

# **The Regulatory Framework for Contaminated Land on Nuclear-Licensed Sites and Defence Sites**

Discussion Paper for the SAFEGROUNDS Learning Network

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Marion Hill  
Enviros

## **FOREWORD**

This paper was originally produced for the SAFEGROUNDS Project Steering Group. It is in two parts, both of which are for use and discussion within the SAFEGROUNDS Learning Network. The first part (Part A) is intended to be a factual summary of the key features of the current regulatory framework for contaminated land on nuclear-licensed sites and defence sites. The second part (Part B) contains some observations on the practical difficulties with, and ambiguities in, that framework. The paper incorporates information from HSE, the Environment Agency, SEPA and DEFRA but all the views expressed are the author's own.

In this third version of the paper there are major changes to Parts A and B, to reflect developments over the period from November 2000 to September 2002.

## CONTENTS

<b>PART A: THE CURRENT REGULATORY FRAMEWORK FOR CONTAMINATED LAND ON NUCLEAR-LICENSED SITES AND DEFENCE SITES .....</b>		<b>3</b>
A1	Key Features of the Regulatory Frameworks.....	3
A1.1	Sites Included .....	3
A1.2	Summaries of Regulatory Frameworks.....	3
A2	Definitions of Contaminated Land.....	4
A2.1	Definitions for Non-Radioactively Contaminated Land .....	4
A2.1.1	Part IIA definition of “contaminated land” .....	4
A2.1.2	Planning regime definition of “land affected by contamination” .....	5
A2.2	Definitions for Radioactively Contaminated Land .....	6
A2.2.1	Definition derived from the radioactive substances and radioactive wastes control regime .....	6
A2.2.2	Definition being developed for Part IIA .....	7
A2.2.3	Definition for the planning regime.....	8
A3	Management of Contaminated Land .....	8
A3.1	Management of Non-Radioactively Contaminated Land.....	8
A3.1.1	Management under the Part IIA regime.....	8
A3.1.2	Management under the planning regime.....	9
A3.2	Management of Radioactively Contaminated Land.....	10
A3.2.1	Radioactively contaminated land at nuclear-licensed sites – general .....	10
A3.2.2	Radioactively contaminated land at nuclear-licensed sites – delicensing.....	11
A3.2.3	Radioactively contaminated land at defence sites.....	11
<b>PART B: PRACTICAL DIFFICULTIES WITH AND AMBIGUITIES IN THE CURRENT REGULATORY FRAMEWORK FOR RADIOACTIVELY CONTAMINATED LAND ....</b>		<b>20</b>
B1	Status of the Current Regulatory Framework .....	20
B2	Definitions .....	20
B3	Remediation Standards.....	21
<b>REFERENCES.....</b>		<b>22</b>
Table 1	Regulatory Regimes .....	13
Table 2	Summary of current regulatory framework for radioactively contaminated land on nuclear-licensed sites.....	14
Table 3	Summary of regulatory framework for non-radioactive and mixed contamination on nuclear-licensed sites.....	15
Table 4	Summary of regulatory framework for defence and other sites.....	16
Table 5	List of legislation and acronyms .....	18

## **PART A: THE CURRENT REGULATORY FRAMEWORK FOR CONTAMINATED LAND ON NUCLEAR-LICENSED SITES AND DEFENCE SITES**

### **A1 Key Features of the Regulatory Frameworks**

#### A1.1 Sites Included

Throughout this paper the term “nuclear-licensed site” is used 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.

All the nuclear power station sites are nuclear-licensed sites, as are the sites where nuclear fuel is manufactured, the site where spent fuel is reprocessed (Sellafield), the UKAEA sites where R&D was or is carried out, and the low level radioactive waste disposal facility at Drigg. Sites where nuclear weapons are made and sites where nuclear-powered submarines are maintained are also nuclear-licensed sites; these sites are owned by the Ministry of Defence (MoD) but operated by contractors.

The term “defence site” is used to mean any site that is owned by MoD that is not a nuclear-licensed site and on which it is known or suspected that radioactive contamination is present on, in or under the land. Most defence sites are ones where the main operation involving radioactive materials was the maintenance of radium luminised instruments, and where this ceased many years ago. MoD is in the process of remediating many of these sites with a view to their sale or re-use for another purpose. A small number of defence sites are ones where nuclear operations (particularly the storage of nuclear weapons) are, and will continue to be, carried out. These defence nuclear sites are not subject to the civilian control regime imposed by the Nuclear Installations Act but it is MoD policy that, where practicable, equivalent standards of control should be applied. All defence sites, and all nuclear-licensed sites, are subject to the Health and Safety at Work etc Act and regulations made under it (in particular, in the present context, the Ionising Radiations Regulations 1999).

#### A1.2 Summaries of Regulatory Frameworks

Table 1 shows the regulatory regimes that are in place and under development in the UK for radioactively and non-radioactively contaminated land. Tables 2-4 summarise the key features of the current regulatory frameworks for:

- radioactively contaminated land on nuclear-licensed sites (Table 2);
- chemically (ie non-radioactively) contaminated land, and land with mixed contamination (ie radioactive and non-radioactive), on nuclear-licensed sites (Table 3);
- all contaminated land on defence sites (Table 4).

For completeness, Table 4 also contains a summary of the regulatory frameworks for sites other than nuclear-licensed sites and defence sites. A key to the acronyms used in Tables 2-4 is given in Table 5, with a list of the principal legislation. Sections A2 and A3 identify the

major differences between the frameworks for radioactive and non-radioactive contamination that appear at the beginning of Tables 2-4: the definitions of “contaminated land” and their implications for the management, and in particular the remediation, of that land. For ease of reference, the *principal* regulators for each type of contamination on each type of site are shown below (see Table 5 for key to acronyms).

	Radioactive contamination	Non-radioactive contamination	Mixed contamination
Nuclear-licensed sites	HSE	Environment Agency or SEPA	HSE, Environment Agency or SEPA
Defence sites (non-licensed)	MoD, HSE, Environment Agency, SEPA, DoE(NI)	Environment Agency, SEPA, DoE(NI)	MoD, HSE, Environment Agency, SEPA, DoE(NI)
Other sites	Environment Agency, SEPA, DoE(NI), local authorities	Local authorities (environment agencies on “special sites”)	Environment Agency, SEPA, DoE(NI), local authorities

## A2 Definitions of Contaminated Land

In UK law there is no single definition of “contaminated land” that applies to both radioactive and chemical (non-radioactive) contamination or to all types of site. The definitions for non-radioactive contamination are somewhat more straightforward so these are dealt with first, in Section A2.1 below. The definitions for radioactively contaminated land are discussed in Section A2.2.

All the definitions are for the purpose of determining whether there should be consideration of any type of action to remediate the contamination. None of the definitions imply what that action should be, nor whether anything beyond further assessment of the land is required.

### A2.1 Definitions for Non-Radioactively Contaminated Land

There are two main components of the environmental regulatory framework that are relevant for definitions of non-radioactively contaminated land. These are:

- the Part IIA regime, which applies to land in its current use (including any use for which planning permission has been granted), and which is designed to deal with the legacy of contaminated land that is posing the greatest risks to people, human activities and the environment;
- the planning regime, which applies to land proposed for development.

The Part IIA regime has a statutory definition of “contaminated land” (see Section A2.1.1). Guidance being developed under the planning regime proposes and defines the wider term “land affected by contamination” (see Section A2.1.2).

#### A2.1.1 Part IIA definition of “contaminated land”

Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) defines “contaminated land” as any land that appears to the local

authority “to be in such a condition, by reason of substances in, on or under the land, that significant harm is being caused or there is a significant possibility of such harm being caused” or “pollution of controlled waters is being, or is likely to be caused”. In this definition “harm” means harm to the health of human beings and various other living organisms, or other interference with the ecological systems of which they form a part, and, in the case of humans, includes harm to property. Guidance is given in regulations on what harm is to be regarded as “significant”, on what is meant by “significant possibility” and on how to determine whether pollution of controlled waters<sup>1</sup> is being or is likely to be caused.

This definition of “contaminated land” is based on the principles of risk assessment and the application of the definition has two steps. The first is to find out whether a “contaminant”, a “pathway” and a “receptor” all exist for one or more of the substances on the land. The second is to determine whether these “pollutant linkages” are leading or are likely to lead to significant harm or pollution of controlled waters. Unless there is one or more “significant pollution linkage” for the land it cannot be deemed to be contaminated land under Part IIA, whatever the levels of contamination present.

If land on nuclear-licensed sites or defence sites is contaminated land they are to be dealt with as “special sites” under the Part IIA regime, which means, in essence, that they are regulated by the relevant environment agency (see below). If the land on a nuclear-licensed site or defence site is not contaminated land (as defined above) then the site will not be a “special site” under Part IIA. At present, none of the Part IIA regime applies to radioactive contamination on land (but see Section A2.2.2 below).

Under Part IIA, local authorities are responsible for identifying land in their areas which meets the statutory definition of contaminated land. In doing so, they will seek information from the relevant environment agency and advice in respect of pollution of controlled waters. In cases where a local authority believes that land, if found to be contaminated land, would subsequently be a “special site”, it will normally ask the environment agency to carry out a site inspection prior to determination. However, the responsibility for the formal determination of land as contaminated land remains with the local authority in all cases. Once land has been determined to be contaminated land, and where the environment agency and local authority agree (or in case of dispute the relevant Minister decides) that the land is also a “special site”, the environment agency will take over regulatory responsibilities from the local authority to ensure that appropriate remediation is carried out.

#### A2.1.2 Planning regime definition of “land affected by contamination”

Guidance is being developed by the Department of Transport, Local Government and the Regions (DTLR) to replace the existing guidance on contaminated land in Planning Policy Guidance Note (PPG) 23. The consultation draft of this new guidance uses the term “land affected by contamination”, which it states is intended to cover “all cases where the actual or suspected presence of substances in, on or under the land may cause risks to people, human activities or the environment, regardless of whether the land meets the statutory definition in Part IIA” [DTLR, 2002].

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<sup>1</sup> “Controlled waters” are as defined in Part II of the Water Resources Act 1991 (for England and Wales) and Section 30A of the Control of Pollution Act 1974 (for Scotland). They include groundwaters.

This wide term “land affected by contamination” reflects the context of planning control. The aim of the guidance is to ensure that all situations in which there are, or could in future be, unacceptable risks from land contamination are addressed in the planning process and that developments are carried out in such a way as to remove these unacceptable risks (see also Section A3.1.2). The DTLR guidance will cover radioactive contamination as well as non-radioactive contamination (see also Section A2.2.3). It will apply to both natural and artificial contamination [DTLR, 2002].

The DTLR guidance is for all sites that come within the planning regime. Nuclear-licensed sites would be included after they have been delicensed and when a development is proposed that requires planning permission. Defence sites for which a change of use is proposed would be included if that change required planning permission.

## A2.2 Definitions for Radioactively Contaminated Land

At present there is no specific definition of “radioactively contaminated land” in UK law. Definitions can be derived from the well-established regime for the control of radioactive substances and radioactive wastes and one is given in Section A2.2.1. Section A2.2.2 briefly describes the approach being used by the Department of Environment, Food and Rural Affairs (DEFRA) to devise a definition of radioactively contaminated land for the extension of the Part IIA regime. Section A2.2.3 discusses the type of definition that might be used for “land affected by radioactive contamination” under the forthcoming DTLR planning guidance [DTLR, 2002]. The whole of this section draws on Environment Agency and HSE guidance issued in 2001 and 2002 [EA, 2002; HSE, 2001a].

### A2.2.1 Definition derived from the radioactive substances and radioactive wastes control regime

The definition of radioactively contaminated land derived here is, in essence, that it is land that has substances in, on or under it that are radioactive in the legal sense. The term “radioactive substance” is defined in the Radioactive Substances Act 1993. Under this Act a substance is radioactive if:

- a) it contains activities per unit mass (expressed in Becquerels per gram (Bq/g)) of the naturally-occurring radioelements uranium, thorium, radium, protactinium, polonium, lead and actinium that are above the levels given in Schedule 1 of the Act;
- b) it contains any substances that are not naturally occurring and the radioactivity of which is wholly or partially due to nuclear fission or to bombardment by neutrons or ionising radiations, but excluding radioactivity that is a consequence of past disposals of radioactive waste that at the time were authorised under the Act.

With this definition the determination of whether land is contaminated relies only on measurement. Unlike the Part IIA definition for non-radioactive contamination (see Section A2.1.1), and the Part IIA definition being developed for radioactive contamination (see Section A2.2.2), there is no identification of pollutant linkages or risk assessment involved. When this definition is used it is implicitly assumed that if there are radioactive substances (as defined in the Radioactive Substances Act) present in, on or under the land then there may be risks to people or the environment. It follows that assessment is needed to find out whether action is required to reduce or remove these risks.

The Radioactive Substances Act applies to all “premises used for the purpose of an undertaking”, which even includes private houses if their occupants are running a business from home. Defence sites have Crown immunity from the Act but it is MoD policy to apply a control regime equivalent to the civilian one to these sites, except where it is impractical to do so. Nuclear-licensed sites are exempt from the requirement in the Act for registration for the keeping and use of radioactive materials and from the requirement in the Act for authorisation to accumulate radioactive waste. They are otherwise subject to its provisions, particularly the requirement for authorisation to dispose of radioactive wastes on or from the site. The definition of radioactively contaminated land derived from the Act can thus be applied to nuclear-licensed sites and defence sites, and it is current regulatory practice to do this.

In applying the definition the regulators (HSE and the environment agencies) usually focus on item (b) of it, ie the part that clearly relates to artificial radioactivity. They interpret this to mean that land is radioactively contaminated if activity levels are above the ubiquitous natural and artificial background that is typical of the area in which the land is located. The ubiquitous artificial background is taken to include radioactivity from atmospheric testing of nuclear weapons in the 1950s and 1960s, fallout from the Chernobyl accident, and radioactivity resulting from effluent discharges from distant nuclear facilities. Radioactive contamination that is a consequence of past disposals of radioactive waste from the site in question, or nearby sites, is usually viewed in the same way as any other contamination (ie the exclusion in item (b) of the definition is ignored in this instance).

Although item (a) in the definition can be interpreted to mean that concentrations of artificially-produced uranium and thorium series radionuclides that are below Schedule 1 levels need not be considered to be radioactive contamination, this is not the interpretation generally used by HSE and the environment agencies. The main reason for this is that the Schedule 1 levels were derived several decades ago in the context of the management of radioactive wastes. Subsequent reviews of the appropriateness of these levels have also focused on this context and it could be that, in some circumstances, land contamination at or below the Schedule 1 levels would lead to risks that could be considered unacceptable.

In the past it has been argued that the Substances of Low Activity Exemption Order (the SoLA EO) made under the Radioactive Substances Act is relevant to the definition of radioactively contaminated land. The SoLA EO states that solid materials and wastes that contain artificial radionuclides at levels less than 0.4 Bq/g, in substantially insoluble form, need not be dealt with as radioactive substances or radioactive wastes under the Radioactive Substances Act regime. This argument is no longer considered valid, for the same reason as given above for the Schedule 1 levels. The situation now is that the 0.4 Bq/g level in the SoLA EO is not used in defining whether land is radioactively contaminated on nuclear-licensed sites, defence sites, or any other types of sites.

#### A2.2.2 Definition being developed for Part IIA

DEFRA is currently developing regulations and technical guidance to extend the Part IIA regime to radioactively contaminated land. This regime will be for land in its current use, except nuclear-licensed sites, and will be designed to deal with those sites that pose the greatest risks to people and the environment. In this regime there will be a statutory definition of “radioactively contaminated land” that is based on the concept of “significant harm” (see Section A2.1.1). The regulations will provide radiation dose levels above which land is considered to be radioactively contaminated for the purposes of Part IIA; these dose levels

will be derived using the radiological protection principle of “intervention”. The technical guidance will provide methods and data to be used in relating the dose levels to radionuclide concentrations in the ground.

### A2.2.3 Definition for the planning regime

From the consultation draft of the DTLR guidance under the planning regime, and from Environment Agency guidance, it appears that a suitable definition of “land affected by radioactive contamination” could be one which is very similar to the definition of radioactively contaminated land given in Section A2.2.1 and derived from the Radioactive Substances Act regime [DTLR, 2002; EA, 2002]. This is because the definition in Section A2.2.1 would meet the objective of the DTLR guidance of ensuring that all land which has potentially unacceptable risks from radioactive contamination is addressed in the planning process. Such a definition would also have the advantage of being consistent with current regulatory practice.

As noted in Section A2.1.2, the DTLR guidance is for all sites that come within the planning regime. Nuclear-licensed sites would be included after they have been delicensed and when a development is proposed that requires planning permission. Defence sites for which a change of use is proposed would be included if that change required planning permission.

## **A3 Management of Contaminated Land**

### A3.1 Management of Non-Radioactively Contaminated Land

#### A3.1.1 Management under the Part IIA regime

By definition, land that is “contaminated land” in the Part IIA sense is causing or is likely to cause significant harm or pollution of controlled waters and therefore some kind of action is required. In general this action will take the form of “remediation”, which is defined in Part IIA as:

- “the doing of anything for the purpose of assessing the condition of –  
the contaminated land in question;  
any controlled waters affected by that land;  
any land adjoining or adjacent to that land;
- the doing of any works, the carrying out of any operations or the taking of any steps in relation to such land or waters for the purpose of –  
preventing or minimising, or remedying or mitigating the effects of, any significant harm, or any pollution of controlled waters, by reason of which the contaminated land is such land;  
restoring the land or waters to their former state;
- the making of subsequent inspections from time to time for the purpose of keeping under review the condition of the land or waters.”

The Contaminated Land Regulations 2000 describe the aim of remediation for an area of contaminated land as the “standard of remediation”. The standard of remediation should be established for each significant pollutant linkage. The minimum aim in each case should be to ensure that the land in its current use (including any future use for which planning

permission exists) is no longer “contaminated land”, and that the effects of any significant harm or pollution are remedied. Under Part IIA, the enforcing authority has a clear role in establishing and implementing the standard of remediation under a variety of situations. In particular:

- under voluntary remediation, the enforcing authority reviews the proposed works to ensure that they will meet the required standard of remediation and then reviews the implementation of the works to ensure that they continue to do so;
- under a remediation notice, the enforcing authority is responsible for identifying the standard of remediation to be achieved by the actions specified within the notice. The authority will then review the implementation of the works to ensure that they continue the required standard.

The Contaminated Land Regulations 2000 require the enforcing authority to take into account the best practicable technique for remediation and in all cases the remediation selected must be reasonable. If remediation actions are not reasonable then they cannot be considered to be the best practicable techniques for the relevant significant pollution linkages.

On a “special site” the relevant environment agency will first encourage voluntary remediation then, if necessary, specify in a remediation notice the remedial measures to be taken and when they should be taken. Failure to comply with a remediation notice issued by the environment agency is an offence.

There will be sites that are not proposed for development where contamination is present but that are not “contaminated land” as defined in the Part IIA regime (for example, because there is no significant pollutant linkage). The options for such sites are to do nothing, or to implement any remedial measures that the site owner feels to be desirable or that are needed for reasons not connected with Part IIA (for example, to comply with an environment agency’s requirements specified under the Anti-Pollution Works Notice Regulations 1999). At nuclear-licensed sites remediation of non-radioactively contaminated land may be necessary in order to comply with site licence conditions related to general safety, or because of the potential for contamination to affect nuclear safety.

#### A3.1.2 Management under the planning regime

The draft DTLR guidance states that the local planning authority should normally require at least a desk study of readily available records for all sites where there is reason to suspect that contamination is present, and when the possibility of contamination has the potential to affect substantively the development or land use for which planning permission is being sought [DTLR, 2002]. The desk study should typically be confirmed by site reconnaissance and, if necessary, be followed by one or more site investigations. In deciding on planning applications, the local planning authority has to be satisfied that the proposed development:

- “does not present or incur unacceptable risk to human beings, or any ecological system, or living organism forming part of such a system, or any property including buildings, or any unexpected financial risks, in ways which impact on land use;
- does not create new pollutant linkages affecting other receptors, for example by mobilising contaminants or changing exposure pathways, particularly where the receptors form an intrinsic part of the development (eg landscaped areas);

- ensures that unacceptable concentrations of contaminants are not left in place, and pollutant pathways are not left open;
- does not prejudice or impede necessary remediation for other contamination problems which may not otherwise impact on land use (eg by creating groundwater pollution problems); and
- can be carried out safely, without the creation of undue risks to workers or neighbours”.

The scale and level of detail in the risk assessment that the developer presents to the local planning authority with the application for planning permission will depend on the nature and extent of the actual or suspected contamination. Any necessary remediation may be carried out as the development proceeds or as a feature of the development process. The local planning authority can attach conditions to planning permissions to ensure that proposed developments meet the above requirements.

The draft guidance summarises the standard of remediation to be achieved through the granting of planning permissions as the removal of unacceptable risk and the making of the site suitable for its new use, thus ensuring that all receptors relevant to the site are protected, including humans, surface and ground water, flora and fauna and buildings [DTLR, 2002]. If the land has been determined to be “contaminated land” under Part IIA, it must no longer meet that definition in its proposed new use.

## A3.2 Management of Radioactively Contaminated Land

### A3.2.1 Radioactively contaminated land at nuclear-licensed sites – general

HSE issued guidance for its inspectors on the management of radioactively contaminated land in nuclear-licensed sites in 2001 [HSE, 2001a]. The guidance states that HSE regard contaminated soil (or other material) as an accumulation of radioactive waste and require it to be dealt with as such. In general this means that some or all of the following operations will need to be carried out:

- further characterisation of the contaminated area;
- restriction of access to the area;
- monitoring of adjacent land, groundwaters and surface waters;
- taking measures to contain the contamination (eg installing covers or barriers);
- removing the soil and placing it in a radioactive waste store or disposing of it by means authorised under the Radioactive Substances Act<sup>2</sup>.

In the terminology used in Part IIA for non-radioactive contamination (see Section A3.1.1) all of these operations would be called “remediation”. While the licensed site is operational the appropriate course of action for ground contamination can often be assessment and containment, rather than removal of the soil or other material and its disposal as radioactive waste.

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<sup>2</sup> These means are: authorised disposal to a radioactive waste disposal site (eg Drigg); burial on the nuclear-licensed site if the site has or can obtain an appropriate authorisation for this; authorised disposal to landfill if the waste can be categorised as very low level (VLLW, activity less than about 4 Bq/g) or is suitable for ‘controlled burial’; and disposal to landfill without a specific authorisation if the waste falls within the terms of the SoLA EO or the Phosphatic Substances, Rare Earths etc Exemption Order (PSRE EO).

It is for licensees to identify and evaluate the possible remediation options, and to obtain HSE permission for their chosen course of action. HSE enforcement powers in this area derive from the conditions attached to nuclear site licences, particularly the conditions that require adequate arrangements for storage of nuclear matter (condition 4), adequate records of amounts and locations (conditions 6 and 25), safety cases (conditions 14 and 23), wastes to be minimised (condition 32) and wastes to be contained (condition 34). The environment agencies have powers relating to unauthorised discharge of radioactive materials into the environment and, in principle, these could be used in the event of, for example, movement of radioactive contamination into off-site groundwater. In practice, under arrangements between HSE and the environment agencies, HSE aim to ensure that remediation is undertaken before such events occur.

HSE require licensees to develop and maintain a preferred strategy and a safety case for the management of radioactively contaminated ground [HSE, 2001a]. The strategy should describe the extent and nature of the contaminated ground and options for managing it. The preferred option and timescale should be justified in terms of the factors that the licensee has been taken into account in arriving at it. The content of the safety case should be similar to that of safety cases for other accumulations of radioactive materials and radioactive waste (see HSE [2001a] for further details).

#### A3.2.2 Radioactively contaminated land at nuclear-licensed sites – delicensing

Under the Nuclear Installations Act 1965 (as amended), 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 land that is to be delicensed. HSE’s approach to, and requirements for, delicensing are discussed in its guidance to inspectors on decommissioning [HSE, 2001b]. It has been announced that the Health and Safety Commission will start a consultation exercise in 2002 on criteria to be met so as to satisfy the “no danger” test [DTI, 2002].

#### A3.2.3 Radioactively contaminated land at defence sites

On operational defence nuclear sites the situation is similar to that on nuclear-licensed sites except that MoD is the nuclear safety regulator, and HSE regulation is via the Health and Safety at Work etc Act and the Ionising Radiations Regulations. For all defence sites that are to be transferred to civilian ownership and/or use the primary consideration in the current regime is that the requirements of the Radioactive Substances Act are met. The Act does not control radioactively contaminated land directly; it controls the management of radioactive wastes. As soon as any work is carried out on such land, whether site investigation or remediation, the potential to generate radioactive wastes exists and, unless the site has Crown immunity, the Act applies. The requirements of the planning regime are relevant if the proposed development of the land requires planning permission [DTLR, 2002]. The Environment Agency guidance applies in all instances of change of use and/or ownership of defence sites [EA, 2002].

The Environment Agency guidance recommends that a broadly based comparison of remediation options be carried out in order to select the best practicable option. The comparison should include radiation doses or risks from residual contamination, factors such as radiological and non radiological environmental impacts, doses to workers and the public

during the remediation process, the costs of the option, its technical feasibility and timescales for completion. The comparison could be a formal “best practicable environmental option” (BPEO) study; its scale and complexity will depend on the nature and scale of the contamination.

The constraint to be used in developing options for comparison is that the risk to a member of the critical group from residual radioactive contamination should not exceed  $10^{-5}$  per year. The Environment Agency also considers that it is unlikely that significant expenditure will be warranted, on radiological protection grounds, to reduce risks below  $10^{-6}$  per year. If there are simple and inexpensive measures to reduce risks further below  $10^{-6}$  per year then these should be taken, but a detailed analysis of options is not needed if the risks would be less than  $10^{-6}$  per year without any remediation [EA, 2002].

Table 1 Regulatory Regimes

Type of site	Radioactive contamination	Non-radioactive contamination	Mixed contamination
1. Nuclear-licensed sites			
1.1 operational sites	NIA (RSA)	Part IIA (special sites)	NIA (RSA), Part IIA (special sites)
1.2 sites to be delicensed	<i>NIA, RSA</i>	Part IIA, <i>DTLR planning guidance</i>	<i>NIA, RSA, Part IIA, DTLR planning guidance</i>
2. MoD sites (non-licensed)			
2.1 “nuclear” sites	MoD	Part IIA (special sites)	MoD, Part IIA (special sites)
2.2 “non-nuclear” sites, no change of land use planned	<i>DEFRA regulations under EPA, RSA</i>	Part IIA (special sites)	<i>DEFRA regulations under EPA, RSA, Part IIA (special sites)</i>
2.3 “non-nuclear” sites, change of land use planned	<i>DTLR planning guidance, RSA</i>	Part IIA (special sites), <i>DTLR planning guidance</i>	<i>DTLR planning guidance, RSA, Part IIA (special sites)</i>
3. Other sites*			
3.1 no change of land use planned	<i>DEFRA regulations under EPA, RSA</i>	Part IIA	<i>DEFRA regulations under EPA, RSA, Part IIA (special sites)</i>
3.2 change of land use planned	<i>DTLR planning guidance, RSA</i>	Part IIA, <i>DTLR planning guidance</i>	<i>DTLR planning guidance, RSA, Part IIA (special sites)</i>

**Key**

NIA – Nuclear Installations Act 1965 (as amended)

RSA – Radioactive Substances Act 1993

Part IIA – Part IIA of the Environmental Protection Act 1990 (and Contaminated Land 2000 Regulations and Statutory Guidance)

EPA – Environmental Protection Act 1990

DEFRA – Department of Environment, Food and Rural Affairs ) For England. It is expected that the devolved administrations

DTLR – Department of Transport, Local Government and the Regions ) will develop their own regulations and guidance.

*Regimes shown in italics are under development, in whole or in part. Where NIA, RSA or Part IIA are shown in italics this means that, although the legislation exists, regulatory guidance is being or may be developed to clarify the application of the legislation in the particular context.*

\*Included for completeness; outside the remit of SAFEGROUNDS.

Table 2 Summary of current regulatory framework for radioactively contaminated land on nuclear-licensed sites

Regulator	Key features of regulatory framework (principal legislation)
HSE	<ul style="list-style-type: none"> <li>• framework for management of contaminated land same as that for management of radioactive waste (NIA 65)</li> <li>• definition of “radioactive contamination” derived from definition of “radioactive waste” (RSA 93)</li> <li>• covers short and long term risks to public and the environment, as well as risks to workers</li> <li>• all site licence conditions apply but conditions 4, 14, 23, 25, 32, 34 are particularly important (NIA 65)</li> <li>• need for waste management and decommissioning strategies (NIA 65)</li> <li>• environmental impact assessments required for reactor decommissioning (EIAD 99)</li> <li>• standards and procedures for worker safety same as for other operations on nuclear-licensed sites (IRRs 1999)</li> <li>• delicensing requires demonstration of “no danger” (NIA 65)</li> <li>• need to compare potential remediation strategies, for ALARP (NIA 65, IRRs 1999)</li> <li>• see HSE [2001a] and HSE [2001b] for further details.</li> </ul>
Environment Agency, SEPA	<ul style="list-style-type: none"> <li>• authorisations for disposals of radioactive wastes (authorisations generally include conditions) (RSA 93)</li> <li>• movement of contamination off-site is an unauthorised discharge, remediation of off-site contamination may be required (RSA 93)</li> <li>• need to compare remediation strategies, for BPEO, ALARA (RSA 93)</li> <li>• availability of methods for disposal of remediation wastes depends on EOs, VLLW arrangements and controlled burial arrangements (RSA 93)</li> <li>• forthcoming DTLR planning guidance for “land affected by contamination” relevant after land is delicensed, if it is to be redeveloped [DTLR, 2002].</li> </ul>

Note

See Table 5 for list of legislation and key to acronyms

Table 3 Summary of regulatory framework for non-radioactive and mixed contamination on nuclear-licensed sites

Regulator	Key features of regulatory framework (principal legislation)
<i>Non-radioactive contamination</i>	
Environment Agency, SEPA	<ul style="list-style-type: none"> <li>• nuclear-licensed sites which have “contaminated land” are “special sites” under Part IIA regime (Part IIA of EPA 90, inserted by Section 57 of Environment Act 95)</li> <li>• definition of “contaminated land” depends on presence of a “significant pollution linkage” (has to be shown that “significant harm” or pollution of controlled waters is happening or likely to happen) (Part IIA regulations)</li> <li>• all “contaminated land” must be remediated if it is reasonable to do so</li> <li>• voluntary remediation is encouraged</li> <li>• environment agencies agree remedial measures and issue remediation notices if necessary (Part IIA)</li> <li>• “appropriate persons” bear remediation costs (typically licensee or site owner if not licensee) (Part IIA)</li> <li>• forthcoming DTLR planning guidance for “land affected by contamination” relevant after land is delicensed if it is to be redeveloped [DTLR, 2002].</li> </ul>
HSE	<ul style="list-style-type: none"> <li>• general rules for occupational health and safety apply (Health &amp; Safety at Work etc Act, COSHH)</li> <li>• potential effects of non-radioactive contaminants on nuclear safety must be considered (NIA 65)</li> </ul>
<i>Mixed radioactive and non-radioactive contamination</i>	
HSE and environment agencies	<ul style="list-style-type: none"> <li>• joint responsibilities, HSE and the relevant environment agency decide how to fulfil them</li> <li>• regimes for radioactively contaminated land and non-radioactively contaminated land apply (NIA 65, RSA 93, Part IIA)</li> <li>• disposal options for remediation wastes may be very limited (RSA 93, Special Wastes Regulations)</li> <li>• forthcoming DTLR planning guidance for “land affected by contamination” relevant after land is delicensed if it is to be redeveloped [DTLR, 2002].</li> </ul>

Note

See Table 5 for list of legislation and key to acronyms

Table 4 Summary of regulatory framework for defence and other sites

Regulator	Key features of regulatory framework (principal legislation)
<b>Defence sites (other than nuclear-licensed sites)</b>	
<i>Radioactive contamination</i>	
MoD, HSE, environment agencies	<ul style="list-style-type: none"> <li>• NIA 65 does not apply but IRRs 1999 do apply</li> <li>• operational defence sites have Crown immunity from RSA</li> <li>• standards of control at defence nuclear sites similar to those at nuclear-licensed sites, under arrangements between MoD, HSE and environment agencies</li> <li>• RSA 93 applies at defence sites being transferred to civilian ownership/use; Environment Agency guidance is relevant [EA, 2002]</li> <li>• regulations under Part IIA being developed by DEFRA for radioactively contaminated sites other than nuclear-licensed sites will apply (see below)</li> <li>• planning guidance being formulated by DTLR for “land affected by contamination” will apply if site is being redeveloped (see below).</li> </ul>
<i>Non-radioactive contamination</i>	
Environment agencies	<ul style="list-style-type: none"> <li>• defence sites which have “contaminated land” are “special sites” under Part IIA regime (Part IIA of EPA 90, inserted by Section 57 of Environment Act 95)</li> <li>• definition of “contaminated land” depends on presence of a “significant pollution linkage” (has to be shown that “significant harm” or pollution of controlled waters is happening or likely to happen) (Part IIA regulations)</li> <li>• all “contaminated land” must be remediated if it is reasonable to do so</li> <li>• voluntary remediation is encouraged</li> <li>• environment agencies agree remedial measures and issue remediation notices if necessary (Part IIA)</li> <li>• “appropriate persons” bear remediation costs (MoD) (Part IIA)</li> <li>• planning guidance being formulated by DTLR for “land affected by contamination” will apply if site is being redeveloped (see below).</li> </ul>
HSE	<ul style="list-style-type: none"> <li>• concerned primarily with occupational health and safety (Health &amp; Safety at Work etc Act, COSHH)</li> </ul>

Regulator	Key features of regulatory framework (principal legislation)
<i>Mixed radioactive and non-radioactive contamination</i>	
MoD, HSE and environment agencies	<ul style="list-style-type: none"> <li>regimes for defence sites with radioactive and non-radioactive contamination all apply (see above)</li> </ul>
<b>Other sites (not nuclear-licensed sites or defence sites)</b>	
<i>Radioactive contamination</i>	
Environment agencies	<ul style="list-style-type: none"> <li>DEFRA developing new regime for land where contamination is very significant, no change of land use is in prospect and intervention is required; regulations to implement it will be made under EPA 90</li> <li>DTLR formulating planning guidance for local authorities for “land affected by contamination” where a change of land use is proposed and where remediation can be carried out as part of redevelopment [DTLR, 2002]</li> <li>environment agencies will identify contaminated sites</li> <li>RSA 93 applies to land on which there are or will be “premises used for an undertaking” and Environment Agency guidance applies [EA, 2002]</li> </ul>
HSE	<ul style="list-style-type: none"> <li>concerned with occupational health and safety, accident risks to the public (Health &amp; Safety at Work etc Act, IRRs 1999)</li> </ul>
<i>Non-radioactive contamination</i>	
Local authorities (or environment agency if special site)	<ul style="list-style-type: none"> <li>Part IIA regime for “contaminated land” applies to sites in their current use</li> <li>DTLR planning guidance for “land affected by contamination” applies if site is to be redeveloped [DTLR, 2002]</li> </ul>
HSE	<ul style="list-style-type: none"> <li>concerned with occupational health and safety, accident risks to the public (Health &amp; Safety at Work etc Act, COSHH)</li> </ul>
<i>Mixed radioactive and non-radioactive contamination</i>	
Environment agencies and local authorities	<ul style="list-style-type: none"> <li>decision required on who is principal regulator; likely that application will be made to designate as “special site”</li> </ul>

Note

See Table 5 for list of legislation and key to acronyms.

Table 5 List of legislation and acronyms

**Legislation (in force as of September 2002)**

Contaminated Land (England) Regulations 2000 (Statutory Instrument 2000 No. 227) (for England; see also Statutory Guidance in DETR Circular 02/2000)\*  
Control of Pollution Act 1974  
Control of Substances Hazardous to Health Regulations 1999  
Environment Act 1995  
Environmental Protection Act 1990  
Health & Safety at Work etc Act 1974  
Ionising Radiations Regulations 1999 (Statutory Instrument 1999 No. 3232)  
Nuclear Installations Act 1965 (as amended) (and conditions attached to nuclear site licences)  
Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (Statutory Instrument 1999 No. 2892)  
Radioactive Substances Act 1993  
Special Waste Regulations 1999  
The Radioactive Substances (Substances of Low Activity) Exemption Order 1986 (Statutory Instrument 1986 No. 1002)  
The Radioactive Substances (Phosphatic Substances, Rare Earths etc) Exemption Order 1962 (Statutory Instrument 1962 No. 2648)  
The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (Statutory Instrument 1999 No. 293)\*  
Water Resources Act 1991

*\*see also corresponding legislation for Scotland, Wales and Northern Ireland*

**List of acronyms and abbreviations**

ALARA - as low as reasonably achievable, economic and social factors being taken into account  
ALARP - as low as reasonably practicable  
BPEO - best practicable environmental option  
Bq/g - Becquerels per gram  
COSHH - Control of Substances Hazardous to Health Regulations (made under the Health and Safety at Work etc Act)  
DEFRA - Department of Environment Food and Rural Affairs  
DoE(NI) – Department of the Environment for Northern Ireland  
DTI – Department of Trade and Industry  
DTLR – Department of Transport, Local Government and the Regions  
EIAD 99 - Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999  
EO - Exemption Order (under the Radioactive Substances Act)  
EPA 90 - Environmental Protection Act 1990  
HSC - Health and Safety Commission  
HSE - Health and Safety Executive  
IRRs - Ionising Radiations Regulations (made under the Health and Safety at Work etc Act)  
LLW - low level (radioactive) waste  
MoD - Ministry of Defence  
NIA 65 - Nuclear Installations Act 1965 (as amended)

**List of acronyms and abbreviations, continued**

Part IIA - Part IIA of the Environmental Protection Act 1990 (inserted by the Environment Act 1995)

PSRE EO – Phosphatic Substances, Rare Earths etc Exemption Order (under the Radioactive Substances Act)

RSA 93 - Radioactive Substances Act 1993

Schedule 1 - Schedule 1 of the Radioactive Substances Act 1993

SEPA - Scottish Environment Protection Agency

SoLA - Substances of Low Activity Exemption Order (under the Radioactive Substances Act)

VLLW - very low level (radioactive) waste

## **PART B: PRACTICAL DIFFICULTIES WITH AND AMBIGUITIES IN THE CURRENT REGULATORY FRAMEWORK FOR RADIOACTIVELY CONTAMINATED LAND**

### **B1 Status of the Current Regulatory Framework**

As can be seen from Part A of this paper, the regulatory framework for radioactively contaminated land is in a state of flux at present. The main items on which work is in progress or planned, and which may come to fruition over the next year or so, are:

- the DEFRA regulations on radioactively “contaminated land”, under Part IIA (for sites in their current use, other than nuclear-licensed sites);
- the DTLR planning guidance on “land affected by contamination” (including radioactive contamination) for all sites proposed for developments that require planning permission [DTLR, 2002];
- the HSC consultation on delicensing criteria for nuclear-licensed sites [DTI, 2002].

The purpose of this section of the paper is to outline the practical difficulties and ambiguities that need to be dealt with during this work or on a longer timescale (eg in technical guidance issued by Government departments and regulators).

### **B2 Definitions**

Section A2.2 mentions three definitions for radioactively contaminated land. For ease of discussion here these will be referred to as the “RSA definition” (see Section A2.2.1), the “Part IIA definition” (see Section A2.2.2) and the “planning regime definition” (see Section A2.2.3).

Although derived from legislation, the RSA definition of radioactively contaminated land is based to some extent on regulatory custom and practice and there are some ambiguities in it (see Section A2.2.1). It is desirable that a clear statement of the definition be developed and included in one or more documents in the regulatory framework. The questions that particularly merit attention are:

- whether the RSA Schedule 1 levels have any relevance for the definition;
- whether and under what circumstances contamination resulting from past authorised disposals of solid, liquid and gaseous radioactive waste is included or excluded;
- whether and under what circumstances contamination resulting from past disposals of solid, liquid and gaseous radioactive waste that did not require authorisation is included or excluded (ie disposals made before RSA 1960, or made from sites with Crown immunity, or made under Exemption Orders).

It is also desirable that there be a clear statement that the SoLA EO is not relevant to the RSA definition of radioactively contaminated land.

In clarifying the RSA definition it would seem sensible to decide whether the planning regime will use the same definition. A difficulty here may be that the planning regime is intended to address natural background as well as artificial contamination [DTLR, 2002]. While it is appropriate for local authorities to require developers to take steps to reduce natural background radiation that is above established standards for new buildings, it is unlikely to be

appropriate for nuclear-site licensees and MoD to have to consider natural background as part of their liabilities. However, because the definitions are to be used only to determine whether the land requires some form of assessment, this difficulty could perhaps be resolved when considering remediation standards (see Section B3).

For the Part IIA definition an important point is that it is clearly distinguished from the RSA and planning regime definitions. A name other than “radioactively contaminated land” may need to be found.

All the above are matters for DEFRA, DTLR and the devolved administrations (the Scottish Executive, the National Assembly for Wales and the Department of the Environment for Northern Ireland) to deal with, in conjunction with HSE and the environment agencies.

### **B3 Remediation Standards**

It is unnecessary and undesirable to have one numerical remediation standard (whether in terms of dose, risk or radionuclide concentrations) that has to be applied to all radioactively contaminated sites. To have one standard would be contrary to the principles of ALARA, ALARP and BPEO and would lead to misallocation of resources. Nevertheless, some form of numerical benchmark is required for purposes such as liability estimation and prioritisation of land for further assessment. The benchmark has to be the same for all types of site, and it has to be clear that remediation should go further if it is simple and relatively inexpensive to do so.

The Environment Agency guidance suggests a benchmark of a risk to critical groups of  $10^{-6}$  per year [EA, 2002]. The problems with this benchmark are:

- it is not in terms of a directly measurable quantity, so it is costly and time-consuming to apply (not least because of differences of view about the health risks of radiation);
- it takes no explicit account of risks to organisms other than humans;
- it takes no explicit account of other environmental impacts, such as adverse effects on the value of land or buildings, or perceived restrictions on land use.

The appropriate form of benchmark is in terms of radionuclide concentrations, derived by considering risks to human health, the environment and human activities.

The benchmark cannot be that land should no longer meet the RSA definition (see Section B2), because this could not be achieved by means other than removing all contamination above background. In many circumstances this is not practicable and/or not appropriate, because it merely creates wastes that have to be managed and shifts the problem from one location to another. Rather, a new set of radionuclide concentration levels is required. Levels are needed for surface contamination, sub-surface contamination and groundwater contamination. They should be consistent with any new clearance levels and generic authorised levels that are established for radioactive wastes. There is also a need for consistency with any new levels that may be established in connection with the “no danger” criterion for delicensing.

The issue of remediation standards is for Government and regulators to address together. This work could be started when responses to the HSC consultation on delicensing criteria are being considered.

## **REFERENCES**

DTI, 2002. *Managing the Nuclear Legacy, A strategy for action.* Cm 5552. London, Department of Trade and Industry.

DTLR, 2002. *Development on Land Affected by Contamination. Consultation Paper on Draft Planning Technical Advice.* London, Department of Transport, Local Government and the Regions.

EA, 2002. *Guidance on the Characterisation and Remediation of Radioactively Contaminated Land.* Bristol, Environment Agency.

HSE, 2001a. *Guidance for Inspectors on the Management of Radioactive Materials and Radioactive Waste on Nuclear Licensed Sites.* Sheffield, Health and Safety Executive.

HSE, 2001b. *Guidance for Inspectors on Decommissioning on Nuclear Licensed Sites.* Sheffield, Health and Safety Executive.

*Note: all the above are available on the web sites of the relevant organisations.*