The management of higher activity radioactive waste on nuclear licensed sites

Radioactive waste management cases

Guidance from the Health and Safety Executive, the Environment Agency and the Scottish Environment Protection Agency to nuclear licensees

November 2008

We are issuing this version of the guidance for comment and trial use. We would welcome comments by 30 January 2009.

Contents

Explanatory note

This explanatory note will not form part of the guidance.

Trial use and comment

We are issuing this version of the guidance for comment and trial use. We would welcome comment on any other aspects of this document.

Please provide any comments by 30 January 2009. We will issue a revised version that takes account of all comments received, and after a further year we will review whether there should be further revision. We will also publish a summary of the responses received during the consultation period.

Responses are invited on the understanding that they may be made public by the regulators. Comments will be attributed, unless a respondent makes a specific request to the regulators for their comments to remain anonymous.

During this period there will be trial use of this document. Regulators will use it in discussions with licensees to test the practical implications of its use. Observations from such trial use will be fed back to inform the production of a final version.

Comments should be directed to: NDenquiries@hse.gsi.gov.uk referencing 'Joint Guidance' in the title of the message.

Health and Safety Executive
Environment Agency
Scottish Environment Protection Agency
November 2008

Foreword

The Health and Safety Executive (HSE), the Environment Agency and the Scottish Environment Protection Agency (SEPA) (together referred to as 'the regulators') have issued this guidance jointly.

You are not required to follow this guidance, and you are free to take other action. However, if you do follow this guidance, you will normally be doing enough to comply with the law as interpreted by the regulators at the time of writing, and the regulators may refer to this guidance as illustrating good practice. However, compliance with this guidance does not automatically mean that we will approve an application for a nuclear site licence, a consent or agreement under the licence or an authorisation.

Given the long timescales involved in radioactive waste management, you should be aware that standards, legislation and national policy might change. While this guidance forms the best advice that the regulators can give at present, nothing in this guidance overrides, or is intended to pre-empt, the ability of the regulators to discharge their statutory powers and duties in accordance with legislation, standards and policy applicable at any time.

Policies for the disposal of higher activity waste differ in Scotland and in England/ Wales. We consider that packages conditioned in anticipation of deep geological

disposal are also suitable for long-term storage, as required by Government policy in Scotland. On this basis the following guidance can be used equally in England, Scotland and Wales, but any references to geological disposal will mean long-term storage when applied to Scotland. We will keep the packaging advice being developed by the Nuclear Decommissioning Authority's (NDA's) Radioactive Waste Management Division (RWMD) under review and if any developments mean that this assertion is no longer valid, we will provide further guidance.

We will review this guidance periodically to ensure that it continues to provide sound advice.

Freedom of information – disclosure of information

The regulators are public authorities for the purposes of the Freedom of Information Act 2000 (FOIA00) and the Environmental Information Regulations 2004 (EIR04) in England and Wales, and the Freedom of Information (Scotland) Act 2002 (FOISA02) and the Environmental Information (Scotland) Regulations 2004 (EISR04) in Scotland. If we receive a request for information that we hold, we will have to consider the request in accordance with this legislation.

This document is available on our websites, in accordance with our respective policies of openness and transparency.

Executive summary

This guidance describes regulatory expectations with respect to the production, content, maintenance and review of radioactive waste management cases (RWMCs), and provides links to further guidance on how the components of a RWMC may be produced.

The RWMC should demonstrate the long-term safety and environmental performance of the management of specific wastes from their generation to their conditioning into the form in which they will be suitable for storage and (in England and Wales) eventual disposal. It should provide a complete picture of the management of waste streams that cannot necessarily be seen from examination of the individual plant safety cases.

Much of the information required should already be available in other documents, eg the integrated waste strategy and relevant plant safety cases. The RWMC should not aim to duplicate such information which can be incorporated through brief summaries and referencing. The added value of a RWMC is a demonstration of how the various components interact together with a description of any necessary arrangements for managing such interactions.

The primary purpose of a RWMC is to provide continuous support for safe operation by establishing and demonstrating in written form that plants, processes, activities, modifications, etc:

- comply with regulatory requirements;
- provide for an acceptable outcome in terms of national policy for radioactive waste management, ie for higher activity wastes, passively safe waste suitable

for disposal in a geological repository (in England and Wales) or secure long-term interim storage (in Scotland);
- are consistent with national and international standards of radioactive waste management; and
- take account of interdependencies among all steps in generation and management of radioactive waste.

A RWMC should be structured in a logical manner and should contain sufficient information to fulfil the above purpose. This information should be easily accessible and understandable.

The scope of an individual RWMC is a matter for the licensee. However, in deciding whether a RWMC covers a single waste stream or a group of waste streams, the licensee should ensure that all higher activity waste on its site is covered by a RWMC.

The RWMC should be treated and managed as a safety case in terms of Licence Conditions 14, 15, and 19–22. As part of the production process the RWMC should therefore undergo appropriate review and approval processes, and once produced should be subject to appropriate modification and periodic review processes.

Licence conditions[1] require arrangements to ensure that radioactive waste is: adequately stored; its production and accumulation is minimised; and it is adequately controlled and contained. A RWMC is a key component of these arrangements. It may deal with a single waste stream or several related waste streams, but all wastes within the scope of this guidance should be covered by a RWMC.

Scope

1 This document is part of a suite of guidance documents covering management of higher activity radioactive wastes on licensed nuclear sites.

2 In the context of this guidance:

- **management of radioactive waste** means the whole process of managing waste from its generation to (but not including) its disposal;
- **higher activity radioactive waste** means all radioactive waste other than:
  - low-level radioactive waste (LLW) which will be disposed of promptly at the Low Level Waste Repository near Drigg or to similar future facilities; and
  - very low-level radioactive waste which will be disposed of promptly at suitably authorised disposal facilities; and
  - radioactive wastes exempted under the provisions of any relevant exemption order;
- **promptly** means as soon as is reasonably practicable after waste generation without the need for any treatment other than basic segregation, sorting and compaction to make it suitable for its intended disposal route. Advice about the disposal of those categories of radioactive waste that are not covered in this guidance can be obtained from the Environment Agency or SEPA.

3 While this guidance refers to the regulatory expectations for production and review of RWMCs, for guidance on how they are dealt with in the regulatory system readers should refer to:

- *The management of higher activity radioactive waste on nuclear licensed sites: Part I The regulatory process;*[2]

- *Fundamentals of the management of radioactive waste: An introduction to the management of higher activity radioactive waste on nuclear licensed sites.*[3]

4 Licensees are reminded that the same general safety and environmental standards apply to all activities involving radioactive materials whether or not the material involved is declared as radioactive waste.

Objective

5 The objective of this document is to give guidance on complying with the legislation described in the following section by:

- describing regulatory expectations with respect to the production, content, maintenance and review of radioactive waste management cases; and
- providing links to further guidance on how the components of the case may be produced.

6 When applying this guidance, licensees should have due regard to:

- HSE's principles for assessing nuclear safety cases, as detailed in the Nuclear Installations Inspectorate's *Safety Assessment Principles;*[4]
- HSE Technical Assessment Guide on 'as low as reasonably practicable' (ALARP);[5] and
- the Environment Agency's principles* for the regulation of radioactive substances as detailed in *Radioactive Substances: Regulation Environmental Principles* (interim).[6]

Applicable legislation

7 As required by the following legislation, facilities and activities for predisposal management of radioactive waste, including decommissioning activities, should be subject to safety and environmental impact assessments to demonstrate that they are adequately safe and, more specifically, that they will be in compliance with safety and environmental requirements established by the regulators.

Nuclear Installations Act 1965 (as amended)

8 The Nuclear Installations Act 1965 (as amended)[7] requires any operator of a defined nuclear installation to be licensed and gives HSE the powers to 'attach to the licence such conditions as may appear ... to be necessary or desirable in the interest of safety' or 'as it may think fit with respect to the handling treatment and disposal of nuclear matter'. The sections of the Nuclear Installations Act relating to the licence and inspection of sites (sections 1, 3–6, 22 and 24A) are 'relevant statutory provisions' under the Health and Safety at Work etc Act 1974.[8] Thus these sections are subject to regulation and enforcement by HSE.

* This document does not apply in Scotland, for additional guidance in this area licensees should contact SEPA.

Standard conditions applied to nuclear site licences

9 There are 36 standard licence conditions (LCs) attached to all nuclear site licences (see *Nuclear site license conditions*[1]). The conditions relevant to this guidance are:

- **LC4** requires that no nuclear matter is stored on the site except in accordance with adequate arrangements made by the licensee for this purpose;
- **LC32** requires adequate arrangements for minimising so far as is reasonably practicable the rate of production and total quantity of radioactive waste accumulated on the site at any time and for recording the waste so accumulated;
- **LC34** requires the licensee to ensure, so far as is reasonably practicable, that radioactive material and radioactive waste on the site is at all times adequately controlled or contained so that it cannot leak or otherwise escape from such control or containment; and
- **LC35** requires the licensee to make and implement adequate arrangements for the decommissioning of any plant or process which may affect safety. Insofar as decommissioning and radioactive waste management are interlinked activities, this is a relevant licence condition to this guidance.

10 A radioactive waste management case is the safety case for the management of a particular radioactive waste stream (or streams), and as such the following conditions are relevant:

- **LC14** requires the licensee to 'make and implement adequate arrangements for the production and assessment of safety cases …';
- **LC19–23** specifically require the licensee to provide adequate documentation to substantiate the safety, including identification of the conditions and limits necessary in the interests of safety, of proposals to construct or install new plant, to modify the design of plant under construction, commission plant, or to modify or experiment on existing plant; and
- **LC15** requires the licensee to 'make and implement adequate arrangements for the periodic and systematic review and assessment of safety cases'.

Health and Safety at Work etc Act 1974 (HSW Act)

11 Section 2 of the HSW Act[8] requires 'every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees'. Section 3 of the Act requires 'every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that the persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety'. In judging whether licensees have complied with their legal duties HSE makes use of the risk management procedures explained in *Reducing risks, protecting people*[9] document. The fundamental requirement is that the licensee shall take measures to reduce risks 'as low as reasonably practicable' (ALARP). Guidance on the meaning and use of the concept of ALARP in HSE's decision making is available from HSE's website.[10–12]

Environmental legislation

12 The primary role of the environment agencies in the regulatory process covered by this guidance is to advise HSE on long-term environmental issues. This includes providing advice on the long-term disposability of conditioned waste, and ensuring waste is managed in a sustainable way, taking into account long-term environmental considerations. The agencies carry out this duty under section 37(3) of the Environment Act 1995[13] and charge for this advice under section 43.

13 Short-term environmental issues (such as discharges) are, in general, covered under separate environmental legislation enforced by the environment agencies. This separate legislation is not the focus of this guidance and a radioactive waste management case is not necessarily the primary vehicle to demonstrate compliance on these matters. However, in certain areas the regulators' interests inevitably overlap and issues arise that should not be considered in isolation. Consequently, licensees should refer to other environmental legislation and associated guidance as appropriate to ensure that their radioactive waste management cases are consistent with it.

14 Of particular note are the statutory requirements under the Radioactive Substances Act 1993 (RSA93).[14] It is under this legislation that the environment agencies regulate radioactive disposals (including the discharge of gaseous and aqueous radioactive wastes) and also transfers of radioactive wastes between nuclear sites. Before granting or significantly varying an authorisation granted under RSA93 the appropriate environment agency will wish to ensure that a systematic and proportionate examination has been made of the options for waste management (having regard to the waste hierarchy) and that the waste management strategy chosen represents the optimum to provide proper protection for people and the environment.

The radioactive waste management case

15 A radioactive waste management case (RWMC) should demonstrate the longer-term safety and environmental performance of the planned management of specific wastes from their generation to their conditioning into the form in which they will be suitable for storage and (in England and Wales) eventual disposal. It should provide a complete picture of the management of waste streams that cannot necessarily be seen from examination of the individual plant safety cases.

Purpose

16 The primary purpose of a radioactive waste management case is to provide continuous support for safe operation by establishing and demonstrating in written form that the plants, processes, activities, modifications etc being proposed for managing radioactive wastes:

- comply with regulatory requirements;
- provide for an acceptable outcome in terms of national policy for radioactive waste management, ie for higher activity wastes, passively safe waste suitable for deep geological disposal (in England and Wales) or secure interim storage (in Scotland);
- are consistent with national and international standards of radioactive waste management; and
- take account of interdependencies among all steps in generation and management of radioactive waste.

The RWMC should ensure that operations are integrated with the lifetime plans for the waste and the site as a whole

17 The RWMC should provide a complete picture of the management of waste streams that cannot necessarily be seen from examination of the individual plant safety cases.

18 The RWMC should be used to ensure that local plant operations are fully integrated with the lifetime plans for the waste and the relevant aspects related to the site as a whole. The RWMC will be a key input into design considerations of future waste processing and storage facilities, ensuring that such facilities are compatible with the wastes they are intended to receive.

19 The RWMC also provides a means of:

- providing the context within which changes in plant safety cases must be reviewed;
- providing information on designers' understanding and intentions with respect to radioactive waste management; and
- providing a means by which plant operators understand the significance and achievement of radioactive waste management performance; and
- aiding training and awareness of personnel in the radioactive waste management aspects of the plant.

Content and structure

20 The RWMC should demonstrate in particular the longer-term safety and environmental performance of the planned management of specific wastes. Appendix 1 details the information expected to appear in such a RWMC.

21 Much of the information required for such a demonstration should already be available in other documents, eg the integrated waste strategy (IWS) and relevant plant safety cases. The RWMC should not aim to duplicate such information which can be incorporated through brief summaries and referencing. The added value of a RWMC is a demonstration of how the various components interact together with a description of any necessary arrangements for managing such interactions. In developing a RWMC it may be that 'gaps' are found between the components and these can be addressed either in the RWMC or in the safety cases as appropriate.

22 The scope of an individual RWMC is a matter for the licensee. However, in deciding whether a RWMC covers a single waste stream or a group of waste streams, the licensee should ensure that all higher activity waste on its site is covered by a RWMC.

23 A RWMC should be structured in a logical manner and should contain all the information necessary to fulfil the purpose described below. This information should be easily accessible and understandable. Where relevant information already exists, this may be specifically referenced, with appropriate summaries, rather than duplicating it in separate RWMC documents.

24 A RWMC may comprise a hierarchy of documents. The top tier should describe the radioactive waste management process, present the main issues and the functions required to deliver an acceptable radioactive waste management outcome, explain the means of delivering these functions, and summarise the main conclusions. The arguments presented in a top-tier report should be coherent, consistent and readily understood. It should be meaningful if read in isolation, as well as providing the main entry point with clear links to the RWMC as a whole.

A RWMC may deal with a single waste stream or many similar waste streams

25 Detailed technical documents and supporting analysis to substantiate the radioactive waste management functions will be presented in lower tiers, often as components of plant safety cases or other documents. There needs to be an auditable trail within the document structure providing clear referencing to all the information which underpins the conclusions of the RWMC. A description of the expected technical contents is in the Appendix.

Arrangements and safety cases

26 Licence Conditions 4, 32 and 34 require arrangements to ensure that radioactive waste is:

- adequately stored (LC4);
- its production and accumulation is minimised and recorded (LC32); and
- it is adequately controlled and contained (LC34).

27 A radioactive waste management case (RWMC) is a key component of these arrangements. It may present the safety case for the management of a single waste stream or several related waste streams, but all wastes covered by the scope of this guidance should be covered by a RWMC. A RWMC addresses the longer-term safety and environmental issues associated with a particular waste from its generation to its conditioning into the form in which it will be suitable for storage and (in England and Wales) eventual disposal. (By 'long term' we generally mean issues that might occur over decades or as wastes are moved from plant to plant for treatment/storage. Short-term environmental issues are in general covered under separate environmental legislation enforced by the environment agencies, eg radioactive discharges are enforced via RSA93. However, there is inevitably overlapping interest, particularly at the options selection stage.)

28 Before reaching its final disposal or storage destination, radioactive waste will be processed and transferred through various plants and facilities on site, each of which will have a nuclear safety case justifying its safe operation. Certain sections of these plant safety cases may cover (or partly cover) the topics of concern to the RWMC as shown in Figure 1. (Figure 1 also indicates which other modules of this guidance will give more detailed guidance on these topics.)

29 The term 'radioactive waste management case' is used here as a construct to explain how information should be organised so that licensee's can demonstrate the long-term safety and environmental performance of specific wastes. Since the RWMC forms part of the overall safety case, together with plant safety cases it should be treated and managed as a safety case in terms of Licence Conditions 14, 15, and 19–22.

Ownership

30 As the body with prime responsibility for radioactive waste management, and compliance with licence conditions, the licensee is legally responsible for the RWMC. As stated above, some components of a RWMC may reside in plant safety cases and have their own owners ie those who have direct responsibility for delivering safety in the plant in question.

31 Ownership of a RWMC is a different role from ownership of a plant safety case; it is a more strategic role and will require a management system to ensure adequate interaction with the individual plants or processes involved in the radioactive waste management process.

32 Ownership and responsibility require:

- an understanding of the RWMC, the standards applied, its assumptions and the limits and conditions derived from it;
- the technical capability to understand and act upon the RWMC work produced by others;
- the ability to use the RWMC to influence operational decisions on individual plant to ensure acceptable management of radioactive waste; and
- that individual plant operators should be involved in the preparation of a RWMC to ensure that it reflects operational needs and reality.

33 The ownership of a RWMC may change through its lifecycle. Management of transitions and changes of ownership from earlier to later stages of the lifecycle

are important aspects that need to be controlled. The management system should explain how relevant information is transferred and demonstrate that there are mechanisms in place to ensure that the RWMC is fully adopted and implemented.

Production

34 The responsibilities for production, revision, review and document control should be clearly defined as part of licence compliance arrangements and be discharged by suitably qualified and experienced people. Where the licensee itself does not produce all of the RWMC and uses contractors for this purpose, at all times the licensee must possess (in-house) the technical capability to understand its RWMC and act as an 'intelligent customer' (see *Technical Assessment Guide: Principles for the assessment of a licensee's 'intelligent customer capability*[15]).

35 For new waste streams, production of RWMCs should commence at an early stage. The production of an IWS is likely to be a key trigger for their production as the IWS will identify the waste stream(s) that will require their own RWMC. The IWS will be the first reference in the RWMC and other components will be added as the relevant safety cases are developed. For existing waste streams RWMCs should be produced as soon as is reasonably practicable. The periodic review of plant safety cases would be an appropriate trigger for producing such RWMCs.

36 Interdependencies are key to a RWMC. As illustrated in Figure 1, some components of a case should already exist as part of the safety case for the various plants through which radioactive waste passes. In the interests of ensuring interdependencies are properly taken into account, it is not appropriate to produce these components in isolation from the RWMC. It should be clear from the RWMC how interdependencies are taken into account. The existing components should be reviewed, if necessary amended, and then referenced. In this aspect, the key component of the case will be a top-tier document explaining how the various components of the case fit together.

37 The process for producing RWMCs should take into account the needs of those who will use them. It is essential that the documentation is clear and logically structured so that the information is readily accessible to those who need to use it. This includes operations and maintenance staff, technical personnel and managers, regulators and future operators of disposal facilities.

38 The process should also take into account how the different levels and types of documentation fit together to cover the full scope and content of the RWMC. The needs of users should be addressed by ensuring that all descriptions and terms are consistent and easy to understand by the prime audience, all arguments are cogent and coherently developed, all references are readily accessible, and that all conclusions are fully supported, and follow logically from the arguments. The trail from claims through argument to evidence should be clear.

Proportionality in the production of RWMCs

39 RWMCs should be produced in a proportionate way. They should be fit for purpose, taking account of, for example:

- the magnitude of the hazard presented by the waste;
- the complexity of the operations involved;
- the degree of challenge posed by the waste streams under consideration;
- the timescales over which waste management operations will take place; and
- the consequences of work not being done, or being delayed.

Peer review and independent assessment

40 As part of the production process the RWMC should undergo appropriate review and approval processes to check, among other things, that:

- the case is complete and addresses all relevant aspects;
- key assumptions are valid and have been subject to a sensitivity check;
- appropriate robust methods and data have been used;
- calculations are correct; and
- the plant and operational details documented are consistent with the actual plant and its operations.

41 For significant RWMCs we would expect the licensee's arrangements to provide for the following additional processes:

- independent assessment by suitably qualified and experienced assessors, who are independent of the authors and verifiers and those directly responsible for the plant's operations; and
- consideration by the licensee's Nuclear Safety Committee.

42 In considering what is significant in this context licensees should take into account the prioritisation process described in Appendix 1 of Part I of the Joint Guidance.[2]

Maintenance

RWMC should be actively maintained throughout its lifecycle

43 A RWMC should be:

- described in a living document, or suite of documents, which is/are easily accessible and understandable by those who need to use it;
- managed through formal processes; and
- reviewed regularly on a defined basis.

44 The RWMC needs to be kept up to date with any changes to waste management processing or storage arrangements, new regulatory requirements and relevant standards, as soon as practicable after the new information is available and applicable. The knowledge used at the time of writing needs to be supplemented by monitoring of plant and data from commissioning and continued operation, periodic inspection and testing as well as longer-term research or experience from other facilities. Processes need to be in place to make legitimate changes that may be needed on an immediate or a longer-term basis. In practice this requires that proposals for changes in design, equipment, storage conditions, waste or spent fuel characteristics, control or management should be subject to a degree of assessment and scrutiny appropriate to the safety significance of the change, so that the specific and wider consequences of the modification including retrieval and disposal are adequately assessed. The process should ensure that a review of possible consequences of a foreseen modification or change in one facility will not adversely impact on the operability or safety of associated or adjacent facilities.

45 The RWMC should also be subject to review where:

- new information comes to light on referenced data and information that underpins analyses and assumptions in the RWMC;
- the outcome of any reviews of the IWS would significantly change the basis of the RWMC;
- changes are suggested or new information arises from operating experience, examination or testing results, updated design, analysis methods, research findings or other sources;

- the outcome from major periodic and interim safety reviews (Licence Condition 15) suggests the need for changes; and
- changes arise from time-dependent degradation.

46 Reviews of incidents, operating experience and other sources of information should not be restricted to the facility or site in question. They should include similar facilities or equipment and also a wider range of nuclear and non-nuclear experience, both national and international.

47 No modification of radioactive waste management plant or processes should take place without a review of the RWMC as described above and the appropriate authorisations. Documentation which no longer forms part of a current RWMC, or which has been superseded, should be identified and archived. This information still forms part of the formal historical record, and remains subject to the arrangements made under Licence Condition 6.

RWMC should be subject to periodic review

Periodic review of safety cases and implications for RWMCs

48 Licence Condition 15 requires that 'the licensee shall make and implement adequate arrangements for the periodic and systematic review and reassessment of safety cases'. The purpose of this licence condition is to ensure that throughout its life, each plant remains adequately safe and that its safety case is kept up to date.

49 Two types of reviews are required: interim reviews and major safety reviews. The latter are commonly referred to as Periodic Safety Reviews (PSRs) (see *Technical Assessment Guide: Periodic Safety Reviews*[16]).

50 Interim reviews are carried out to provide regular confirmation that the safety case remains valid and that the safety of mid-term future operations will continue to be demonstrated by the case. They should cater for components whose behaviour or nature may change significantly and if necessary bring forward the date of the next PSR.

51 Such reviews would normally be expected every one to three years (eg at the time of periodic outage for reactors). The licensee's arrangements should also initiate reviews if new information indicates any significant change in safety case assumptions.

52 The purpose of a Periodic Safety Review is to determine, by means of a comprehensive assessment, whether the plants, processes, management, operations and facilities covered by a safety case remain as safe as reasonably practicable when judged against modern standards. It should also determine that ageing and other time-related phenomena will not compromise safety, particularly before the next PSR. The maximum period between PSRs is normally ten years.

53 Specifically with respect to waste management aspects the reviews should also include:

- consideration of the acceptance criteria and the limits for deviation from these criteria during storage; and
- any changes in the basis for interdependencies between waste management steps.

54 The licensee should take all reasonably practicable improvement measures indicated by the review.

55 Most of the components of a RWMC are part of individual plant safety cases and as such should be part of such reviews. Arrangements should be in place to ensure that when a component of the RWMC is reviewed as part of a plant safety case review, then this should be in the context of the whole RWMC.

56 Additionally the RWMC as a whole should be periodically reviewed to ensure that it remains consistent with its supporting documentation and that modifications to its components have been fully considered in the context of the overall radioactive waste management process. Such reviews should be planned in the context of the reviews of the component parts, but should be undertaken no less than every ten years.

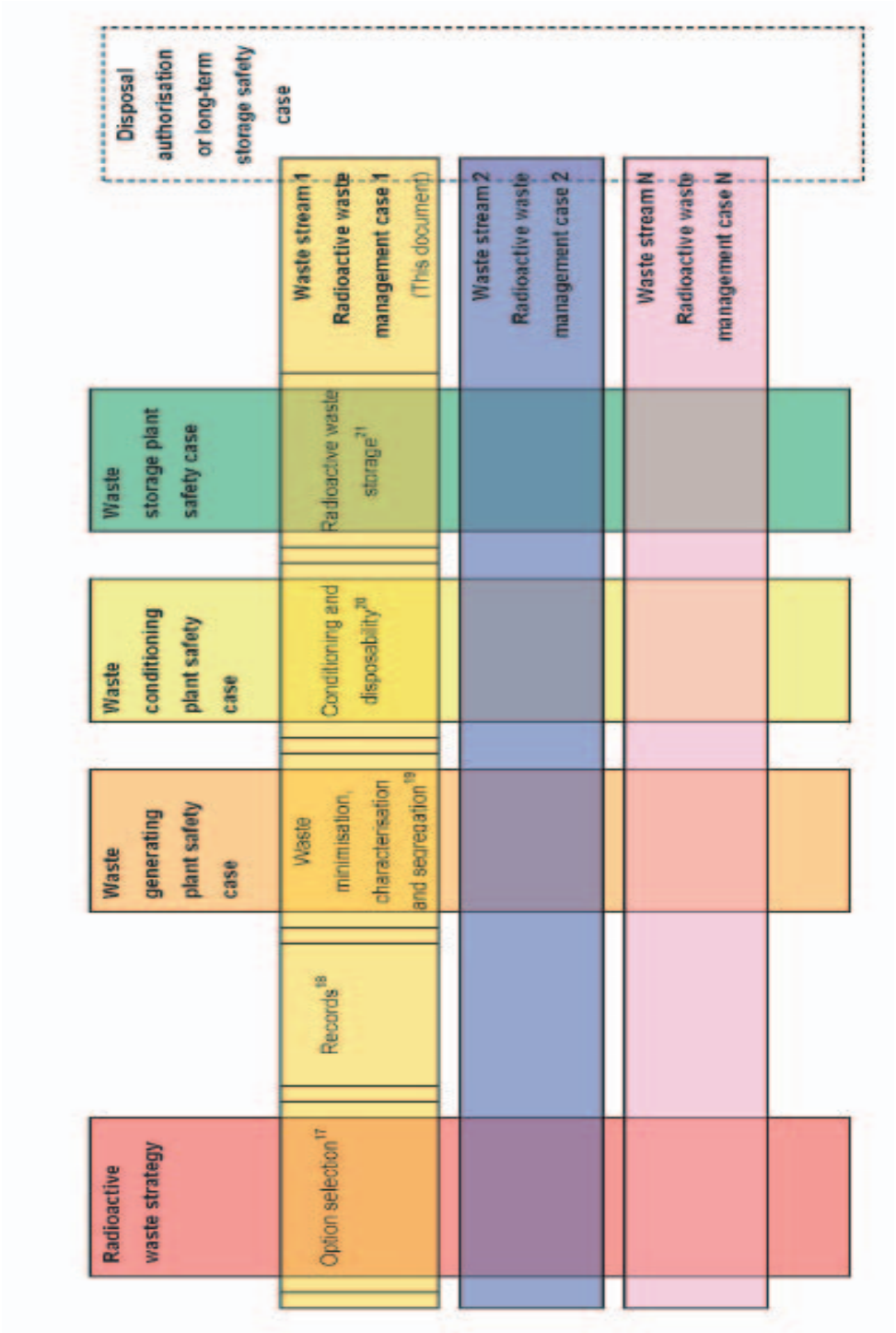

Figure 1 Relationship between specific safety cases and a radioactive waste management case

Notes Every waste stream within the scope of this guidance should be covered by a radioactive waste management case. A single radioactive waste management case may deal with a number of similar waste streams. References are to the modules of the Joint Guidance that deal with this section of the safety case.

Appendix Technical contents of a RWMC

1 Much of the information required for a RWMC should already be available in other documents, eg the integrated waste strategy (IWS) and relevant plant safety cases. The RWMC should not aim to duplicate such information which can be incorporated through brief summaries and referencing. The added value of a RWMC is a demonstration of how the various components interact together with a description of any necessary arrangements for managing such interactions. In developing a RWMC it may be that 'gaps' are found between the components and these can be addressed either in the RWMC or in the safety cases as appropriate.

2 The RWMC should describe and substantiate, in a proportionate way (see section 'Proportionality in the production of RWMCs') and as appropriate (noting that not all the contents listed will be relevant to all waste streams), details of:

General requirements

3 General requirements of a RWMC may include:

- the site, the facility layout and normal operation; and demonstrate how safety is achieved, in particular with respect to:
  - the waste streams (including their source of arising, characteristics, inventory and quantities);
  - the proposed waste management processes;
  - how the waste will be conditioned; and
  - the relevant buildings and plant involved (eg for conditioning or storage) and their conditions;
- relevant aspects of the facility organisation and the management of safety;
- interdependencies among all steps in generation and management of radioactive waste management;
- the identification of applicable regulations, codes and standards, modern standards and best practice;
- outline the general design concept and the approach adopted to meet the above regulations, codes etc, in particular how optimisation in protection is addressed;
- how the radioactive waste is adequately controlled and contained;
- how any safeguards and security issues will be addressed; and
- how the radioactive waste meets the relevant requirements to enable its transport.

4 The RWMC should refer where appropriate to individual plant safety cases which:

- describe the safety analyses performed to assess the safety of the facility in response to postulated initiating events against safety criteria and radiological release limits;
- describe the safety functions; all safety systems; their design basis and functioning in all operational states, including accident conditions. In the latter case, it should also describe the appropriate measures taken to prevent incidents or accidents and how consequences would be mitigated should an incident or accident occur;
- describe the emergency operation procedures and accident management guidelines, the inspection and testing provisions, the qualification and training of personnel, the operational experience feedback programme, and the management of ageing;
- contain the technical bases for the operational limits and conditions;
- describe the policy, strategy, methods and provisions for radiation protection;
- describe the emergency preparedness arrangements;
- describe the on-site radioactive waste management provisions;

- describe how the relevant decommissioning and end-of-life aspects are taken into account during operation;
- define a monitoring regime for the required environmental conditions within the storage facility; and
- define an appropriate programme for demonstrating the continuing compliance of waste stored within the storage limits.

5 The following topics should be covered, as appropriate, in a RWMC. These will be the subject of further guidance in this series.

Radioactive waste management strategies

*See **Waste minimisation, characterisation and segregation**[19] for further guidance on radioactive waste management strategies*

6 Radioactive waste management strategies may include:

- a description of the actual or expected waste inventory and its source or origin;
- identification of the ultimate destinations be it disposal or long-term storage for the wastes;
- the options and processes considered to convert the raw waste into a product that is suitable for long-term interim storage and/or disposal (including any necessary pre-treatment stages);
- the reasons and assumptions used to reject options;
- the reasons, assumptions, uncertainties, calculations and conclusions for selecting the preferred option(s), including comparison of the safety and environmental performance of the preferred option(s) with the options that were not selected;
- how the preferred option is consistent with the IWS;
- how the preferred option is consistent with existing and reasonably foreseeable provisions for transport, storage and (in England and Wales) disposal;
- details of any stakeholder or public consultation, if appropriate; and
- the use of, and implications for, existing waste disposal routes if the preferred option is selected.

Waste minimisation, characterisation and segregation

*See **Waste minimisation, characterisation and segregation**[19] for further guidance on waste minimisation and characterisation*

7 Minimisation, characterisation and segregation details may include:

- a description of the techniques adopted to prevent or minimise arisings (including how any secondary wastes generated during conditioning will be prevented or minimised);
- the details of the methods to be used for the segregation and characterisation of wastes and the practicable steps taken to avoid dilution; and
- the evidence that the (segregated) waste streams can be characterised to the level necessary to ensure compliance with the specifications for waste packaging (eg with respect to potential variability or heterogeneity).

Conditioning and disposability

*Other Joint Guidance (**Conditioning and disposability**[20]) will provide further guidance on waste conditioning and disposability*

8 Conditioning and disposability may cover:

- how passive safety will be achieved;
- the evidence that the waste package produced will be consistent with existing and reasonably foreseeable provisions for transport, storage and (in England and Wales) disposal. For most higher-activity radioactive wastes this will take into account advice provided by the Nuclear Decommissioning Authority's (NDA's) Radioactive Waste Management Directorate (RWMD) in the form of a Letter of Compliance. Where other options are considered, eg decay storage, then this evidence will need to be derived by the licensees themselves;

- the intended specification for the waste package (presented in a format suitable for external audit to ensure compliant packages have been produced);
- how the inventory of individual packages will be controlled and determined including demonstration that any heterogeneity or variability in the waste stream can be accommodated within the specifications for the final waste form;
- a demonstration that the proposed packaging and conditioning strategy uses best practicable means (BPM)/best available technique (BAT) to minimise the long-term environmental impact and to ensure associated doses are ALARP;
- a demonstration that the proposed strategy will not compromise criticality safety both during storage and in the geological disposal facility;
- an assessment of the long-term performance and degradation of the waste containers;
- an evaluation of any reactions that may take place between the waste and the conditioning matrix;
- an evaluation of the long-term performance of the waste form, eg assessment of the potential for cracking and chemical degradation;
- an assessment of the potential for gas generation from the wastes in the long term;
- consideration of the impact of toxic materials and any associated environmental impacts that might arise during, or as a result of, operations and eventual disposal;
- an assessment of the potential impact from any detrimental effects due to chemical species that may be present in the wastes or might reasonably be expected to form, eg enhancement of radionuclide solubility through chemical complex formation;
- how conditioned waste that does not meet specifications will be managed; and,
- the arrangements for quality assurance and records.

Storage of radioactive waste

*Other Joint Guidance (**Storage of radioactive waste**[21]) will provide further guidance on waste storage*

9 Storage information may include:

- details of the storage capacity requirements;
- the timescale for storage;
- demonstration that the conditioned wastes will remain within the agreed specification for final disposal throughout the storage period;
- how passive safety will be achieved;
- the integrity of the storage arrangements;
- arrangements for leak detection;
- the details of ventilation requirements and the filtration of airborne releases;
- the environmental monitoring arrangements;
- how the stored waste will be inspected and retrieved; and
- how packages that show evidence of deviating from specification during storage will be managed.

Control, accountancy and records

*See **Managing information relating to radioactive waste**[18] for further guidance on record keeping*

10 Control, accountancy and records may include:

- the arrangements for recording information that may be required in the future to facilitate the subsequent management of radioactive substances and facilities;
- the ongoing measures to demonstrate whether compliance with requirements and standards has been achieved;
- the timescales over which such information shall be recorded and retained; and
- the environmental conditions for storage and long-term preservation of records.

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17 *Guidance for the Environment Agencies' Assessment of Best Practicable Environmental Option Studies at Nuclear Sites* Environment Agency, SEPA February 2004 http://publications.environment-agency.gov.uk/pdf/PMHO0204BKHK-e-e.pdf

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19 *The management of higher activity radioactive waste on nuclear licensed sites: Waste minimisation, characterisation and segregation* NRW07 HSE, Environment Agency, SEPA 2008 www.hse.gov.uk/nuclear/wastemanage.htm

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Glossary

ALARP as low as reasonably practicable.
as low as reasonably practicable (ALARP) see 'optimisation'.

BAT best available technique – see 'optimisation'.
BPM best practicable means – see 'optimisation'.

HSE Health and Safety Executive.
higher-activity radioactive waste all radioactive waste other than:

- low-level radioactive waste which will be disposed of promptly at the Low Level Waste Repository near Drigg or to its successor facility;
- very low-level radioactive waste which will be disposed of promptly at suitably authorised disposal facilities; and
- radioactive wastes exempted under the provisions of any relevant exemption order.

'Promptly' means as soon as is reasonably practicable after waste generation. Both categories require there is no need for any treatment other than basic segregation, sorting and compaction to make it suitable for its intended disposal route.

integrated waste strategy a strategy produced with the aim of optimising the management of radioactive waste across a site.
IWS integrated waste strategy.

LC licence condition.
licence condition a condition attached to a licence issued under the Nuclear Installations Act 1965.

management of radioactive waste see 'radioactive waste management'.

NDA Nuclear Decommissioning Authority.
Nuclear Decommissioning Authority a non-departmental public body set up, under the Energy Act 2004, by the Government in 2005 with a vision to ensure the safe, accelerated and affordable clean up of the UK's civil nuclear legacy.
NDA(RWMD) the Radioactive Waste Management Directorate of NDA.

optimisation is the process by which the management option is selected, and the practices applied, that best meet the full range of relevant health, safety, environmental, and security (including safeguards) principals and criteria taking into account all relevant (eg social and economic) factors. Different regulatory regimes use different terminology and have their own guidance on this topic, ie reducing risks as low as reasonably practicable (ALARP),[5,9–12] best practicable environmental option (BPEO),[17] use of best practicable means (BPM)[22] and use of best available techniques (BAT). (In draft statutory guidance the Environment Agency is required to ensure that BAT is applied in place of the current techniques of best practicable means (BPM) and best practicable environmental option (BPEO). It also states that operators who currently meet the requirements of BPM and BPEO will satisfy the current requirements of BAT.) However, all of the above involve the same process, ie making a judgement between options by comparing benefits in terms of safety, environmental protection etc and costs in terms of time, effort or money.

passive safety providing and maintaining a safety function by minimising the need for active safety systems, monitoring or prompt human intervention.
PSR Periodic Safety Review.

radioactive waste management the whole process of managing waste from its generation to (but, for the purposes of this guidance, not including) its disposal.
RWMC radioactive waste management case.

safety case documentation to substantiate the safety, including the identification of the conditions and limits necessary in the interests of safety, of proposals to construct or install new plant, to modify the design of plant under construction, commission plant, or to modify or experiment on existing plant.
SEPA Scottish Environment Protection Agency.

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