecessary to notify HSE of work with material contaminated with radioactive substances resulting from authorised releases that the appropriate environment agency has declared not to be subject to further control.

only carbon-14 or tritium at a concentration not exceeding 4 Bq/ml, and gases that contain only very short-lived radionuclides (half-life less than 100 seconds).

The PSRE EO specifies that material that is radioactive solely because of the presence of one or more of the radioelements listed in Schedule 1 (see Section 2.2.1 above) and is substantially insoluble in water is unconditionally exempted from the provisions of RSA93 if the concentration of each radioelement does not exceed 14.8 Bq/g. This exemption includes waste disposal. The limit of 14.8 Bq/g is usually reduced to 4.9 Bq/g for radium-226 and to 7.4 Bq/g thorium-232, to take account of radioactive daughter products that are present in secular equilibrium [EA, 2002 and 2005b].

The SoLA EO is particularly relevant to wastes containing man-made radionuclides and the PSRE EO to wastes containing naturally-occurring radionuclides. Guidance and advice on the interpretation of the limits in the two EOs is available from the Environment Agency [EA, 2002 and 2005b] and from the nuclear industry's Clearance and Exemption Working Group [CEWG, 2006]. The main points on background levels and solubility criteria for RSA93 Schedule 1 and the two EOs are summarised in the following table [EA, 2007].

Summary of Guidance on Schedule 1 and EO Limits

Limits (radionuclides)	*Background levels deducted?*	*Solubility criterion?*
Schedule 1 (uranium, thorium and actinium series radioelements)	No. (Limits are absolute values.)	None
PSRE EO (uranium, thorium and actinium series radioelements)	No. (Limits are absolute values.)	Yes. (Substantially insoluble.)
SoLA EO (artificial radionuclides)	Yes. (Deduct ubiquitous artificial background levels for area.)	Yes. (Substantially insoluble.)
SoLA EO (natural radionuclides other than those in Schedule 1)	Yes. (Deduct natural background levels for area.)	Yes. (Substantially insoluble.)

Defra and the devolved administrations have recently (late 2006) begun a review of all the EOs, as part of government work to simplify regulations and reduce the burden on those regulated [Defra, 2006a]. It is possible that the format, limits and conditions in the SoLA and PSRE EOs will all change as a result of the review.

2.2.6 Radiologically Clean Waste

There is no formal regulatory definition of 'radiologically clean' waste. The term is usually taken to mean waste in which the activity levels are equal to or below the ubiquitous natural and artificial background for an area. Such waste is not subject to regulatory control under RSA93 or any other legislation related to radioactive waste or to ionising radiation.

2.2.7 Intermediate and High Level Radioactive Waste

The definitions of intermediate level radioactive waste (ILW) and high level radioactive waste (HLW) are included here for completeness. The management of these wastes is not covered in this paper, but the management of LLW arising from their treatment is covered.

Both ILW and HLW are defined in terms of what they are, rather than by activity levels. ILW consists mainly of metals, ion exchange materials, cement, graphite, glass and ceramics. Most of it arises from reprocessing spent nuclear fuel and from general operations and

maintenance of radioactive plant [Defra et al, 2001]. It all has activity levels higher than LLW. Some ILW contains mainly alpha activity, some mainly beta/gamma activity and some both types of activity.

HLW is heat-generating waste that has accumulated since the early 1950s as the concentrated liquid nitric acid product from the reprocessing of spent nuclear fuel [Defra et al, 2001]. Most HLW is stored at Sellafield, where it is being converted into solid form by immobilising in glass (vitrification). HLW makes up about 2% of the UK's stored radioactive waste but contains about 90% of the total radioactive content. If spent nuclear fuel were to be declared to be waste it would also be HLW.

2.3 Categories of Non-Radioactive Waste

2.3.1 Legal Definition of 'Waste'

Legally, 'waste' is 'any substance or object …..... which the producer or the person in possession of it discards or intends to discard or is required to discard'. In this definition, 'producer' means anyone whose activities produce waste or who carries out pre-processing, mixing or other operations resulting in a change in its nature or composition' [DoE et al, 1996]. This definition of waste arises from the European Waste Framework Directive[3], which is implemented in Great Britain through various regulations made under the Environmental Protection Act 1990 (EPA90).

Part II of Schedule 4 of the Waste Management Licensing Regulations 1994 sets out sixteen categories of substances and objects that are waste when discarded or when intended to be or required to be discarded. The last of these categories is a 'catch-all', so the key questions in determining whether a substance or object is waste are about what constitutes discarding, and when waste no longer needs to be dealt with as waste because it has been recovered. Decisions as to what is waste and what has ceased to be waste have to be made on a case-by-case basis.

The guidance from government departments is that a substance or object can usually be regarded as discarded when it is no longer part of the 'normal commercial cycle or chain of utility' [DoE et al, 1996]. The 'normal commercial cycle' excludes any commercial cycle that exists for the purpose of collecting, transporting, storing, recovering or disposing of waste.

A substance or object *should not* be regarded as waste [DoE et al, 1996]:

- solely on the grounds that it falls into one of the categories listed in Part II of Schedule 4 to the Waste Management Licensing Regulations 1994
- solely on the grounds that it has been consigned to a recovery operation listed in Part IV of Schedule 4 to the Waste Management Licensing Regulations 1994
- if it is sold or given away and can be used in its present form (after repair if necessary) or in the same way as any other raw material without being subjected to a specialised recovery operation
- if the producer puts it to beneficial use, or
- solely on the grounds that its producer would be unlikely to seek a substitute for it if it ceases to become available to him as, say, a by-product.

Conversely, a substance or object *should* be regarded as waste if it falls into one of the categories listed in Part II of Schedule 4 to the Waste Management Licensing Regulations 1994 *and* [DoE et al, 1996]:

[3] Council Directive 75/442/EEC, as amended by Directives 91/156/EEC and 91/692/EEC.

- it is consigned to a disposal operation listed in Part III of Schedule 4 of the Waste Management Licensing Regulations 1994
- it can be used only after it has been consigned to a specialised recovery operation
- the holder pays someone to provide him with a service, and that service is the collection (and taking away) of a substance or object that the holder does not want and wishes to get rid of
- the purpose of any (beneficial) use is wholly or mainly to relieve the holder of the burden of disposing of it and the user would be unlikely to seek a substitute for it if it ceases to become available to him as, say, a by-product
- it is discarded or otherwise dealt with as if it were waste, or
- it is abandoned or dumped.

Waste does not cease to be waste as soon as it is transferred for collection, transport, storage, specialised recovery or disposal, or as soon as it reaches a specialised recovery establishment. It ceases to be waste when it has been recovered within the meaning of the Waste Framework Directive. In general this is when the recovered material can be used as a raw material in the same way as raw materials that do not originate from waste [DoE et al, 1996]. Waste can also cease to be waste if the person to whom it has been transferred finds that it is fit for use in its present form, or in the same way as any other raw material, without being subjected to a specialised recovery operation [DoE et al, 1996]. There are UK protocols in use and under development to help in determining when waste ceases to be waste [WRAP et al, 2005; Defra, 2006a].

2.3.2 Controlled Waste

'Controlled waste' is defined in Section 30 of the Control of Pollution Act 1975, Section 75 of EPA90 and the Controlled Waste Regulations 1992 (as amended). It is household, commercial and industrial waste. One important feature of controlled waste is that it is subject to a 'duty of care' (see Section 6.2).

For the purposes of regulating its treatment and disposal, controlled waste is divided into three categories: inert waste, non-hazardous waste and hazardous waste. Non-hazardous waste is simply waste that is not hazardous waste. The other two categories are defined as follows.

2.3.3 Inert Waste

'Inert waste' is defined in the Landfill (England and Wales) Regulations 2002 (as amended) and in the corresponding regulations in Scotland and Northern Ireland (see Appendix). These regulations state that waste is inert waste if:

- 'it does not undergo any significant physical, chemical or biological transformations
- it does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way that is likely to give rise to environmental pollution or harm to human health, and
- its total leachability and pollutant content and the ecotoxicity of its leachate are insignificant and, in particular, do not endanger the quality of any surface water or groundwater.'

Concrete, bricks, tiles and stones from construction and demolition qualify as inert waste, provided that they are of known origin and have low contents of other types of materials (such as metals, plastics and wood). Inert waste can be disposed of to any landfill . Landfills that contain only inert waste are subject to less stringent conditions than other landfills (see Section 6.2).

2.3.4 Hazardous Waste

'Hazardous waste' was originally defined in European Directive 91/689/EEC. The current definitions are in various Hazardous Waste Regulations and List of Waste Regulations for England, Wales and Northern Ireland (see Table 6). Hazardous wastes were previously called 'special wastes' throughout the UK and this terminology is still used in Scottish legislation (see Appendix). Wastes that are categorised as hazardous include those that are or contain substances that are explosive, flammable, irritant, toxic, carcinogenic, corrosive, mutagenic, teratogenic or ecotoxic [EA, 2006a and 2006b]. Most producers of hazardous waste have to notify their premises to the relevant environment agency [Defra, 2005a]. There are specific requirements for the movement and disposal of hazardous wastes (see Section 6.2).

3 DECOMMISSIONING ON NUCLEAR-LICENSED SITES

3.1 Government Policy and Organisational Arrangements

3.1.1 Government Policy

The most recent statement of UK government policy on decommissioning of nuclear facilities was published in 2004 [DTI, 2004a]. It covers all existing and new civil nuclear facilities and their sites, facilities on sites owned by MoD and nuclear-powered submarines and their liabilities.

The policy is that decommissioning operations should be carried out as soon as reasonably practicable, taking relevant factors into account. These factors and their relative importance, and hence the timing of decommissioning, are to be determined on a case-by-case basis. Operators have to prepare decommissioning strategies and plans for their sites. These strategies and plans are to be developed taking into account the views of stakeholders and factors that are related to [DTI, 2004a]:

- ensuring worker and public safety
- maintaining site security
- minimising waste generation and providing for effective and safe management of wastes that are created
- minimising environmental impacts, including reusing or recycling materials wherever possible
- using resources effectively, efficiently and economically
- providing adequate funding.

Operators should review their decommissioning strategies when there are changes in circumstances, including changes in government policy, that make this necessary. The policy statement also makes it clear that the level of regulation at a nuclear site should be proportionate to the risks the site poses to people and the environment and, in general, should reduce as decommissioning proceeds. New facilities should be designed and built so as to minimise decommissioning and waste management operations and costs [DTI, 2004a].

3.1.2 The Nuclear Decommissioning Authority

The Nuclear Decommissioning Authority (NDA) was created by the Energy Act 2004 and became fully operational in 2005. Its main purpose is to ensure that the UK's civil, public sector nuclear facilities and sites are decommissioned. The NDA achieves this by letting contracts to companies to manage the sites that are being decommissioned. The sites for which the NDA is currently responsible are: Harwell, Dounreay, Winfrith, Windscale, Sellafield, the LLWR (near Drigg), Capenhurst, Wylfa, Oldbury, Sizewell A, Dungeness A, Chapelcross, Hinkley Point A, Bradwell, Hunterston A, Trawsfynydd, Berkeley. The NDA is

putting management of these sites out to competitive tender, starting with the LLWR and Sellafield and Windscale.

The NDA is funded by grant-in-aid from the UK government, via a statutory segregated account called the Nuclear Decommissioning Funding Account (NDFA). Income generated by the NDA by running existing facilities (eg some Magnox stations, the LLWR) is credited to the NDFA and is available for the NDA to use for decommissioning.

The Energy Act 2004 makes it a duty of the NDA to prepare a strategy for carrying out its functions, to review its strategy at least every five years, and to revise the strategy when necessary. The strategy must include decommissioning and clean-up of sites, and operation of installations and facilities. It must set out the NDA's priorities for fulfilling its responsibilities and its proposals for maintaining and developing a skilled workforce, for promoting competition, for ensuring that good practice is adopted, and for supporting local communities. The NDA must consult stakeholders when preparing, reviewing or revising its strategy and when making annual plans. It also has a general obligation to communicate with everyone who has an interest in its work. the first NDA strategy was published in 2006 [NDA, 2006a].

3.1.3 Other Nuclear-Licensed Sites

It is for their owners to carry out decommissioning on nuclear-licensed sites that have not been 'designated' to be the responsibility of the NDA. The wording of the Energy Act 2004 is sufficiently flexible to allow the NDA to be given responsibility for more nuclear sites if it is decided in future that this would be desirable. This is expected to happen for British Energy sites. At present the NDA has a responsibility to oversee British Energy's planning for decommissioning and to review and approve its strategies and cost estimates. The funding for decommissioning of British Energy's sites will come from the Nuclear Liabilities Fund, which is backed by government.

3.2 Health and Safety

3.2.1 General

The main legislation for all aspects of health and safety at work is the Health and Safety at Work etc Act 1974 (HSWA74) and the regulator is HSE.[4] The Act places duties on employers with regard to the health and safety of their employees and others, and duties on employees themselves. HSAW74 applies to nuclear-licensed sites and so do the various regulations made under it. The most important regulations related to conventional safety when decommissioning are the Management of Health and Safety at Work Regulations (MHSW), the Construction (Design and Management) Regulations (CDM) and the Control of Substances Hazardous to Health Regulations (COSHH).

The main requirement on employers in the MHSW regulations is to carry out a risk assessment and to record its significant findings. Employers are also required to make arrangements for implementing the health and safety measures that are identified as being necessary by the risk assessment, appoint competent people to do the implementation, set up emergency procedures, provide information and training to employees, and work with other employers who share the same workplace [HSC, 2000].

The CDM regulations have been revised recently and a new version is due to come into force in April 2007; the new regulations are supported by a revised code of practice [HSC, 2007]. The regulations specify general management duties that apply to all construction

[4] In England, Scotland and Wales. Northern Ireland has its own health and safety legislation and executive (see Appendix).

work, including dismantling and demolition. There are additional duties for projects that are expected to last more than 30 working days or to involve more than 500 person days of construction work. Such projects must be notified to HSE. The duties under CDM are on clients, designers and contractors, and, for notifiable projects, CDM co-ordinators and principal contractors. The duties include checking the competence of people involved in the project, allowing sufficient time and resources, reducing risks during design, ensuring that there are adequate welfare facilities for workers and training workers. The additional duties for notifiable projects include creating and maintaining a health and safety file, and preparing and implementing a written plan and site rules.

The COSHH regulations require employers to assess the risks to employee's health from hazardous substances used in or created in a workplace, and to prevent or control exposure. Employers must also monitor exposures, carry out appropriate health surveillance, prepare plans to deal with accidents and emergencies and inform, train and supervise employees [HSC, 2005]. Workplace exposure limits for use with the COSHH regulations are given in an environmental hygiene guidance note [HSE, 2005]. There are separate regulations and codes of practice for asbestos [HSC, 2006a and 2006b].

HSE is currently (early 2007) running a 'worker engagement initiative' for the construction industry. Its aim is to reduce risks and accidents by encouraging construction sector employers to engage workers fully in risk assessment, to communicate effectively safe and healthy methods of working, to brief workers on the day-to-day risks of their jobs and to check that workers themselves understand how these risks are to be controlled. This is in addition to their legal duties under the CDM regulations.

3.2.2 Nuclear and Radiological Safety

Nuclear and radiological safety on nuclear-licensed sites is regulated by HSE under the Nuclear Installations Act 1965, as amended (NIA65) and the Ionising Radiations Regulations 1999 (IRR99), made under HSWA74. All the conditions in nuclear site licences (see HSE website) and all the requirements of IRR99 apply to decommissioning as they do to any other work on a nuclear-licensed site [HSE, 2005a and 1999].

Licence condition 35 relates specifically to decommissioning. It requires the licensee to make arrangements for decommissioning any plant or process that may affect safety, to provide adequate documentation to justify safety and to prepare and implement decommissioning programmes for each plant. It also gives HSE discretionary powers to direct that decommissioning of a plant must start or stop.

Further information about what HSE expects licensees to do with respect to decommissioning is given in its Safety Assessment Principles for Nuclear Facilities (SAPs) [HSE, 2006a] and its guidance for inspectors [HSE, 2001a]. The SAPs state that, amongst other requirements:

- a decommissioning strategy should be prepared and maintained for each nuclear site and should be integrated with other relevant strategies (eg the radioactive waste management strategy)
- decommissioning should be carried out as soon as reasonably practicable taking relevant factors into account
- a decommissioning plan and programme should be prepared and maintained for each nuclear facility
- throughout the life-cycle of a facility, the documents and records that might be needed for decommissioning should be identified, prepared, updated and retained [HSE, 2006a].

Licensees are required to prepare an outline safety case for decommissioning prior to the end of normal operations at a facility and to prepare a full safety case before decommissioning begins [HSE, 2006a and 2001a].

3.2.3 Delicensing

Under NIA65, in order to delicense part or all of a nuclear site HSE must be satisfied that there is 'no danger' from ionising radiations from anything on, in or under the area that is to be delicensed. In 2005, after public consultation, HSE published a policy statement on its criterion for delicensing nuclear sites [HSE, 2005b]. The statement gives the basis from which HSE can establish that any residual radioactivity on the site presents 'no danger'.

The criterion for what HSE will regard as constituting 'no danger' is 'a demonstration that any residual radioactivity, above background radioactivity, which remains on the site, which may or may not have arisen from licensable activities, will lead to a risk of death to an individual using the site for any reasonably foreseeable purpose of no greater than one in a million per year'. The statement notes that the overarching requirements of HSWA74 to reduce risks to 'as low as reasonably practicable' (ALARP) apply but, if risks are below 10^{-6}, HSE will only expect licensees to show that there are no other, inexpensive clean-up activities that could be carried out. HSE intends to publish technical guidance on complying with the criterion.

3.3 Environmental Protection

3.3.1 Role of the Environment Agencies

The principal regulators for environmental protection during decommissioning on nuclear-licensed sites are the Environment Agency, for sites in England and Wales, and the Scottish Environment Protection Agency (SEPA) for sites in Scotland. (There are no nuclear-licensed sites in Northern Ireland.) These environment agencies have a major role in regulating the management of solid radioactive waste, using powers under RSA93 (see Section 5.2), and in regulating the management of solid non-radioactive waste (see Section 6.2). They also regulate discharges of radioactive and non-radioactive effluents into the environment and have roles in the management of contaminated land.

The first, interim, issue of the Environment Agency's 'radioactive substance regulation principles' (REPs) was made publicly available in January 2007 [EA, 2005c]. It contains fundamental principles for use in all aspects of radioactive substance regulation and principles for the management of radioactive substances and radioactive wastes, including their disposal. The next version of the REPs is expected to contain principles that are specific to other activities, including decommissioning.

The environment agencies have a special role in regulating the decommissioning of radioactive waste disposal facilities on nuclear-licensed sites.[5] For such facilities to be completely decommissioned the environment agencies would have to agree to revoke their authorisations under RAS93. This process would take place at the same time as delicensing (see Section 3.2.3) and in consultation with HSE.

3.3.2 Environmental Impact Assessments

Under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations (EIADR), operators of civil nuclear reactors must carry out an environmental impact assessment (EIA) before the start of decommissioning. This EIA must be submitted to HSE, who consult publicly on it and take the views of consultees into account when deciding whether to grant consent for decommissioning to begin. EIADR specify the

[5] Some nuclear-licensed sites have facilities that are, or used to be, authorised under RSA93 for the disposal of LLW. The LLWR near Drigg is a special case because it is a nuclear-licensed site in its own right (but is licensed for radioactive waste storage).

information to be included in the Environmental Statement that describes the EIA. If there are any changes or extensions to the decommissioning project that may result in significant adverse effects on the environment, the operator must stop the relevant part of the project and ask HSE whether a further EIA is needed.

There is no requirement under EIADR for an EIA for decommissioning on nuclear-licensed sites other than those on which there are civil nuclear reactors. If it is proposed to restore and redevelop the site or part of it after decommissioning facilities then an EIA would usually be required under planning regulations.

The NDA carried out an environmental assessment of its proposals for decommissioning and consulted stakeholders about it as part of the development of its first strategy [NDA, 2006]. This assessment met the requirements for 'strategic environmental assessment' (SEA) in the UK regulations that implement the European SEA Directive.[6]

3.3.3 Providing Information to the Public

The full provisions of the Freedom of Information Act 2000 came into force at the beginning of 2005, as did the Environmental Information Regulations 2004 made under this Act, and the corresponding Act and regulations in Scotland. The regulations are relevant to decommissioning in that they require 'public authorities' to disseminate progressively to the public 'environmental information' that they hold and to make such information available to the public on request.

'Public authorities' include all government departments and agencies (most notably, in the context of this paper, MoD, HSE, the Environment Agency, SEPA and the NDA). 'Environmental information' includes any information (written, visual, aural, electronic) on the state of land and soil, with respect to factors that include radioactivity and other releases to the environment, and information about the state of human health and safety. It also includes information about policies and plans for protecting the environment and human health, reports on the implementation of environmental legislation and cost benefit and other economic analyses, and assumptions used in protecting the environment and human health. There some grounds on which a 'public authority' can refuse to disclose information (eg because disclosure would have an adverse effect on public safety or national security or protection of the environment, or would infringe commercial confidentiality where this is protected by law).

3.4 Security

The main legislation that is relevant to security on civil nuclear sites is the Nuclear Industries Security Regulations 2003 (NISR03). The regulator is the Office for Civil Nuclear Security (OCNS), which is an independent unit within the DTI. The regulations require nuclear premises (as defined in NISR03) to have security plans that are approved by OCNS. NISR03 apply throughout decommissioning and security plans are modified as necessary as decommissioning proceeds. Information about the current status of plans and security is given in the OCNS annual reports [OCNS, 2006].

The security plans for nuclear premises must contain standards, procedures and arrangements to ensure the security of 'nuclear material' (as defined in the Anti-Terrorism, Crime and Security Act 2001 and NISR03), other nuclear and radioactive material, equipment and 'sensitive nuclear information' (as defined in the 2001 Act). They must describe the arrangements for receipt and despatch of nuclear material, for policing and guarding nuclear premises and for approving people who work in such premises. There must also be arrangements for dealing with events such as unauthorised access, malicious damage, and theft or attempted theft of nuclear or radioactive material or sensitive

[6] Directive 2001/42/EC on the effects of certain plans and programmes on the environment.

information. Temporary security plans are required during building work etc. There are also regulations in NISR03 about security during transport of nuclear material.

4 DECOMMISSIONING ON OTHER SITES

4.1 MoD Operated Nuclear Sites

Government policy on decommissioning of nuclear facilities (see Section 3.1.1) applies to facilities on sites that are owned and operated by MoD. Such sites are not subject to the civilian nuclear safety regime imposed by NIA65, nor to the RSA93 radioactive waste management regime but it is MOD policy that, where practicable, standards equivalent to those under NIA65 and RSA93 should be applied. HSE and the environment agencies have an advisory role on MoD operated nuclear sites. The MoD's Defence Nuclear Safety Regulator (DNSR) was involved in the development of the new HSE SAPs (see Section 3.2.2) and intends to use these principles in its work. HSWA74 does apply to MoD operated nuclear sites and so do the regulations made under it, including IRR99 and the COSHH regulations.

4.2 Offshore Oil and Gas Facilities

Decommissioning of offshore oil and gas installations and pipelines on the UK continental shelf is controlled through the Petroleum Act 1998. DTI has the responsibility for ensuring that the requirements of the Act are met and that international obligations are fulfilled. The latter are for installations only and stem from an international agreement reached in 1998 under the auspices of the Convention for Protection of the Marine Environment in the North East Atlantic (known as the OSPAR Convention, after the Oslo and Paris Conventions of the 1970s that it updated and replaced). There are no international guidelines on decommissioning disused pipelines [DTI, 2006].

OSPAR Decision 98/3 prohibits the dumping at sea of offshore installations and leaving them wholly or partly in place. The topsides of all installations must be returned to shore. All installations with a jacket weight less than 10,000 tonnes must be completely removed for reuse, recycle or disposal on land. There is provision for derogation from this rule for the footings of steel jackets weighing more than 10,000 tonnes and for concrete installations. These are to be considered on a case-by-case basis to determine whether they could be left in place. This is only allowed if assessment and consultation show that there are 'significant reasons' why leaving them in place is preferable to removal and reuse, recycle or disposal on land [DTI, 2006]. The derogation only applies to older installations (those installed before February 1999). The use of concrete installations has been discouraged since 1998.

Before the owners of offshore installations or pipelines can decommission one of them they have to obtain, inter alia:

- approval from DTI for their decommissioning programme (under the Petroleum Act 1998)
- for installations, acceptance by HSE of a safety case for decommissioning (under the Offshore Installations (Safety Case) Regulations 2005)
- from the relevant environment agency, any environmental consents or permits required during decommissioning (which may include a revised or additional RSA93 authorisation) [DTI, 2006].

The contents required in a decommissioning programme are set out in DTI guidance [DTI, 2006]. The principles that HSE use in assessing decommissioning safety cases are given in their Assessment Principles for Offshore Safety Cases (APOSC) [HSE, 2006b]. HSWA74 and the relevant regulations made under it apply during decommissioning. Management of

wastes that are returned to land is covered by the same regulatory regimes as wastes from other facilities (see Sections 5 and 6).

4.3 Other Facilities

There is no overarching government policy for decommissioning the other facilities covered in this paper (factories, laboratories, hospitals etc). The planning regime, with its requirements for EIAs, applies if the site is to be redeveloped or subject to some other change of land use specified in the relevant legislation. HSWA74 and all the regulations made under it apply to the decommissioning process (see Section 3.2.1). Also, under IRR99, the operator of the facility must notify HSE that it is to be decommissioned.

If the facility has an RSA93 authorisation for the accumulation and/or disposal of any type of radioactive waste (solid, liquid or gaseous), and it is to be fully decommissioned and the site used for other purposes, the operator must formally ask the relevant environment agency to revoke the authorisation. If the facility is covered by a wider authorisation (eg if it is one of several on a site), then the operator must ask the environment agency to amend that authorisation so that the facility is not mentioned (in effect to revoke the authorisation for the facility being decommissioned).

The Environment Agency has issued guidance on the revocation of RSA93 non-nuclear authorisations [EA, 2004]. This states that the Agency will not revoke an authorisation for premises until it is satisfied that no radioactive waste remains on them that is subject to regulation under RSA93. Residual radioactive contamination on premises constitutes waste if the premises are being redeveloped or demolished or contaminated soil is being excavated. Thus an authorisation needs to remain in force until it has been demonstrated that the residual contamination has been removed. The guidance sets out the steps that an operator should take to achieve revocation of an authorisation, and gives advice on record-keeping. It recommends that the operator holds discussions with the local Agency inspector before starting decommissioning and throughout the process, until the authorisation is revoked [EA, 2004]. It is not clear how the guidance could be applied to an authorised radioactive waste disposal site that is to be 'decommissioned', in the sense that it is to be closed to future disposals.

There are no corresponding environment agency procedures for facilities that have been used for the disposal of radioactive wastes but have not required authorisations. The main example of such facilities is landfills that have been used for the disposal of exempt radioactive waste (see Section 2.2.5) or VLLW (see Section 2.2.4). The closure and aftercare procedures for these are specified in the Landfill Regulations (see Section 6.2.4). They include monitoring and control for a period to be determined by the relevant environment agency, taking into account the time over which the landfill could present hazards.

5 MANAGEMENT OF RADIOACTIVE WASTES

5.1 Government Policy

5.1.1 Long-Term Management of LLW

(To be added when new policy is published. Presumably will need to mention application of the waste hierarchy, proximity principle, new LLW disposal facilities to be established by the NDA. Any revised definition of VLLW will be given in Section 2.2.4.)

5.1.2 Long-Term Management of ILW and HLW

The government announced in October 2006 that it accepted the recommendation of the Committee on Radioactive Waste Management (CoRWM) that the long-term management method for ILW and HLW should be disposal in a deep geological repository [Defra et al, 2006b; CoRWM, 2006a, 2006b]. Until a repository is established, the wastes are to be kept in safe and secure interim storage. The NDA has been given the responsibility for developing and implementing interim storage and geological disposal programmes. The site for the repository is to be found through a process of 'volunteering' by local communities. There is to be a public consultation in 2007 on the implementation framework, the site selection approach and an outline geological disposal programme. Decisions on the locations and types of new interim stores are also expected to be made in 2007.

5.2 Radioactive Substances Act Regime

5.2.1 Authorisations under RSA93

On all sites, except those owned and operated by MoD, the disposal of radioactive waste on or from the site requires an authorisation from the relevant environment agency under RSA93. On sites other than nuclear-licensed sites, accumulation of radioactive wastes requires an RSA93 authorisation, and registration under RSA93 is required for the keeping and use of radioactive substances (as defined in RSA93, see Section 2.2.1). The environment agencies attach conditions to authorisations, which provide means of controlling radioactive waste management. For nuclear-licensed sites the conditions in authorisations normally cover [EA, 2005d]:

- the use of 'best practicable means' (BPM) to minimise the production of all radioactive wastes, discharges to the environment and the radiological effects of waste disposals on the environment and the public
- the characteristics of the management systems that the site operator must have in place to achieve compliance with the authorisation
- carrying out sampling, measurements, tests, surveys and calculations to determine compliance with the authorisation
- record-keeping and providing information to the relevant environment agency.

The conditions in authorisations for non-nuclear facilities cover similar topics but are less detailed.

RSA93 defines 'disposal' to include 'removal, deposit, destruction, discharge (whether into water, air, or into a sewer or drain or otherwise) or burial (whether underground or otherwise)'. This means that, in effect, all reuse, recycle or disposal methods for solid radioactive wastes require authorisation under RSSA93 from the relevant environment agency, unless the wastes are exempt (see Section 2.2.5).

The environment agencies carry out public consultations on many of the applications for new authorisations and variations to existing authorisations for nuclear-licensed sites and other major sites that they regulate under RSA93. In such cases the environment agency publishes the operator's application for a new or revised authorisation, its correspondence with the operator about the application, the agency's proposed authorisation and an explanatory document. After the consultation, the environment agency publishes a 'decision document', which gives the background to and basis for its decision on the authorisation and responses to consultees' comments [EA, 2005e].

MoD is not subject to RSA93 but applies equivalent arrangements. It voluntarily requests agreement from the relevant environment agency for disposals of radioactive waste on or from the sites that it owns and operates.

5.2.2 Exemption Orders

There are nineteen EOs made under the Radioactive Substances Act and they deal with a wide variety of types of radioactive materials, products, premises and situations. Only two of these EOs are particularly relevant to the management of decommissioning wastes. These are the SoLA and PSRE EOs (see Section 2.2.5), which both exempt some LLW from the need for an RSA93 authorisation for disposal. Their effect is that, once a waste has been determined to meet the activity limit and solubility criterion in the relevant EO (see Section 2.2.5 for details), it need not be treated as radioactive waste for RSA93 purposes. It remains a radioactive waste for other purposes, particularly those of NIA65 (see Section 5.3) and the controlled waste regime (see Section 7).

5.2.3 Regulatory Guidance on RSA93

As noted in Section 3.3.1, the Environment Agency has now published its 'radioactive substance regulation environmental principles' (REPs) [EA, 2005c]. The guidance in the REPs is targeted at the Environment Agency's nuclear site regulators but is also intended to be useful to nuclear site operators, to the Agency's regulators of non-nuclear sites and to the operators of these sites.

The fundamental principles in the REPs include ones related to sustainability, stakeholders, integrated strategies for the management of radioactive substances and wastes, use of best available options, protecting human health and the environment, use of best scientific knowledge, and uncertainties and the precautionary principle. The specific principles in the REPs that are relevant to the management of decommissioning wastes include those on:

- the use of BPM to minimise the activities and volumes of radioactive wastes produced
- carrying out 'best practicable environmental option' (BPEO) studies to inform the development of radioactive waste management strategies
- avoiding irreversible consequences
- using BPM to minimise environmental risks and impacts
- monitoring and assessment
- record-keeping.

More detailed guidance on many aspects of the RSA93 regime is given in the Environment Agency's 'Radioactive Substances Act Guidance' (RASAG). This guidance is intended for the Agency's staff but is published because it could be used by others. There are separate chapters in RASAG on authorisations, generic issues and EOs [EA, 2004, 2005a, 2005b]. There is additional Environment Agency guidance on radioactive substance regulation and the authorisation process at nuclear-licensed sites [EA 2005d, 2005e]. The Environment Agency and SEPA have issued joint guidance on BPEO assessments [EA and SEPA, 2004]. All the environment agencies have jointly produced information about the application of BPM [SNIFFER, 2005]. The environment agencies' guidance on requirements for authorisation of disposal facilities for LLW and ILW (the 'GRA') is about to be revised [EA et al, 1997].

5.2.4 Integrated Waste Strategies

Most nuclear sites are now developing an integrated waste strategy (IWS) for the management of all their radioactive and non-radioactive waste. The NDA requires all the sites for which it is responsible to have an IWS and the environment agencies and HSE are encouraging other nuclear sites to produce IWSs. The NDA has issued a specification for

the content and format of an IWS document and a companion publication that gives guidance on the development of an IWS [NDA, 2006b, 2006c].

5.3 Safety of Radioactive Waste Management Operations

HSE is the regulator for the safety of radioactive waste management operations on all types of site. The general regime is that of HSWA74 and regulations made under it (see Section 3.2.1); the radiological safety regime is that of IRR99 [HSC, 1999]. Nuclear safety is regulated by HSE under NIA65 on nuclear-licensed sites (see Section 3.2.2). At nuclear sites owned and operated by MoD an equivalent regime is enforced by DNSR, with HSE advice (see Section 4.1).

All the conditions in nuclear site licences (see HSE website) apply to the management of radioactive wastes [HSE, 2005a]. Licence conditions 32 and 33 impose specific requirements. Condition 32 requires the licensee to minimise, as far as is reasonably practicable, the rate of production of radioactive waste and the total quantity of waste accumulated on the site at any one time. Condition 33 gives HSE powers to direct the licensee to dispose of radioactive waste in a specified manner. These powers are additional to those of the environment agencies under RSA93.

The HSE SAPs and its guidance for inspectors on radioactive waste management provide further information on what is expected of licensees [HSE, 2006a, 2001b]. The SAPs contain seven principles on radioactive waste management including ones on:

- producing and implementing a radioactive waste management strategy
- preventing and minimising the generation and accumulation of radioactive waste
- characterising and segregating radioactive waste
- passively safe storage
- record-keeping.

Safety cases are required for radioactive waste management facilities and operations, as they are for all activities on nuclear-licensed sites. The licence conditions and the SAPs apply to all radioactive wastes, including those that are excluded from or exempt under RSA93 (see Sections 2.2.1, 2.2.2 and 2.2.5).

5.4 Transport of Radioactive Wastes

UK regulations for the transport of radioactive materials are based on regulations issued by the International Atomic Energy Agency (IAEA) [IAEA, 2000 and 2005]. The most relevant regulations for transport of radioactive wastes arising from decommissioning are:

- Radioactive Material (Road Transport) (Definition of Radioactive Material) Order 2002 (SI No. 1092)
- Radioactive Material (Road Transport) Regulations 2002 (SI No. 1093) (known as 'RAMroad')
- Radioactive Material (Road Transport) (Amendment) Regulations 2003 (SI No. 1867)
- Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2004 (SI No. 568) (2006 SR 173 in Northern Ireland)
- Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (Amendment) Regulations 2005 (SI No. 1732) (2006 SR 525 in Northern Ireland).

The regulator for these is the Radioactive Materials Transport Division (RMTD) of the Department for Transport (DfT). The regulations contain activity limits in various types of waste packages, and labelling and record-keeping requirements. Guidance on radiological protection during transport is available from the DfT website [NRPB, 2002].

The transport regulations contain limits on the concentrations of each radionuclide in material to be transported and limits on the total activity of each radionuclide permitted in a single consignment. Only if both types of limit are exceeded do the transport regulations apply. With a few exceptions, material that is not radioactive under RSA93 (see Section 2.2.1) or is exempt under the SoLA EO (see Section 2.2.5) is not subject to the transport regulations. This is because the concentration limits for most radionuclides in these regulations are higher than those in Schedule 1 and the SoLA EO. The exceptions are some naturally occurring radionuclides (see CEWG [2006] for details). There are also general limits in the transport regulations that apply when no radionuclide-specific information is available for the material to be transported. These limits are:

Type of radionuclide	*Concentration limit (Bq/g)*	*Consignment limit (Bq)*
beta/gamma emitters	10	10,000
alpha emitters	0.1	1,000

The concentration limit for alpha emitters (0.1 Bq/g) is lower than the exemption level in the SoLA EO (0.4 Bq/g), so it is possible for large amounts of alpha-contaminated material to be exempt under SoLA but subject to the transport regulations. Further advice on compliance with the transport regulations when moving low activity LLW is given in the nuclear industry's code of practice on clearance and exemption [CEWG, 2006].

Transport of waste to other countries ('transfrontier shipment') requires an authorisation from the relevant environment agency under the Transfrontier Shipment of Radioactive Waste Regulations 1993. There are restrictions as to the countries to which radioactive waste may be sent. In particular, it is prohibited to ship radioactive waste to countries that do not have the technical, legal or administrative resources to manage the waste safely. A country that receives waste from the UK has to notify the relevant environment agency when the waste has arrived.

6 MANAGEMENT OF NON-RADIOACTIVE WASTES

In all the regulations and guidance on the management of non-radioactive waste it is simply called 'waste'. For consistency and brevity this terminology is used throughout this section of the paper, except where it is necessary to specify the type of waste.

6.1 Government Policy

6.1.1 Waste Strategy

The management of waste is a devolved matter so there are separate, but consistent, policies for England, Scotland, Wales and Northern Ireland. The policies are set out in the 'waste strategy' documents for each country. The following text deals with the waste strategy for England. Differences for Scotland, Wales and Northern Ireland are summarised in the Appendix.

The waste management strategy for England is currently (early 2007) under review. the previous strategy was issued in 2000 and was for England and Wales [DETR, 2000]. The key aims of the strategy were:

- to tackle the amount of waste produced, by breaking the link between economic growth and waste production
- to put the waste that is produced to good use, through substantial increases in reuse, recycling composting and recovery of energy.

The 2000 waste strategy introduced the 'waste hierarchy'. For the purposes of this paper the hierarchy can be stated as:

1. reduction (of the quantities of waste produced)
2. reuse or recycle
3. disposal.

In 2005 changes were made to the principles in the strategy relating to waste management decisions [Defra, 2005]. These now state that the objectives of waste management decisions should be to:

- reduce the environmental impact of waste by moving waste management up the hierarchy
- manage wastes in ways that protect human health and the environment, and in particular to do it:
    - without risk to water, air, soil, plants and animals
    - without causing a nuisance through noise or odours
    - without adversely affecting the countryside or places of special interest
    - by disposing of waste at the nearest appropriate installation and by means of the most appropriate methods and technologies.

The 2005 document also states that waste decision-making should be based on the following principles:

- individuals, communities and organisations should take responsibility for their waste
- in taking decisions there should be consideration of alternative options in a systematic way
- effective community engagement should be an important and integral part of the decision-making process
- the environmental impacts of possible options should be assessed looking at both the long and short term
- decisions should seek to deliver the environmental outcomes that do most to meet the objectives above, taking account of what is feasible and what is an acceptable cost.

6.1.2 Site Waste Management Plans

There is nothing in the government's overall waste management strategy that is specific to wastes from demolition, dismantling or decommissioning but there have been various initiatives that are relevant. In particular, in 2004 the DTI issued a voluntary code of practice that provides guidance for construction contractors and clients on 'site waste management plans' (SWMPs) [DTI, 2004b]. The code was drawn up by a working group that included representatives from government departments, regulators and the construction industry. It applies to demolition and redevelopment, as well as to construction per se.

SWMPs are aimed at reducing the amounts of waste that are produced on construction sites and maximising the amounts of construction waste that are reused or recycled, both on and off-site. It is anticipated that regulations will be introduced in 2007 or 2008 that will make the production of SWMPs mandatory for developments with a value of over £200,000.

6.2 Waste Legislation and Licensing

The main regulatory regime for waste management is that of EPA90 and the regulations made under it (except in Northern Ireland, see Appendix). EPA90 imposes a 'duty of care'

on persons concerned with controlled waste and further details are set out in regulations (see Section 6.2.1). The Act and other regulations impose a system of waste management licensing (see Sections 6.2.2 and 6.2.3). The other regulations made under EPA90 that are relevant to this paper are those on landfills (see Section 6.2.4) and on hazardous wastes (see Section 6.2.5). There are various regulations about transport of wastes (see Section 6.2.6).

6.2.1 Duty of Care

The duty of care applies to anyone who produces, imports, transports, stores, treats or disposes of controlled waste or who acts as a broker to arrange theses activities. The duty is to ensure that waste is managed properly and received and disposed of safely [DoE et al, 1996]. A key feature of the regime is that controlled waste can only be transferred to someone who is authorised to receive it. Under the Duty of Care Regulations 1991 a person who transfers waste must complete and retain a transfer note that contains a written description of the waste[7]. A 2003 amendment to the regulations specifies that the waste must be described by reference to the European Waste Catalogue and its appropriate code number. Authorised receivers of controlled waste include waste collection authorities, anyone who holds a waste management licence (see Section 6.2.2) and anyone registered with an environment agency as a carrier of controlled waste. There is statutory guidance on compliance with the duty of care requirements, in the form of a code of practice [DoE et al, 1996].

In 2006 Defra began a review of the duty of care and waste carrier registration systems [Defra, 2006b and 2006c]. The review will result in a consolidated and updated set of regulations and revised guidance. The aim is to make the systems more effective and easier to use, to introduce a risk-based approach and to follow 'better regulation' principles.

6.2.2 Waste Management Licensing – General

Most activities involving controlled waste require a waste management licence or an exemption from licensing. There are two types of waste management licence. One is a site licence, which authorises the deposit, recovery or disposal of controlled waste in or on land. The other is a mobile plant licence, which authorises the recovery or disposal of controlled waste using certain types of mobile plant. If planning permission is required for the particular activity it must be obtained before a waste management licence can be issued.

There are currently forty six types of activity that are exempt from the need to hold a waste management licence. Some exempt activities must be notified to the relevant environment agency and a fee paid. Other exempt activities need only be registered with an environment agency; yet other exempt activities do not need to be registered. Most exemptions contain limits on the types of waste, quantities, capacities and the duration of storage. The exemptions that are most relevant to the use of decommissioning wastes for site restoration are discussed in Section 6.2.3.

There are also a number of 'low risk waste activities' that the Environment Agency regard as having a very low potential to pollute and for which it is not normally in the public interest to take enforcement action for failure to have a waste management licence. These low risk waste activities are listed in Environment Agency guidance, which states that present policy is not to require them to be licensed [EA, 2006c].

Defra, the Welsh Assembly Government and the Environment Agency are currently reviewing the scheme of exemptions from waste management licensing. The aim of the review is to introduce a more risk-based and proportionate approach to the regulation of

[7] Householders are exempt from the transfer note requirement but must take 'reasonable measures' to ensure that their waste is passed on to an authorised person.

waste recovery and disposal, to complement the new environmental permitting regime [Defra, 2006a]. The first consultation is due to begin in March 2007 and will be on the principles behind the review.

6.2.3 Waste Management Licensing – Relevant Exemptions

The two exemptions from waste management licensing that are particularly relevant to decommissioning wastes are those under paragraphs 9A and 19A of the 2005 amendments to the waste management licensing regulations (see SI 2005/1728 in Table 6 for England and Wales and Appendix for Scotland and Northern Ireland). These exemptions relate to reclamation and improvement of land (paragraph 9A) and storage and use of building waste (paragraph 19A). In both cases if planning permission is required for the exempt activity it must be obtained before the activity begins. Fees are payable to the relevant environment agency for the initial use of the exemption and for annual renewal, there are record-keeping requirements, and the Environment Agency may visit sites to check on compliance. Defra has issued statutory guidance to the Environment Agency that is relevant to these exemptions and there is also guidance for businesses [Defra, 2005c and 2005d].

The paragraph 9A exemption allows certain wastes to be spread on land in order to improve it in any way, and other wastes to be spread on land to improve it agriculturally or ecologically. The wastes in question include gravel, crushed rock, sand, clays, bricks, concrete and soils (including soils from contaminated sites, except those that contain 'dangerous substances'). The exemption is restricted to land needing improvement, restoration or reclamation following industrial or other man-made development. The volume of waste that can be spread on the land is restricted to at most 20,000 cubic metres per hectare and the depth of spreading has to be no more than 2 metres. The exemption also allows the storage of wastes for a maximum of six months at the site where it is to be spread. Records must be kept of the amounts of waste spread if they are greater than 2,500 tonnes.

The paragraph 19A exemption allows storage of certain wastes on sites where they are to be used for purposes other than land reclamation or improvement. The wastes concerned are similar to those covered by the paragraph 9A exemption. The quantity stored must be no more than 50,000 tonnes and, if the waste is not produced on site, the storage period must be no longer than six months. The purposes for which the wastes must be used in order to qualify for the exemption include the construction, maintenance and improvement of buildings, roads, railways, airports, docks, recreational facilities and drainage. If more than 2,500 tonnes of waste are used, records must be kept of waste quantities, their nature and origin, and their destination and treatment method. There is an additional provision for storage of road planings and road base at locations other than those where they will be used. Also, the Environment Agency allows the use of small quantities of road planings on tracks and roads (less than 150 tonnes per year per site) without an exemption or fee, provided users inform the Agency of the use.

6.2.4 Landfill Regulations

The Landfill Regulations 2002 implement the EU Landfill Directive in England and Wales (there is separate legislation for Scotland, see Appendix). They require the Environment Agency to classify landfills as being for the disposal of hazardous waste, non-hazardous waste or inert waste (see Section 2.3 for definitions). They also set conditions that the Agency must include in landfill permits. These conditions relate to waste acceptance criteria, and to general requirements and monitoring procedures that landfill operators must follow. The regulations also specify closure and after-care procedures for landfills. These include monitoring and control for as long as the Environment Agency determines to be reasonable, taking into account the time over which the landfill could present hazards. The Agency must not revoke or accept the surrender of a landfill permit for as long as it considers the landfill is

'likely to cause a hazard to the environment'. The Agency can also serve closure notices on landfill operators to prevent them from accepting further wastes for disposal.

Landfills are defined in the regulations as waste disposal sites. They include 'internal waste disposal sites', ie those where the waste producer is disposing of waste on the site where it was produced. Sites used for more than a year for the temporary storage of wastes are also classed as landfills. The regulations do not apply to the use of suitable inert waste for redevelopment, restoration or filling-in work for construction purposes (because these uses are covered by waste management licence exemptions, see Section 6.2.3). The Environment Agency has issued guidance on waste acceptance criteria for the various types of landfill [EA, 2006e]. Disposal of waste to landfill requires a permit under the Pollution Prevention and Control Regulations 2000 (a 'PPC permit').[8]

6.2.5 Management of Hazardous Wastes

Most premises where hazardous wastes (see definition in Section 2.3) are produced must be notified to the relevant environment agency and a notification fee must be paid. (The exceptions are shops, offices, farms and some other types of premises.) No-one is allowed to remove hazardous wastes from premises unless the premises have been notified. Consignment notes must be prepared for all movements of hazardous wastes. Those who receive hazardous wastes (consignees) must inform those who sent them the waste that they have received it and must also send quarterly returns to the relevant environment agency with details of all hazardous wastes received.

Treatment of hazardous wastes can only take place at facilities that have the appropriate PPC permits and disposal can only be to designated landfills. It is prohibited to mix hazardous waste with non-hazardous waste, with any other category of hazardous waste and with any other substance or material. There is also a duty to separate hazardous wastes from other wastes. Records must be kept of transfers, recovery and disposal of hazardous wastes. Details of the records required are in the Hazardous Waste Regulations and Environment Agency guidance [EA, 2006d].

6.2.6 Waste Transport

Anyone who transports waste as part of their business must register with the relevant environment agency, unless they are only transporting their own waste and it is not construction or demolition waste. The registration requirement applies to all organisations and to self-employed people, whether they transport waste occasionally or frequently. It applies to everything that is classed as waste (see Section 2.3.1).

The other major regulations that are relevant to waste transport are those about the carriage of dangerous goods by road and rail. The UK regulations on this topic (see SI 2004/568 and SI 2005/1732 in Table 6) implement the European agreement on the carriage of dangerous goods by road (known as the ADR) and the European Directive on the carriage of dangerous goods by rail (known as RID). HSE is the enforcement authority for many aspects of the UK carriage regulations but DfT is the 'competent authority' for most purposes, including the certification of packaging. HSE has produced a manual and other guidance material on the carriage of dangerous goods [HSE, 2006c and 2004]. The HSE manual states that Environment Agency consignment notes for hazardous wastes (see Section 6.2.5) include all the data required under ADR. This is not the case for SEPA consignment notes, so separate transport documents are needed in Scotland to meet ADR requirements (see Appendix).

There are additional regulations for transfrontier shipments of waste, for which the environment agencies are the regulators. The export of waste for disposal is completely

[8] A PPC permit is also required for treatment of more than 50 tonnes of non-hazardous waste per day to make it suitable for disposal to landfill (or for other reasons).

prohibited. Hazardous waste can be exported to OECD Member States for recovery. Certain non-hazardous wastes (known as 'green list' wastes) can be exported to OECD Member States and to some other countries for recovery. All waste exports require authorisation, which can be obtained from the Environment Agency (for England and Wales), SEPA (for Scotland) or a district council in Northern Ireland.

6.3 Regulators' Roles and Guidance

6.3.1 Environment Agencies

The environment agencies are the main regulators for the management of non-radioactive wastes. Their roles include:

- issuing waste management licences and exemptions
- issuing landfill permits
- monitoring the production, movement, storage, treatment, recovery and disposal of hazardous wastes
- registering waste carriers and brokers
- authorising transfrontier shipments of waste for recovery
- making periodic inspections of holders of licences, exemptions and permits.

The environment agencies charge fees for most notifications, registrations, permits, licences and exemptions. Their websites contain guidance on the regulations for waste management, details of fees and application forms.

6.3.2 HSE

HSE regulates the health and safety of waste management operations. The regime is that of HSWA74 and the regulations made under it, especially MHSW and COSHH (see Section 3.2.1). HSE also enforces the regulations for the carriage of dangerous goods (see Section 6.2.6). There is guidance on the HSE website about all these regulations and there are HSC approved codes of practice for many of them (see Section 10 for details).

7 INTERFACES BETWEEN RADIOACTIVE AND NON-RADIOACTIVE WASTE REGIMES

7.1 Interface Situations

There are three cases in which both the radioactive and non-radioactive waste regimes might need to be considered in decisions on how to manage decommissioning wastes. These are when:

- wastes are radioactive under RSA93 and have other hazardous properties
- wastes are radioactive but exempt under RSA93 and have no other hazardous properties
- wastes are not radioactive under RSA93 but are radioactive for other regulatory purposes.

The three cases are discussed in turn below.

7.2 Radioactive Wastes that are Otherwise Hazardous

The regulatory regime for wastes that are radioactive under RSA93 and have other hazardous properties is set out in the Hazardous Waste (England and Wales) Regulations 2005 (see Appendix for differences in Scotland and Northern Ireland). The situation is that most such radioactive wastes are only subject to RSA93. The exceptions are radioactive wastes that are exempt from RAS93 (see Section 2.2.5). If exempt wastes are hazardous for

other reasons they are subject to the Hazardous Waste Regulations (see Section 6.2.5). The environment agencies, who are the regulators for both regimes, take into account other hazardous properties when issuing RSA93 authorisations for the disposal of radioactive wastes [EA, 2005c].

7.3 Exempt Radioactive Wastes that are Non-Hazardous

When radioactive wastes are determined to be exempt under the SoLA EO or the PSRE EO they are not subject to further regulation under RSA93. If the wastes have no properties that would cause them to be classified as hazardous wastes (see Section 2.3.4), they are not subject to that regime. Also, because exempt wastes are radioactive wastes for RSA93 purposes, they are not subject to the duty of care or to the waste management licensing regime (see Sections 6.2.1 and 6.2.2). In effect, such wastes can be managed as if they are neither radioactive waste nor controlled waste. They are subject to the Landfill Regulations but some landfill operators refuse to accept them because they are radioactive.

7.4 Non-Hazardous Wastes that are not Radioactive under RSA93

The third case is when wastes are not hazardous wastes and are not radioactive for RSA93 purposes but are radioactive for other regulatory purposes, such as NIA65 (see Section 2.2.2). Such wastes are subject to all the regulations under EPA90 for non-hazardous wastes, including the duty of care, waste management licensing and exemptions, and the landfill regulations (see Sections 6.2.1 to 6.2.4).

8 REUSE OF STRUCTURES, PLANT AND EQUIPMENT

8.1 Regulatory Regimes

The discussion in this section is about structures, plant and equipment that are known or suspected to be radioactively contaminated or activated but which have the potential to be reused. Such items are not radioactive waste under RSSA93 because they do not ‘require to be disposed of’ (see Section 2.2.1) and so are not subject to the requirements of the Act or the EOs. If decontaminated, the items would not be waste for the purposes of the EPA90 regime, because there is no ‘intention or requirement’ to discard them (see Section 2.3.1). The regulatory regimes that do apply to such items are those of IRR99 and, if the items originate from or are to be reused on a nuclear-licensed site, NIA65.

8.2 Reuse on Non-Nuclear Sites

The most general case is when an item is to be reused on a site that is neither a nuclear-licensed site nor a site where work is subject to IRR99. The operator of the site on which the item is to be reused will not wish to become subject to IRR99. The regulatory criterion for accepting the item is thus that it should not contain a quantity or concentration of radioactive material that would require work with it to be notified to HSE as work with ionising radiation. The limiting quantities (Bq) and concentrations (Bq/g) of radionuclides are those in Schedule 8 of IRR99. There is also a dose rate criterion of 1 microsievert per hour at 0.1 metre if the activity is in the form of a sealed source in an apparatus of a type approved by HSE (see Schedule 1 of IRR99). There are no corresponding limits for surface contamination.

8.3 Reuse on Nuclear-Licensed Sites

If the structure, plant or piece of equipment is to be reused on a nuclear-licensed site that is not to be delicensed in the foreseeable future, the main regulatory requirement is for a safety case for reuse. This can be in the same form as any other safety case but must take into account the radioactive contamination or activation that is known or suspected to be present.

If the item is to be reused on a site that is to be delicensed in the near future, it is appropriate that the reuse should not breach the delicensing criterion. This is that any radioactivity

remaining on a site should not lead to a risk to an individual above 10^{-6} per year (see Section 3.2.3). Compliance with this criterion must be demonstrated by means of a safety case.

The demonstration is likely to be straightforward for any plant that will need to go through a decommissioning process after reuse, and for any equipment that will be decontaminated and scrapped prior to delicensing. Difficulties may arise in the case of the reuse of buildings, especially if it is known or suspected that there is radioactive contamination in sub-surface structures or in the ground under the building. In such cases it may not be possible to determine the extent and nature of the contamination with any accuracy without seriously damaging the building, so it may not be possible to satisfy HSE that their delicensing criterion would be met when the building is reused. If this happens there is no alternative but to demolish the building and, if necessary, remediate its site.

8.4 Transport of Radioactively Contaminated Items

The transport regulations for radioactive materials (see Section 5.4) also cover radioactively contaminated items. The regulations contain limits for surface contamination, as well as limits for activity concentrations and total activities in packages and consignments. The nuclear industry code of practice on clearance and exemption contains guidance that may be helpful when considering the transport of items for reuse [CEWG, 2006].

9 POSSIBLE FUTURE DEVELOPMENTS

There are a number of developments in progress and planned that will or could affect the regulatory regimes for decommissioning and the management of decommissioning wastes. These are mentioned in other sections of this paper and are discussed further below, with other topics that merit attention.

9.1 Review of EOs for Radioactive Wastes

The review of EOs by Defra and the devolved administrations will also include Schedule 1 of RSA93. It presents an opportunity to modernise and simplify the RSA93 regime for the management of low activity LLW, and to address international developments on 'clearance levels'.[9] It would be valuable if the review also addressed two issues identified in this paper, namely:

- differences between the RSA93 definition and the more general definition of radioactive waste (see Sections 2.2.1 and 2.2.2)
- the exclusion of non-hazardous exempt radioactive waste from the regulatory regime for controlled waste (see Section 7.2).

The first issue could be dealt with by revising Schedule 1 of RSA93 so that it only serves the purpose of excluding materials and wastes that it is not feasible to regulate as radioactive. The clearance of low activity wastes containing uranium and thorium series radionuclides would then need to be covered by a comprehensive EO to replace SoLA. There might also be a need for a new EO to exempt bulk materials containing only naturally occurring radionuclides from some or all RSA93 authorisation requirements.

The second issue could be addressed by including in new EOs conditions that impose a duty of care and a permit scheme similar to that of exemptions from waste management licensing. Alternatively, this could be done through the Defra reviews of the duty of care and the exemptions from waste management licensing (see Section 9.3). The aim in both cases

[9] Clearance is the process by which radioactive wastes are removed from regulatory control. Clearance levels have been derived by the IAEA and the European Commission, based on a dose criterion of 10 microsieverts per year to a member of the public. It is not mandatory to include them in UK legislation but it may become so in the future.

would be to bring radioactive wastes that are exempt from RSA93 and otherwise non-hazardous within the duty of care and waste management licensing regimes for controlled waste.

9.2 Other Issues for Radioactive Wastes and Items

9.2.1 Revoking Authorisations for Radioactive Waste Disposal Facilities

The current Environment Agency procedure for revocation of authorisations under RSA93 is not for nuclear sites and involves removing all the radioactive waste from a facility (see Section 4.3). There is a need for a new procedure for radioactive waste disposal facilities that have been closed and sealed, and where it has been determined that it is safe to leave all the wastes permanently in place. This may involve complete revocation of the facility's authorisation, or its replacement by an authorisation for closure and the initial post-closure period. It would be appropriate for the environment agencies to address this issue during the revision of the GRA (see Section 5.2.3).

9.2.2 Clearance Levels for Radioactively Contaminated Items

It can be seen from Section 8 that there is no single set of activity criteria below which items can be declared to be acceptable to reuse on a non-nuclear site (or a delicensed nuclear site). The only levels that exist and that could be relevant are those in IRR99 for work that does not need to be notified to HSE, and those in the regulations for the transport of radioactive materials. It would be helpful if a comprehensive set of clearance levels were established to allow general reuse of plant, equipment, machinery and other non-waste items. It would be appropriate to base these levels on the 10^{-6} delicensing criterion (see Section 3.2.3) and to include levels for surface contamination. The clearance levels would need to be established by, or at least acceptable to, HSE, as the regulators for IRR99 and NIA65.

9.3 Issues for Non-Radioactive Wastes

9.3.1 Duty of Care

The Defra review of the duty of care began in late 2006, as part of a wider review of the system of controls on the handling, transfer and transport of waste (see Section 6.2.1). The questions asked in the initial consultation included what changes could be made to promote compliance with the duty of care and how awareness of the duty could be improved. Feedback was also requested on updating the current Defra guidance on the duty of care, changing the penalties for non-compliance, and extending the waste transfer note system to help to meet landfill requirements. All these topics are of interest for the management of decommissioning wastes.

9.3.2 Exemptions from Waste Management Licensing

The first consultation in the Defra, Environment Agency and Welsh Assembly Government review of exemptions from waste management licensing is due to begin in March 2007 (see Section 6.2.2). Most of the current exemptions are old and some are complex and difficult for users and regulators to work with. It is also felt that new exemptions are required to take into account technical developments and the clarification of the definition of waste arising from European case law. The review may lead to simplification of the exemptions that are particularly relevant to decommissioning wastes (see Section 6.2.3) and perhaps to useful new exemptions.

9.3.3 Site Waste Management Plans

At present it is good practice to prepare SWMPs for construction, demolition and development projects (see Section 6.1.2). Over the next year or two regulations will be

introduced to make the production of SWMPs mandatory for developments of value over £200k and require more detailed SWMPs for developments over £500k.[10] It is unclear how or whether such regulations will apply to nuclear sites, but they would apply to decommissioning of other facilities on land.

9.3.4 'End-of-Waste' Protocols

The existing WRAP quality protocol is for the production of aggregates from inert waste [WRAP et al, 2005]. It is widely used in road building and maintenance and is also in use in other parts of the construction industry and at some nuclear sites. Its structure is being used in an Environment Agency/WRAP project to produce quality protocols for ten other materials, including some non-hazardous wastes and wastes from remediation of contaminated land. The importance of these national 'end-of-waste' protocols is that organisations that use the recovered materials do not need a waste management licence or exemption. This saves time and money [Defra, 2006a].

10 REFERENCES

All references are available on the website of the authoring organisation, unless otherwise stated. Additional guidance from the environment agencies is available on the NetRegs website, www.netregs.gov.uk.

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[10] The Clean Neighbourhoods and Environment Act 2005 includes a clause that enables DTI to make the regulations for England and Wales by statutory instrument. There are plans to introduce similar regulations in Scotland and Northern Ireland.

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Table 1 Current UK Regulatory Regimes for Decommissioning and Waste Management

Type of site or facility	*Decommissioning*	*Management of Radioactive Wastes*	*Management of Non-Radioactive Wastes*
Nuclear-licensed sites	NIA65	RSA93	EPA90
MoD operated nuclear sites	MoD	MoD	EPA90
Civil non-nuclear sites and facilities	Planning	RSA93	EPA90
Defence non-nuclear sites and facilities	MoD	MoD	EPA90
Off-shore oil and gas facilities	Petroleum Act 1998	RSA93	EPA90

Key to Table 1
NIA65 – Nuclear Installations Act 1965, as amended.
RSA93 – Radioactive Substances Act 1993, as amended, and Exemption Orders.
EPA90 – Environmental Protection Act 1990, and related regulations (and other legislation in Northern Ireland, see Appendix).
MoD – Ministry of Defence.
Planning – the planning regimes for demolition and redevelopment.

Table 2 Principal UK Regulators for Decommissioning and Waste Management

Type of site or facility	*Decommissioning*	*Management of Radioactive Wastes*	*Management of Non-Radioactive Wastes*
Nuclear-licensed sites	HSE	EA, SEPA	EA, SEPA
MoD operated nuclear sites	MoD	MoD	EA, SEPA
Civil non-nuclear sites and facilities	LAs	EA, SEPA, EHS(NI)	EA, SEPA, EHS(NI)
Defence non-nuclear sites and facilities	MoD	MoD	EA, SEPA, EHS(NI)
Off-shore oil and gas facilities	DTI, HSE, HSE(NI)	EA, SEPA, EHS(NI)	EA, SEPA, EHS(NI)

Key to Table 2
HSE – Health and Safety Executive (in England, Scotland and Wales)
EA – Environment Agency (in England and Wales)
SEPA – Scottish Environment Protection Agency
MoD – Ministry of Defence.
LAs – local authorities
EHS(NI) – Environment and Heritage Service (Northern Ireland)
DTI – Department of Trade and Industry
HSE(NI) – Health and Safety Executive (Northern Ireland)

Note for Table 2
There are no nuclear sites in Northern Ireland.

Table 3 Summary of Regulatory Framework for Decommissioning

Regulator	*Key features of regulatory framework for decommissioning (principal legislation) [references to guidance or policy statement]*
1. Nuclear-Licensed Sites	
HSE	• decommissioning should be carried out as soon as reasonably practicable, taking relevant factors into account, and the timing of decommissioning should be determined on a case-by-case basis [DTI, 2004a; HSE, 2006a] • all nuclear site licence conditions apply; licence condition 35 imposes specific requirements for decommissioning (NIA65) • each nuclear-licensed site should have a decommissioning strategy and there should be a decommissioning plan and programme for each nuclear facility [HSE, 2006a] • a full safety case must be prepared before decommissioning begins (NIA65) [HSE, 2006a] • all documents relevant to decommissioning should be identified, prepared, updated and kept throughout the lifetime of each facility [HSE, 2006a] • radiological safety requirements are those for all work with ionising radiation (IRR99) • general health and safety requirements are those for all similar work (HSWA74, MHSW, CDM, COSHH) • an EIA is required before reactor decommissioning (EIADR) • delicensing requires a demonstration of 'no danger' [HSE, 2005b]
EA, SEPA	• discharges of radioactive effluents require an authorisation (RSA93) • discharges of non-radioactive effluents require a permit (PPC Regulations)
OCNS	• nuclear premises must have security plans that are approved by OCNS (NISR03)
2. MoD Operated Nuclear Sites	
DNSR	• nuclear safety regime equivalent to that of NIA65 for nuclear-licensed sites
HSE	• radiological safety requirements are those for all work with ionising radiation (IRR99) • general health and safety requirements are those for all similar work (HSWA74, MHSW, CDM, COSHH) • HSE advises on nuclear safety

Regulator	*Key features of regulatory framework for decommissioning (principal legislation) [references to guidance or policy statement]*
EA, SEPA	• MoD voluntarily requests EA/SEPA agreement for discharges of radioactive effluents • discharges of non-radioactive effluents require a permit (PPC Regulations)
3. Offshore Oil and Gas Facilities	
DTI	• installations must be removed and returned to land for reuse, recycle or disposal on land, unless there are significant reasons to do otherwise [DTI, 2006] • each facility must have a decommissioning programme that is approved by DTI (Petroleum Act 1998)
HSE	• a safety case for decommissioning must be produced and it must be accepted by HSE (Offshore Installations (Safety Case) Regulations 2005) [HSE, 2006b] • radiological safety requirements are those for all work with ionising radiation (IRR99) • general health and safety requirements are those for all similar work (HSWA74, MHSW, COSHH)
EA, SEPA, EHS(NI)	• discharges of radioactive effluents require an authorisation (RSA93) • discharges of non-radioactive effluents require a permit (PPC Regulations)
4. Other Facilities	
HSE, HSE(NI)	• radiological safety requirements are those for all work with ionising radiation (IRR99)* • HSE must be notified that facility is to be decommissioned (IRR99)* • general health and safety requirements are those for all similar work (HSWA74*, MHSW, CDM, COSHH)
EA, SEPA, EHS(NI)	• except at MoD sites, discharges of radioactive effluents require an authorisation (RSA93) • if the facility has an RSA93 authorisation, all radioactive waste must be removed before the authorisation can be revoked (and all residual radioactive contamination must be removed if the site is to be redeveloped) [EA, 2004] • discharges of non-radioactive effluents require a permit (PPC Regulations)
LAs	• planning regime applies if site is to be redeveloped
*Except in Northern Ireland, see Appendix and Table 6.	

Table 4 Summary of Regulatory Framework for Management of Radioactive Wastes

Regulator	*Key features of regulatory framework for radioactive waste management (principal legislation) [references to guidance or policy statement]*
1. Nuclear-Licensed Sites	
EA, SEPA	• disposal of radioactive waste on or from a site requires an authorisation, unless the waste is exempt (RSA93) • conditions in authorisations require operators to use BPM to minimise both waste production and the effects of waste disposal on people and the environment [EA, 2005c, 2005d] • operators must have an appropriate management system to achieve compliance with their authorisation, must keep records and must carry out sampling, measurements and surveys [Ea, 2005c, 2005d] • disposal of radioactive waste that is exempt under the SoLA or PSRE EOs does not require authorisation [EA, 2005b] • operators should carry out BPEO studies to support the development of a radioactive waste management strategy [EA, 2005c; EA & SEPA, 2004]
HSE	• all nuclear site licence conditions apply; licence conditions 32 and 33 impose specific requirements for radioactive waste management (NIA65) • each nuclear-licensed site should have a radioactive waste management strategy [HSE, 2006a] • licensees are required to minimise the generation and accumulation of radioactive waste, to characterise and segregate radioactive waste and to store it so that it is passively safe [HSE, 2006a] • radiological safety requirements are those for all work with ionising radiation (IRR99) • general health and safety requirements are those for all similar work (HSWA74, MHSW, COSHH)
2. MoD Operated Nuclear Sites	
MoD	• MoD is not subject to RSA93 but applies equivalent arrangements and voluntarily requests EA/SEPA agreement for the disposal of radioactive wastes • DNSR enforces a nuclear safety regime equivalent to that of NIA65 for nuclear-licensed sites
HSE	• radiological safety requirements are those for all work with ionising radiation (IRR99) • general health and safety requirements are those for all similar work (HSWA74, MHSW, COSHH) • HSE advises on nuclear safety aspects of radioactive waste management

Regulator	*Key features of regulatory framework for radioactive waste management (principal legislation) [references to guidance or policy statement]*
3. Civil Non-Nuclear Facilities	
EA, SEPA, EHS(NI)	• accumulation and disposal of radioactive waste on or from a site require an authorisation, unless the waste is exempt (RSA93) [EA, 2004, 2005a] • registration is required for the keeping and use of radioactive substances (RSA93) [EA, 2005a] • authorisations contain conditions about BPM, BPEO, management systems and record-keeping [EA, 2005c] • disposal of radioactive waste that is exempt under the SoLA or PSRE EOs does not require authorisation [EA, 2005b]
HSE, HSE(NI)	• radiological safety requirements are those for all work with ionising radiation (IRR99)* • general health and safety requirements are those for all similar work (HSWA74*, MHSW, COSHH)
4. Defence Non-Nuclear Facilities	
EA, SEPA, EHS(NI)	• MoD is not subject to RSA93 but applies equivalent arrangements and voluntarily requests EA/SEPA/EHS(NI) agreement for the disposal of radioactive wastes
HSE, HSE(NI)	• radiological safety requirements are those for all work with ionising radiation (IRR99)* • general health and safety requirements are those for all similar work (HSWA74*, MHSW, COSHH)
*Except in Northern Ireland, see Appendix and Table 6.	

Table 5 Summary of Regulatory Framework for Management of Non-Radioactive Wastes on All Sites

Regulator	*Key features of regulatory framework for non- radioactive waste management (principal legislation) [references to guidance or policy statement]*
EA, SEPA, EHS(NI)	• duty of care applies to anyone who produces, transports, stores, treats or disposes of controlled waste (EPA90, Duty of Care Regulations) [DoE et al, 1996] • waste can only be transferred to authorised receivers and transfer notes are required waste (EPA90, Duty of Care Regulations) [DoE et al, 1996] • waste management licence or exemption required for most activities involving controlled waste (EPA90, Waste Management Licensing Regulations) • paragraph 9A and 19A exemptions from waste management licensing apply to use of wastes for land improvement and construction [Defra, 2005c, 2005d] • landfills are designated as for hazardous, non-hazardous or inert wastes (EPA90, Landfill Regulations) • operation of a landfill requires a permit, which includes waste acceptance criteria [EA, 2006e] • disposal of waste to landfill requires a PPC permit (PPC Regulations) • premises where hazardous wastes are produced must be notified to the appropriate environment agency wastes (Hazardous Waste Regulations) [EA, 2006a, 2006b; Defra, 2005a] • consignment notes are required for all movements of hazardous wastes (Hazardous Waste Regulations) [EA, 2006a, 2006b; Defra, 2005a] • treatment of hazardous wastes requires a PPC permit (PPC Regulations) • it is prohibited to mix hazardous waste with non-hazardous waste and there is a duty to separate out hazardous waste (Hazardous Waste Regulations) • records must be kept of transfers, recovery and disposal of hazardous wastes (Hazardous Waste Regulations) [EA, 2006d]
HSE, HSE(NI)	• general health and safety requirements are those for all similar work (HSWA74, MHSW, COSHH)
Notes • Guidance on all environmental topics is available on the NetRegs website, www.netregs.gov.uk. • Northern Ireland has its own legislation on the management of non-radioactive wastes and on health and safety at work (see Appendix and Table 6).	

Table 6 List of Legislation

1. UK LEGISLATION ON DECOMMISSIONING

Energy Act 2004
Nuclear Installations Act 1965 (as amended) (and conditions attached to nuclear site licences)
Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (SI 2892)
Nuclear Reactors (Environmental Impact Assessment for Decommissioning) (Amendment) Regulations 2006 (SI 657)
Petroleum Act 1998

2. LEGISLATION ON RADIOACTIVE WASTE MANAGEMENT

2.1 UK Legislation on Radioactive Waste Management

Radioactive Substances Act 1993 (as amended)
Radioactive Substances (Phosphatic Substances, Rare Earths etc) Exemption Order 1962 (SI 2648)
Radioactive Substances (Substances of Low Activity) Exemption Order 1986 (SI 1002)
Transfrontier Shipment of Radioactive Wastes Regulations 1993 (SI 3031)

2.2 Radioactive Waste Management Legislation for England and Wales

Radioactive Substances (Basic Safety Standards) (England and Wales) Direction 2000

2.3 Radioactive Waste Management Legislation for Scotland

Radioactive Substances (Basic Safety Standards) (Scotland) Direction 2000

3. LEGISLATION ON MANAGEMENT OF NON-RADIOACTIVE WASTES

3.1 Waste Management Legislation for the UK or Great Britain

Control of Pollution Act 1974
Control of Pollution (Amendment) Act 1989
Environmental Protection Act 1990
Pollution Prevention and Control Act 1999
Controlled Waste Regulations 1992 (SI 588)
Controlled Waste (Amendment) Regulations 1993 (SI 566)
Environmental Protection (Duty of Care) Regulations 1991 (SI 2839)
Transfrontier Shipment of Waste Regulations 1994 (SI 1137)
Transfrontier Shipment of Waste (Amendment) Regulations 2005 (SI 187)
Waste Management Licensing Regulations 1994 (SI 1056)
Waste Management Licensing (Amendment) Regulations 1995 (SI 288)

3.2 Waste Management Legislation for England and Wales

Clean Neighbourhoods and Environment Act 2005
Hazardous Waste (England and Wales) Regulations 2005 (SI 894)
Landfill (England and Wales) Regulations 2002 (SI 1559)
Landfill (England and Wales) (Amendment) Regulations 2004 (SI 1375)
Landfill (England and Wales) (Amendment) Regulations 2005 (SI 1640)
Pollution Prevention and Control (England and Wales) Regulations 2000 (SI 1973) (as amended)[11]

[11] An unofficial copy of the PPC Regulations 2000 that includes all amendments up to 11 July 2006 is available on the Defra website.

Waste Management Licensing (England and Wales) (Amendment and Related Provisions) (No.3) Regulations 2005 (SI 1728)
Waste Management (England and Wales) Regulations 2006 (SI 937)

3.3 Waste Management Legislation for England
Environmental Protection (Duty of Care) (England) (Amendment) Regulations 2003 (SI 63)
List of Wastes (England) Regulations 2005 (SI 895)
List of Wastes (England) (Amendment) Regulations 2005 (SI 1673)

3.4 Waste Management Legislation for Scotland
Environmental Protection (Duty of Care) (Scotland) (Amendment) Regulations 2003 (SSI 533)
Landfill (Scotland) Regulations 2003 (SSI 235)
Landfill (Scotland) (Amendment) Regulations 2003 (SSI 343)
Pollution Prevention and Control (Scotland) Regulations 2000 (SSI 323)
Special Waste Regulations 1996 (SI 972)
Special Waste (Amendment) Regulations 1996 (SI 2019)
Special Waste (Amendment) Regulations 1997 (SI 251)
Special Waste (Scotland) Regulations 1997 (SI 257)
Special Waste Amendment (Scotland) Regulations 2004 (SSI 112)
Waste Management Licensing Amendment (Scotland) Regulations 2003 (SSI 171)
Waste Management Licensing Amendment (Scotland) Regulations 2004 (SSI 275)
Waste Management Licensing Amendment (Scotland) Regulations 2006 (SSI 541)

3.5 Waste Management Legislation for Wales
Environmental Protection (Duty of Care) (Wales) (Amendment) Regulations 2003 (SI 1720)
Hazardous Waste (Wales) Regulations 2005 (SI 1806)
List of Wastes (Wales) Regulations 2005 (SI 1820)
Waste Management Licensing (Amendment) (Wales) Regulations 2002 (SI 1087)
Waste Management Licensing (Amendment) (Wales) Regulations 2003 (SI 780)
Waste Management Licensing (Amendment) (Wales) Regulations 2004 (SI 70)

3.6 Waste Management Legislation for Northern Ireland
Pollution Control and Local Government (NI) Order 1978 (SI 1049 (NI 19), including amendments up to 2004)
Waste and Contaminated Land (Northern Ireland) Order 1997 (SI 2778 (NI 19), including amendments up to 2004)
Controlled Waste Regulations (NI) 2002 (SR 248)
Controlled Waste (Amendment) Regulations (NI) 2003 (SR 404)
Controlled Waste (Duty of Care) Regulations (NI) 2002 (SR 271)
Controlled Waste (Duty of Care) (Amendment) Regulations (NI) 2004 (SR 277)
Hazardous Waste Regulations (Northern Ireland) 2005 (SR 300)
Hazardous Waste (Amendment) Regulations (Northern Ireland) 2005 (SR 461)
Landfill Regulations (Northern Ireland) 2003 (SR 496)
Landfill (Amendment) Regulations (Northern Ireland) 2004 (SR 297)
List of Wastes Regulations (Northern Ireland) 2005 (SR 301)
List of Wastes (Amendment) Regulations (Northern Ireland) 2005 (SR 462)
Pollution Prevention and Control Regulations (Northern Ireland) 2003 (SR 46)
Waste Management Licensing Regulations (Northern Ireland) 2003 (SR 493)
Waste Management Regulations (Northern Ireland) 2006 (SR 280)

4. Health and Safety Legislation

4.1 Health and Safety Legislation for Great Britain

Health and Safety at Work etc Act 1974
Construction (Design and Management) Regulations 2007 (SI ??)
Control of Asbestos Regulations 2006 (SI 2739)
Control of Substances Hazardous to Health Regulations 2002 (SI 2677)
Control of Substances Hazardous to Health (Amendment) Regulations 2003 (SI 978)
Control of Substances Hazardous to Health (Amendment) Regulations 2004 (SI 3386)
Ionising Radiations Regulations 1999 (SI 3232)
Management of Health and Safety at Work Regulations 1999 (SI 3242)
Offshore Installations (Safety Case) Regulations 2005 (SI 3117)

4.2 Health and Safety Legislation for Northern Ireland

Health and Safety at Work (Northern Ireland) Order 1978 (SI 1039 (NI 9))
Health and Safety at Work (Amendment) (Northern Ireland) Order 1998 (SI 2795 (NI 18))
Control of Asbestos Regulations (Northern Ireland) 2007 (SR 31)
Control of Asbestos at Work Regulations (Northern Ireland) 2003 (SR 33)
Control of Substances Hazardous to Health Regulations (Northern Ireland) 2003 (SR 34)
Control of Substances Hazardous to Health (Amendment) Regulations (Northern Ireland) 2003 (SR 288)
Control of Substances Hazardous to Health (Amendment) Regulations (Northern Ireland) 2005 (SR 165)
Construction (Health, Safety and Welfare) Regulations (Northern Ireland) 1996 (SR 510)
Construction (Design and Management) Regulations (Northern Ireland) 1995 (SR 209)
Construction (Design and Management) (Amendment) Regulations (Northern Ireland) 2001 (SR 142)
Ionising Radiations Regulations (Northern Ireland) 2000 (SR 375)
Management of Health and Safety at Work Regulations (Northern Ireland) 2000 (SR 388)
Management of Health and Safety at Work (Amendment) Regulations (Northern Ireland) 2006 (SR 255)
Offshore and Pipelines Safety (Northern Ireland) Order 1992 (SI 1728 (NI 17))

5. PLANNING AND ENVIRONMENTAL ASSESSMENT LEGISLATION

5.1 Planning Legislation for England and Wales

Town and Country Planning Act 1990
Planning and Compulsory Purchase Act 2004
Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (SI 293)
Town and Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2000 (SI 2867)

5.2 SEA Legislation for England

Environmental Assessment of Plans and Programmes Regulations 2004 (SI 1633)

5.3 EIA and SEA Legislation for Scotland

Environmental Assessment (Scotland) Act 2005
Environmental Impact Assessment (Scotland) Regulations 1999 (SSI 1)
Environmental Impact Assessment (Scotland) Amendment Regulations 2002 (SSI 324)

5.4 SEA Legislation for Wales

Environmental Assessment of Programmes and Plans (Wales) Regulations 2004 (Welsh SI 1656 (W170))

5.5 SEA Legislation for Northern Ireland

Environmental Assessment of Programmes and Plans Regulations (Northern Ireland) 2004 (SR 280)

6. LEGISLATION ON TRANSPORT OF RADIOACTIVE MATERIALS AND DANGEROUS GOODS

Radioactive Material (Road Transport) (Definition of Radioactive Material) Order 2002 (SI 1092)
Radioactive Material (Road Transport) Regulations 2002 (SI 1093)
Radioactive Material (Road Transport) (Amendment) Regulations 2003 (SI 1867)
Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2004 (SI 568)
Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (Amendment) Regulations 2005 (SI 1732).
Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (Northern Ireland) 2006 (SR 173)
Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (Amendment) Regulations (Northern Ireland) 2006 (SR 525).

7. OTHER LEGISLATION

Environment Act 1995 (for England, Wales and Scotland)
Environmental Information Regulations 2004 (SI 3391)
Environmental Information (Scotland) Regulations 2004 (SSI 520)
Freedom of Information Act 2000
Freedom of Information (Scotland) Act 2002
Nuclear Industries Security Regulations 2003 (SI 403)

Note for Table 6

All legislation is available on the Office of Public Sector Information (OPSI) website (www.opsi.gov.uk). Environmental legislation is available on the NetRegs website (www.netregs.gov.uk).

Table 7 Key to Acronyms

Acronym	*Meaning*
ADR	European agreement on the carriage of dangerous goods by road
ALARP	as low as reasonably practicable
APOSC	assessment principles for offshore safety cases (HSE)
BPEO	best practicable environmental option
BPM	best practicable means
Bq	becquerel (unit of radioactivity), also kBq (kilobecquerel, a thousand becquerels), MBq (megabecquerel, a million becquerels), Bq/g (becquerels per gram), Bq/ml (becquerels per millilitre)
CDM	Construction (Design and Management) Regulations
CEWG	Clearance and Exemption Working Group
CIRIA	Construction Industry Research and Information Organisation
CoRWM	Committee on Radioactive Waste Management
COSHH	Control of Substances Hazardous to Health Regulations
DE	Defence Estates
Defra	Department for Environment, Food and Rural Affairs
DETR	Department of Environment, Transport and the Regions (a predecessor of Defra)
DfT	Department for Transport
DoE	Department of Environment (a predecessor of Defra)
DNSR	Defence Nuclear Safety Regulator
DTI	Department of Trade and Industry
EA	Environment Agency
EHS(NI)	Environment and Heritage Service (Northern Ireland)
EIA	environmental impact assessment
EIADR	Nuclear Reactors (Environmental Impact Assessments for Decommissioning) Regulations
EO	Exemption Order (made under the Radioactive Substances Act)
EPA90	Environmental Protection Act 1990
EU	European Union
GRA	Guidance on Requirements for Authorisation of Disposal Facilities on Land for Low and Intermediate Level Radioactive Waste (from the environment agencies)
HLW	high level (radioactive) waste
HSE	Health and Safety Executive
HSE(NI)	Health and Safety Executive (Northern Ireland)
HSC	Health and Safety Commission
HSWA74	Health and Safety at Work etc Act 1974
ILW	intermediate level (radioactive) waste
IRR99	Ionising Radiations Regulations 1999

Acronym	*Meaning*
IWS	integrated waste strategy
LA	local authority
LLW	low level (radioactive) waste
LLWR	UK Low Level Waste Repository (near Drigg in Cumbria)
MHSW	Management of Health and Safety at Work Regulations
MoD	Ministry of Defence
NDA	Nuclear Decommissioning Authority
NIA65	Nuclear Installations Act 1965
NISR03	Nuclear Industries Security Regulations 2003
OCNS	Office of Civil Nuclear Security
OECD	Organisation for Economic Cooperation and Development
OSPAR	Convention for the Protection of the Marine Environment in the North East Atlantic (named after its bases, the Oslo and Paris Conventions)
PPC	pollution prevention and control (regime, regulations, permits)
PSRE EO	Phosphatic Substances, Rare Earths etc Exemption Order
RASAG	Radioactive Substances Act guidance
REPs	radioactive substances regulation environmental principles (EA)
RID	European agreement on the carriage of dangerous goods by rail
RMTD	Radioactive Materials Transport Division (of DfT)
RSA93	Radioactive Substances Act 1993
SAPs	safety assessment principles (for nuclear facilities)
SD:SPUR	site decommissioning: sustainable practices in the use of resources
SEA	strategic environmental assessment
SEPA	Scottish Environment Protection Agency
SI	Statutory Instrument
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
SoLA EO	Substances of Low Activity Exemption Order
SR	Statutory Rule (in Northern Ireland)
SSI	Scottish Statutory Instrument
SWMP	site waste management plan
VLLW	very low level (radioactive) waste
WAG	Welsh Assembly Government
WRAP	Waste and Resources Action Programme

APPENDIX DIFFERENCES IN SCOTLAND, WALES AND NORTHERN IRELAND

This appendix briefly outlines the ways in which the regulatory frameworks for decommissioning and the management of radioactive and non-radioactive wastes in Scotland, Wales and Northern Ireland differ from those in England. Reference should be made to the legislation and associated guidance for further details. The legislation on decommissioning per se is common to the whole of the UK (see Section 1 in Table 6), so the focus in this appendix is on waste management and health and safety.

A1 Scotland

Health and safety at work and nuclear safety are not devolved matters in Scotland so all the primary and secondary legislation on these topics listed in Table 6 and mentioned in the main text applies in Scotland. Environmental matters are devolved but several key pieces of legislation, including RSA93 and EPA90, pre-date devolution and are still in force in Scotland. The following summarises how the Scottish regulatory frameworks for the management of radioactive and non-radioactive wastes differ from those in England, in terms of legislation and its application.

A1.1 Management of Radioactive Wastes

The main components of the regulatory framework for the management of radioactive wastes, namely RSA93 and the EOs, are the same throughout the UK. The only difference for Scotland that is relevant to this paper is in how the SoLA EO is interpreted. In Scotland the 0.4 Bq/g limit in SoLA is taken to apply at the time when the waste is created. SEPA do not consider it permissible to store waste to allow radioactive decay to occur and apply the 0.4 Bq/g limit at the time of disposal. This is in contrast to the situation in England and Wales where the Environment Agency permits 'decay storage' as a means of rendering waste exempt under SoLA.

A1.2 Management of Non-Radioactive Wastes

Scotland has its own national waste strategy and national waste plan [SEPA, 1999; Scottish Executive and SEPA, 2003]. These include emphasis on minimising waste production and maximising reuse and recycling, through application of the waste hierarchy. There are also numerical targets of various kinds.

UK legislation on waste management that dates from the 1990s is still in force in Scotland (see Section 3.1 of Table 6). There are also some Scottish regulations on the duty of care, landfills, PPC and waste management licensing (see Section 3.4 of Table 6). These are essentially the same as the corresponding regulations in England and Wales. The situation for hazardous waste is somewhat different. In Scotland the 1996 UK regulations on 'special waste' are still in force, but with amendments to apply the EU Directive on hazardous waste (see Section 3.4 in Table 6). Guidance on these regulations and on exemptions from waste management licensing in Scotland is available on the SEPA website. The Scottish Executive Planning Advice Note PAN 51 contains summaries of various parts of the regulatory framework [Scottish Executive, 2006].

A2 Wales

Health and safety at work and nuclear safety are not devolved matters in Wales. Environmental matters are devolved but the Welsh Assembly can only make secondary legislation. Thus all the primary legislation mentioned in this paper and listed in Table 6 applies in Wales, as does all the secondary legislation on health and safety at work and nuclear safety. The secondary legislation on radioactive waste management (ie the EOs) pre-dates devolution and applies in Wales. Much of the secondary legislation on management of non-radioactive wastes is common to England and Wales but there are some regulations that are specific to Wales (see Section 3.5 in Table 6). These Welsh regulations are, in practice, the same as those in England. Environment Agency guidance on all the waste regulations is applicable to Wales.

The most recent national waste strategy for Wales was published in 2002 [WAG, 2002]. It includes measures to increase recycling and the use of recycled materials, and to develop technologies and products to prevent waste generation. The objective is to move waste management in Wales as far up the waste hierarchy as is practicable.

A3 Northern Ireland

In Northern Ireland health and safety at work and environmental matters are devolved. Nuclear safety is not devolved and parts of NIA65 apply in Northern Ireland, in so far as it may be affected by nuclear-licensed sites in England, Scotland or Wales.

A3.1 Management of Radioactive and Non-Radioactive Wastes

RSA93 and the EOs apply in Northern Ireland, as they do in the rest of the UK. These and other legislation for radioactive waste management are listed in Section 2.1 of Table 6 and the regulatory framework is described in Section 5 of the main text.

The Northern Ireland strategy for managing all wastes has six policy strands [DoE(NI), 2006]. These are: waste prevention, recycling and recovery, waste planning, data and research, legislation and enforcement, and learning and communication. New legislation is planned on some topics so as to implement the policies. The strategy has a supporting document that shows how management of various types of waste will be affected.

The Waste and Contaminated Land (Northern Ireland) Order 1997 implemented the EU Waste Framework Directive in Northern Ireland and transferred the regulatory role from the twenty six district councils to DoE(NI). Northern Ireland has its own regulations on controlled waste, the duty of care, hazardous waste, landfills, PPC and waste management licensing (see Section 3.6 in Table 6). These are enforced by EHS(NI), which is part of DoE(NI). The regulations are similar in intent and practical application to those in England (see Section 6 of the main text). Guidance on them is available on the EHS(NI) website.

A3.2 Health and Safety

Northern Ireland has its own Health and Safety Executive (HSE(NI)) and its own primary legislation on health and safety at work (in particular, the Health and Safety at Work (Northern Ireland) Order 1978). Secondary legislation includes Northern Ireland versions of the main regulations that are relevant to decommissioning, ie the IRRs, MHSW, CDM and COSHH (see Section 4.2 in Table 6). All the legislation is listed on the HSE(NI) website, which also contains guidance for the major subject areas.