

Appendix A

Further Guidance for Nuclear-Licensed Sites

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Foreword

This appendix contains further guidance on the management of contaminated land on nuclear-licensed sites. Its focus is on strategic aspects of the long-term management of contaminated land. Shorter-term management of contaminated land is dealt with in existing regulatory guidance and in site licensees' established systems for health, safety and environmental protection.

Various parts of the guidance in Appendix B for defence sites are also likely to be relevant to nuclear-licensed sites but, to avoid duplication, are not included here. Readers whose interest is in nuclear-licensed sites may therefore wish to use Appendix B. In doing so they should bear in mind that the regulatory regimes for nuclear-licensed sites and defence sites are different.

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A1 Sites and Contaminants

A1.1 SITES

A 'nuclear-licensed site' is defined as:

- any site in respect 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,

where 'nuclear site licence', 'licensee' and 'period of responsibility' have the same meaning as in Section 26 of the Nuclear Installations Act 1965. The term 'delicensing' is used to mean the release of the land from regulation under the Act and the release of the operator from his period of responsibility for any nuclear liability.

All the nuclear power station sites are nuclear-licensed sites, as are the Sellafield site (at which spent nuclear fuel is reprocessed), the Drigg radioactive waste disposal site, the UKAEA research establishments (e.g. Harwell, Dounreay) and sites that are operated for MoD by contractors (e.g. dockyards and atomic weapons establishments). The SAFEGROUNDS site characterisation guidance [Baker et al, 2000] contains a complete list of nuclear-licensed sites and a map of their locations.

A1.2 CONTAMINANTS

Contaminated land at nuclear-licensed sites might contain radioactive substances, non-radioactive substances or mixtures of the two. The contamination might have arisen from nuclear and non-nuclear operations during the time for which it has been a licensed site, or from its past, non-nuclear use (for example, a number of nuclear-licensed sites were used for military purposes before nuclear installations were built on them). Baker et al [2000] and Hill et al [2001] describe the kinds of radioactive and non-radioactive contaminants that may be present.

A2 Contexts for Decisions on Management of Contaminated Land

There are five possible contexts for decisions on the management of contaminated land on a nuclear-licensed site:

1. as part of the on-going safe management of the licensed site, with no intention to change the use of the land;
2. as part of the on-going safe management of the licensed site, with the intention of re-using the land for nuclear purposes (eg new plant);

3. as part of decommissioning of part of the site, with the intention of re-using the land for non-nuclear purposes, without any delicensing;
4. as part of decommissioning of part of the site, with the intention of re-using the land for non-nuclear purposes, after delicensing;
5. as part of decommissioning of the whole site, with the intention of re-using the land for non-nuclear purposes, after delicensing.

In contexts 2, 3, 4 and 5, the ‘decision’ could be about what the licensee wishes to do and be required for liability estimation and financial provisioning, rather than being a decision about what will definitely be done to manage the contaminated land in the longer-term. In most contexts, no decision can be taken to actually implement a management option until all the various steps up to and including the gaining of final regulatory approval have been achieved (see Section A4).

A3 The Regulatory Regime

The principal regulatory regime is that of the Nuclear Installations Act 1965, as amended¹ (NIA), which covers all aspects of nuclear safety. The principal regulator is the Health and Safety Executive’s Nuclear Installations Inspectorate (HSE’s NII). Nuclear site licences contain a number of conditions and it is mainly through the enforcement of these conditions that NII regulates nuclear safety. There are 36 standard conditions in nuclear site licences and they cover safety in normal circumstances and in the event of an accident or other emergency [HSE, 1994; HSE, 1999b].

The Health and Safety at Work etc Act 1974 (HSWA 74) also applies at nuclear-licensed sites, as do the regulations made under it. Those of particular relevance to contaminated land are the Ionising Radiations Regulations 1999 (IRR) and the Control of Substances Hazardous to Health Regulations 1999 (COSHH). HSE enforces the Act and the regulations.

Guidance as to what NII expects for nuclear plant safety is given in the HSE’s ‘Safety Assessment Principles for Nuclear Plants’ [HSE, 2001a] and for management of radioactive materials and radioactive waste in another publication [HSE, 2001b]. The guidance is for the NII’s own inspectors but is published to inform licensees and others. The guidance on radioactive waste management [HSE, 2001b] contains an appendix on radioactively contaminated land. Also relevant is the guidance to NII inspectors on decommissioning [HSE, 2001c].

Part IIA of the Environmental Protection Act 1990 applies if the land on a nuclear-licensed site is contaminated with non-radioactive material in the sense defined in the Act. Nuclear-licensed sites that are contaminated to this extent will be designated as ‘special sites’ and the relevant environment agency will be responsible for them in respect of Part IIA (the Environment Agency (EA) for sites in England and Wales, the Scottish Environment Protection Agency (SEPA) for sites in Scotland). Some guidance associated with Part IIA has been issued [DETR 2000a and 2000b] and more is in preparation. Part IIA only applies to sites in their current use and does not contain

¹ See Tromans and Fitzgerald [1997] for an unofficial text of the Act and all the amendments made up until 1997.

provisions that are relevant to delicensing land. The environment agencies can also apply other legislation to regulate non-radioactively contaminated land, for example the Water Resources Act 1991, and the Pollution Prevention and Control (PPC) regime for dealing with wastes.

The Radioactive Substances Act 1993 (RSA) applies to disposals of radioactive wastes on and from nuclear-licensed sites and is relevant to any wastes disposed from contaminated land and any secondary wastes arising from the management of contaminated land. The environment agencies are the regulators for RSA and consult HSE.

For nuclear reactor sites that are to be decommissioned the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (EIAD) apply. These are administered by HSE.

A4 Applying the Key Principles in the Regulatory Framework

The focus in this appendix is on the long-term management of contaminated land on nuclear-licensed sites. This is because shorter-term management of such land is part of the routine safe management of the licensed site and existing guidance and procedures are sufficient and will be enforced by the NII. (Appendix B of HSE [2001b] provides further details, including advice on the content of the safety cases that are required for radioactively contaminated land.)

A4.1 NII REQUIREMENTS FOR RADIOACTIVELY CONTAMINATED LAND

Unless it is a disposal authorised under RSA, radioactively contaminated land (or emplaced radioactive material) on a nuclear-licensed site is as an ‘accumulation of radioactive waste’ and it should be managed as such (see Appendix 8 of HSE [2001b]). NII expects licensees to demonstrate that they are managing² radioactively contaminated ground in compliance with all the conditions of the nuclear site licence. The conditions that are particularly relevant are numbers 4, 14, 23, 25, 32 and 34 (see HSE [1994 and [1999b]). These require licensees to control or contain nuclear matter, including radioactive materials and radioactive waste, to record the amount of material and its location, and to justify and demonstrate the adequacy of the arrangements to maintain safety by means of a safety case.

To achieve the necessary control, NII requires that the licensee has a strategy for the management of radioactively contaminated land. The remainder of this section of the appendix is about applying the key principles (see Section 2 of the main text) in the development of that strategy. The most relevant key principles are 1, 2 and 3. In using

² In NII usage the term ‘management’ has a wider meaning than it does in this guidance. It includes everything that has to be done to ensure safety and thus covers matters such as preventing land contamination, having suitably qualified personnel, training them, supervising them etc.

the appendix it should be borne in mind that the key principles do not cover the full task of managing the land to meet NII requirements (see footnote 2).

A4.2

DEVELOPING A LONG-TERM STRATEGY FOR MANAGING CONTAMINATED LAND

It is recommended that the licensee develops one overall long-term strategy for managing contaminated land that includes both radioactive and non-radioactive contamination (and mixtures). This is because such a holistic approach will be the most efficient and transparent. Non-radioactive contamination has to be considered in the strategy for radioactively contaminated ground because it may have the potential to influence both radiological safety and the effectiveness of management methods for radioactively contaminated land. Furthermore, HSE and the environment agencies consult each other so, if a licensee has one strategy for both regulators to assess, this could shorten approval processes. In the case of other stakeholders, having one strategy can make consultation simpler and quicker.

NII will expect the contaminated land management strategy to be integrated with the decommissioning strategy for the site [HSE, 2001b]. It is Government policy and an NII requirement that every licensee has a decommissioning strategy. It is reviewed and revised regularly, and the detail in it increases as the time for the start of decommissioning approaches. The detailed plans and safety cases for decommissioning a site require information from, and make reference to, the decommissioning strategy [HSE, 2001c].

The steps in reaching a final decision on the decommissioning strategy to be implemented at a particular site can be described as shown below (see also Figure 3 in the main text).

1. Development of a contaminated land strategy, a waste management strategy and strategies for other decommissioning activities.
2. Development of the licensee's preferred decommissioning strategy, integrating the land and waste strategies with the other decommissioning activities.
3. Formal consultation on, and regulatory acceptance procedures for, the licensee's preferred decommissioning strategy. For reactor sites that are to be decommissioned these will include EIAD procedures, with the production of, and public consultation on, an environmental impact assessment (EIA).
4. Development of the licensee's proposed decommissioning strategy.
5. Production of implementation safety cases for submission to HSE, RSA authorisation submissions for EA/SEPA, other authorisation submissions for EA/SEPA (eg under PPC).
6. Regulatory assessment of safety cases and authorisation submissions, with public consultation on RSA authorisation submissions.
7. Final regulatory approvals to proceed with decommissioning.
8. Licensee decides to implement decommissioning strategy.

Licensees should work with their regulators throughout these steps, i.e. with NII, other parts of HSE, and the relevant environment agency.

These eight steps would apply whether the whole site or only part of the site is to be decommissioned and delicensed in the near future (i.e. contexts 4 and 5 in Section A2). In the latter case steps 3-8 would focus on the part of the site that is about to be decommissioned and delicensed, with the decommissioning strategy for the remainder of the site being provided as background. The steps would also largely apply if the aim is to develop and implement a long-term management strategy for contaminated land, without any delicensing taking place in the foreseeable future (contexts 1, 2 and 3 in Section A2). In this case steps 3-8 would be for the contaminated land strategy only, but set against the background of the site decommissioning strategy, and step 3 might be a less formal consultation, without any EIA. There are likely to be several iterations of steps 1 and 2, as site and waste characterisation progresses in the period up to the planned start of decommissioning.

Although full implementation safety cases are not needed until step 5, some safety assessments and environmental impact studies would normally be carried out as part of strategy development. They are particularly important at step 3, where the licensee will need to justify the choice of strategy in comparison to alternatives. This is a formal requirement of EIAD procedures and is needed in other cases to satisfy ALARP and BPEO principles [HSE, 2001b]. It is preferable to include comparisons of alternative strategies at steps 1 and 2, then carry the results through to step 3, rather than only starting to do comparisons at step 3. As explained in Section 5.1 of the main text, it is not necessary to have detailed site characterisation information in order to do these comparisons, nor to carry out detailed safety assessments and environmental impact studies. EIAD provides guidance on the content of a decommissioning EIA and has a procedure for making a preliminary submission to obtain the views of HSE and the EIAD consultees on the scope of an EIA for a particular site. Smith [2002] provides advice on health and environmental risk assessments.

A5 Applying Principle 1: Protection of People and the Environment

All the guidance in the main text (see, in particular Section 3.1) applies at nuclear-licensed sites. There is a further legal and regulatory requirement if the licensee wishes to delicense part or all of the site. The requirement is that HSE has to be satisfied that ‘there has ceased to be any danger from ionising radiations from anything on the site’ (see NIA). This is commonly known as the ‘no danger’ criterion. The licensee’s obligation to manage radioactively contaminated land safely continues until the site is delicensed.

At present, the only way to be reasonably sure of satisfying the ‘no danger’ criterion is to remove all radioactivity above the ubiquitous natural and artificial background (unrelated to site activities). This can be done either by physically removing soil and other material (for off-site disposal or for passively safe storage on a licensed site), or by waiting until levels have decayed to such an extent they are indistinguishable from background before delicensing (with monitoring and control throughout the decay period). This way of satisfying the ‘no danger’ criterion places considerable constraints on the choice of management option for the contaminated land. Licensees, and other stakeholders, may feel that it is undesirable to restrict a comparison of options in this way.

One consideration is that in the future other ways may become available to satisfy the ‘no danger’ criterion. This could occur if HSE were able to establish generic numerical

levels of radioactivity in ground and groundwater that are above background but low enough to be considered to give rise to no danger to people or the environment, whatever the land is used for in the future. The Health and Safety Commission plans to launch a consultation exercise on delicensing criteria in late 2002 [DTI, 2002].

Meanwhile, licensees could try to develop their own ‘no danger’ levels for their site, in consultation with stakeholders. In doing so they would need to recognise that, even if they arrived at levels to which most stakeholders could agree, there could be legal challenges to an interpretation of ‘no danger’ that relied on such levels.

One way to address this issue in decision-making is for licensees to consider long-term land management options that involve removal of all activity above background levels and options that might allow delicensing if other ways to satisfy the ‘no danger’ criterion became available. They could then include in their comparison of options one or more attributes to represent ‘ability to delicense’, and score the options accordingly (see also Section A7.)

A6 Applying Principle 2: Stakeholder Involvement

The guidance in the main text (see Section 3.2 in particular) applies. Regulators will already be involved but licensees will need to discuss with other external stakeholders at what point in the steps in Section A4.2 they wish to begin their involvement in the decision making on the long-term contaminated land management strategy. The remainder of this section deals with involving stakeholders other than regulators and those from the licensee’s own and other nuclear industry-related organisations. Collier [2002] provides advice on who to involve and how.

If the whole or part of the site is being decommissioned and delicensed, stakeholders could become involved at step 1, or they may wish to wait until step 2 when they could deal with all the elements of the decommissioning strategy together. Starting involvement at step 3, when the preferred strategy has been decided, is likely to be too late to be effective and is not recommended (see also DTI [2002]). If there is to be no delicensing in the immediate future, stakeholder involvement is best started at step 1 (see Section 3.2.2 of the main text).

If an EIA is being produced, either to comply with EIAD or for other reasons, it is best to involve stakeholders during its production. This will increase the chance of avoiding criticism and delays at a later stage. As a member of European Commission staff stated recently in connection with nuclear projects: ‘.....*the developer should not regard an EIA as an unavoidable imposition. He should regard it as an opportunity to establish a full and open dialogue with all local bodies and representatives. The final EIA should not be a product that he will need to defend against public criticism, but a joint developer/public document that all sides can endorse and support.*’ [Taylor, 2001].

In all cases, it is recommended that stakeholders are involved at step 4, the development of the licensee’s proposed strategy, prior to the production and submission of implementation safety cases (step 5) and to formal public consultations on authorisations (step 6). To comply with Principle 2, stakeholders should be kept informed throughout steps 7 and 8, and throughout implementation and validation.

A7

Applying Principle 3: Identifying the Preferred Management Option

Principle 3 refers to options, but in this appendix the main concern is with strategies, ie combinations of the options for various areas of the site. In building up alternative strategies for managing the contaminated land on a site, it will often be necessary to look at different options for the various areas. If the problems are complex, it is sensible to compare options for each main area, then use the results to select the options to be included in potential strategies. If the problems are not so complex, it is possible to formulate potential strategies just by choosing practicable combinations of the options for the various areas. In both cases, a small number of potential strategies should be developed and compared in accordance with Principle 3 and the guidance in Section 5 of the main text.

If the whole or part of the site is being decommissioned and delicensed, it may be possible to omit the comparison of contaminated land strategies per se and only compare complete decommissioning strategies (ie contaminated land, plus waste management plus other decommissioning activities). If this is done, it is preferable to compare contaminated land options at an early stage, to feed into the development of alternative decommissioning strategies.

Two approaches are possible if it is proposed to delicense the whole site, or part of it. One is to use the need to remove radioactive contamination above background levels as a constraint on the choice of options for the land that is to be delicensed. The other is to consider contaminated land options that include those that could allow delicensing if other ways of satisfying the 'no danger' criterion became available (see Section A5).

In the latter case, one or more attributes to represent 'ability to delicense' would then be included in the comparison of options and/or strategies. If the ability to delicense at all is the issue, then one attribute might suffice. If the issue is the timescale on which delicensing could be achieved, then several attributes, each relating to the ability to delicense in a different time period, may be needed. The importance attached to these attributes will vary from one site to another, depending on objectives for using the land in question. In this way it should be possible to see the advantages and disadvantages of each option/strategy as far as delicensing is concerned, in perspective with their other pros and cons. This procedure could also be used if no delicensing is yet planned but may be proposed in future. This would help to avoid situations in which further remedial actions are found to be needed at a later stage.

It is recommended that the financial costs of options and strategies be compared using undiscounted values (which highlight overall cost differences) and discounted values (which highlight short-term cost differences).

A8

Applying Principle 4: Immediate Action

No further guidance is required on applying this key principle at nuclear-licensed sites. Immediate action to record, monitor, control and, where appropriate, remediate

contaminated land is necessary to fulfil regulatory requirements. This is required irrespective of work to develop long-term management strategies.

A9 **Applying Principle 5: Record-Keeping**

Compilation and maintenance of comprehensive records is fundamental to the process of managing contaminated land on nuclear-licensed sites. Record-keeping is enforced through the site licence and HSE can specify particular requirements. However, these records may not have the same scope as those envisaged in this guidance (see Section 3.5 of the main text). For example, although the amounts and locations of all radioactive material on a site must be recorded, there may be no explicit requirement to include all site characterisation information for non-radioactive contamination, nor to include information on the process of deciding how to manage contaminated land. Also, there is at present no requirement for a second copy of records or a summary to be made, potentially to be held by a public body (see Section 3.5 of the main text).

It is recommended that licensees should, as part of the development of a long-term contaminated land management strategy, establish the format of the records required to meet Principle 5. These records should then be made in parallel with the records required by the site licence conditions, so that they are consistent with them and common material can be included where appropriate.

A10 **Funding**

Licensees must make financial provisions to deal with nuclear liabilities, of which contaminated land is just one component. Certain privately owned companies (eg British Energy) have segregated funds; government-owned organisations (eg BNFL, UKAEA, MoD) have other arrangements. Arrangements for government-owned civil nuclear organisations are expected to change in the next year or two, when the government establishes a 'Liabilities Management Authority' [DTI, 2002]. It is possible that the new arrangements will involve the establishment of a government-held segregated fund or a 'statutory segregated account'. It is important that the full costs of managing contaminated land on nuclear-licensed sites, up to and including delicensing, are taken into account when estimating liabilities, and that arrangements ensure that funds for dealing with contaminated land are available when required.