



Version for approv



The management of higher activity radioactive waste on nuclear licensed sites

Part 2

Radioactive waste management cases

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

February 2010

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Contents

Foreword	3
Freedom of information – disclosure of information	4
Executive summary	5
Scope	6
Objective and aims of this document	7
Key applicable legislation	8
Nuclear Installations Act 1965 (as amended).....	8
<i>Standard conditions applied to nuclear site licences</i>	8
Health and Safety at Work etc Act 1974 (HSW Act)	9
Environmental legislation.....	9
The radioactive waste management case	10
Purpose	10
Content and structure	11
Ownership.....	12
Production.....	12
Proportionate approach in the production of RWMCs.....	13
Peer review and independent assessment	13
Maintenance	14
Periodic review of safety cases and implications for RWMCs	15
Appendix Technical contents of a RWMC	17
General contents	17
Radioactive waste management strategies.....	18
Waste minimisation, characterisation and segregation	18
Conditioning and disposability	18
Storage of radioactive waste	19
Control, accountancy and records.....	20
References	21
Further information	23

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.

Dutyholders on nuclear licensed sites who follow this guidance will normally be doing enough to comply with the relevant law as interpreted by the regulators at the time of writing, and the regulators may refer to this guidance as illustrating relevant good practice. However, dutyholders are not required to follow this guidance and compliance with it 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. The guidance provides information to other parties who may be stakeholders in how radioactive waste is managed on a nuclear licensed site.

Policies for the disposal of higher activity waste differ in Scotland and in England/Wales. We consider that packages conditioned in anticipation of 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 Directorate (RWMD) under review and if any developments mean that this assertion with respect to Scottish waste is no longer valid, we will provide further guidance.

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.

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 policies of openness and transparency.

Executive summary

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

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 that support a RWMC may be produced.

The primary purpose of a RWMC is to provide a transparent demonstration of adequate radioactive waste management for the waste stream(s) covered by demonstrating in written form:

- compliance with regulatory requirements;
- provision of an acceptable outcome in terms of national policy for radioactive waste management;
- consistency with national and international standards of radioactive waste management; and
- how interdependencies are taken account of among all steps in generation and management of radioactive waste.

The RWMC should indicate in transparent summary form how the key elements of long-term safety and environmental performance will be delivered for the management of the waste stream or streams covered. This should cover the period from their generation through their conditioning, storage and to their removal from site for eventual disposal. It should provide the complete story of the management of waste streams that cannot necessarily be seen from examination of the individual plant safety cases and environmental documentation. The RWMC should include the reasons for the management strategy proposed for the waste stream(s) concerned.

The RWMC should outline the arrangements for quality assurance and for management of information and records for the waste stream(s) concerned.

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 and form of an individual RWMC is a matter for the licensee and may cover a single waste stream or a group of waste streams. The licensee should ensure that the totality of its RWMCs covers all higher activity radioactive waste on its site.

Supporting information should already be available in other documents, eg the Integrated Waste Strategy and relevant plant safety cases. The RWMC should not duplicate such information, which should be incorporated through brief summaries and referencing.

The RWMC should undergo appropriate review and approval processes, and once produced should be subject to appropriate modification and periodic review processes.

Scope

1 This document is part of a suite of guidance documents covering management of higher activity radioactive waste on nuclear licensed 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 HLW, ILW, and such LLW as cannot be disposed of at present. If there is doubt over how to regard a particular waste stream, the owner of that waste stream should consult the regulators.

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 Policies for the disposal of higher activity waste differ in Scotland and in England/Wales. We consider that packages conditioned in anticipation of 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 Directorate (RWMD) under review and if any developments mean that this assertion with respect to Scottish waste is no longer valid, we will provide further guidance.

4 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;*¹
- *Fundamentals of the management of radioactive waste: An introduction to the management of higher-level radioactive waste on nuclear licensed sites.*²

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

Objective and aims of this document

6 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 and supporting documentation of the case may be produced.

7 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*;³
- HSE Technical Assessment Guide on 'as low as reasonably practicable' (ALARP);⁴ and
- the Environment Agency's principles* for the regulation of radioactive substances as detailed in *Radioactive Substances Regulation: Environmental Principles*.⁵

* The Environment Agency's Principles do not apply in Scotland. For additional guidance in this area operators should contact SEPA.

Key applicable legislation

8 As required by the following legislation, facilities and activities for predisposal management of radioactive waste, including decommissioning activities, shall 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)

9 The Nuclear Installations Act 1965 (as amended)⁶ 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 1974.⁷ Thus these sections are subject to regulation and enforcement by HSE.

Standard conditions applied to nuclear site licences

10 There are 36 standard licence conditions (LCs) attached to all nuclear site licences (see *Nuclear site licence conditions*⁸) 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.

11 A RWMC will be considered by HSE when judging the adequacy of these arrangements.

12 A RWMC is a summary report of 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)

13 Section 2 of the HSW Act 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 the *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

14 The primary role of the environment agencies in the regulatory process covered by this guidance is to advise HSE on the long-term protection of the public and the environment. This includes providing advice on the disposability of conditioned waste in the long term, 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 1995¹³ and charge for this advice under section 37(1).

15 Shorter-term environmental issues (such as discharges) are, in general, regulated by the environment agencies under separate environmental legislation. 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.

16 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. Waste management strategies should be determined by application of the principles of best practicable environmental option (BPEO), best practicable means (BPM) or best available techniques (BAT) as appropriate to the legislative regime. In England and Wales, it is anticipated that radioactive substances regulation will be incorporated into the Environmental Permitting Regulations (EPR) from April 2010. This legislative change will not affect the applicability of this guidance and references to RSA93 can be taken to include the EPR.

The radioactive waste management case

17 The RWMC should indicate in summary form how the key elements of long-term safety and environmental performance will be delivered for the management of the waste stream or streams covered. (By 'long-term' we generally mean issues that might occur over decades or as wastes are moved from plant to plant for treatment/storage).

18 The RWMC for a waste stream should cover the period from its generation through conditioning, storage and up to removal from site for eventual disposal. It should provide the complete story of the management of waste streams that cannot necessarily be seen from examination of the individual plant safety cases and environmental documentation. At each stage the aim should be to ensure that radioactive waste is managed in a way that protects the health and interests of people and the integrity of the environment, both now and in the future, inspires public confidence and takes account of costs.

19 The long timescales involved may mean that the RWMC cannot cover all eventualities, and that some aspects may not yet be known. The RWMC should make it clear how such uncertainties are being dealt with and refer to a programme of work, where appropriate, that is designed to address any gaps in knowledge.

Purpose

20 The primary purpose of a RWMC is to provide a transparent demonstration of adequate radioactive waste management for the waste stream(s) covered by demonstrating in written form:

- compliance with regulatory requirements;
- provision of an acceptable outcome in terms of national policy for radioactive waste management;
- consistency with national and international standards of radioactive waste management; and
- how interdependencies are taken account of among all steps in the generation and subsequent management of radioactive waste.

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

21 The RWMC should be used to demonstrate how local plant operations are fully integrated with the lifetime plans for the waste and 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.

22 The RWMC also provides a means of:

- providing a context within which changes in plant safety cases should be reviewed;
- providing information on the operator's understanding and intentions with respect to radioactive waste management;
- providing a means by which plant operators understand the significance of delivering specific strategies with respect to the safe management of radioactive waste; and
- aiding training and awareness of personnel in the radioactive waste management aspects of the plant.

Content and structure

23 The RWMC should demonstrate in particular the longer-term safety and environmental performance of the planned management of specific wastes. The Appendix details the information expected to appear in a RWMC and its supporting documentation.

24 Much of the information required for such a demonstration should already be available in other documents, eg the integrated waste strategy and relevant plant safety cases. The RWMC should not duplicate information that 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 supporting documentation as appropriate.

25 The regulators recognise that plans, and hence detailed supporting documentation, for the long-term management of some waste streams may be less developed than for others. As a living document we expect that a RWMC will be maintained in line with development of waste strategies and plant safety cases.

26 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 the totality of its RWMCs cover all higher activity radioactive waste on its site.

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

27 A RWMC should be structured in a logical manner and should contain, in summary form, all the information necessary to fulfil the purpose described in this guidance. This information should be easily accessible and understandable. Where relevant information already exists, this should be specifically referenced, with an appropriate summary within the RWMC.

28 A RWMC, in most cases, will comprise the top tier of a hierarchy of documents. It 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 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 detailed arguments in supporting safety cases and other documentation.

29 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 substantiating 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. (*Note: Figure 1 also indicates which other modules of this guidance will give more detailed guidance on these topics.*)

30 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.

31 Licensees may find it useful to include diagrams or flowcharts to identify information and records and that provide key support for the main elements of radioactive waste management such as waste package disposability.

Ownership

32 The licensee shall be responsible for the overall strategy for the management of its waste, taking into account interdependencies between all stages of waste management, and options available, from generation to disposal, and the overall national radioactive waste management strategy. The owner of the waste stream or streams covered by the RWMC should analyse the available options and provide the reasons for the strategy proposed for those waste streams, for inclusion in the RWMC.

33 As the body with prime responsibility for radioactive waste management, and compliance with licence conditions, the licensee has ultimate responsibility 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.

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

35 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 project or facility teams should be involved in the preparation of a RWMC to ensure that it reflects operational needs and reality.

36 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 and records are transferred and demonstrate that there are mechanisms in place to ensure that the RWMC is fully adopted and implemented.

Production

37 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 should 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).

38 For new waste streams, production of RWMCs should commence at an early stage. The options assessment in the integrated waste strategy (IWS) will be the first reference in the RWMC for a new waste stream 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 IWS should identify all waste streams and the list of RWMCs should correlate with this. Significant modifications or the periodic review of plant safety cases would be appropriate triggers for producing such RWMCs.

39 Interdependencies are key to a RWMC. As illustrated in Figure 1, some supporting components of a case should already exist as part of the safety and environmental case for the various plants through which radioactive waste passes. It should be clear from the RWMC

how interdependencies are taken into account. The supporting components should be reviewed, if necessary amended, and then referenced.

40 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 and records are readily accessible to those who need to use them both now and in the future (which may be decades away). This includes operations and maintenance staff, technical personnel, senior managers, regulators and future operators of disposal facilities.

41 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, that all arguments are cogent and coherently developed, that 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.

Proportionate approach in the production of RWMCs

42 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

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

- the case is complete and addresses all relevant aspects of the Part 3 modules;
- key assumptions in the RWMC and supporting documentation have been validated and subject to a sensitivity check;
- fit-for-purpose methods and data have been used;
- that calculations in the RWMC and supporting documentation have been checked for accuracy; and
- that the plant and operational details documented are consistent with the actual plant and its operations.

44 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.

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

Maintenance

A RWMC should be actively maintained throughout its lifecycle

46 A RWMC should be:

- a living document, easily accessible and understandable by those who need to use it;
- managed through formal processes; and
- reviewed regularly on a defined basis.

47 The RWMC needs to be kept up to date with any changes to waste 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 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, quality assurance, information and records management, or overall control or management arrangements should be subject to a degree of assessment and scrutiny appropriate to the safety significance of the changes, so that the specific and wider consequences of the changes 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.

48 The RWMC should also be subject to review where:

- new information comes to light on referenced information and records that underpin analyses and assumptions in the RWMC and its supporting documentation;
- changes are suggested or new information arises from:
 - operating experience
 - examination or testing results
 - updated design
 - analysis methods
 - research findings
 - the outcome of any reviews of the integrated waste strategy
 - the outcome from major periodic and interim safety reviews (Licence Condition 15) suggests the need for changes or
 - other sources
- changes arise from degradation over time.

49 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.

50 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.

51 Documentation which is no longer needed to support 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.

Periodic review of safety cases and implications for RWMCs

A RWMC should be subject to periodic review

52 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.

53 When considering the adequacy of arrangements a proportionate approach as discussed in this document should be applied.

54 Most of the supporting components of a RWMC are part of individual plant safety cases and should be part of such reviews. Arrangements should be in place to ensure that when a supporting 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.

55 Additionally the RWMC as a whole should be periodically reviewed to ensure that it remains valid and that modifications to its supporting components have been fully considered in the context of the overall radioactive waste management process. Such reviews should be proportionate, being sufficient to verify that changes over time have not adversely affected the validity of the RWMC. They should be planned in the context of the reviews of the component parts, but should be undertaken no less often than every ten years.

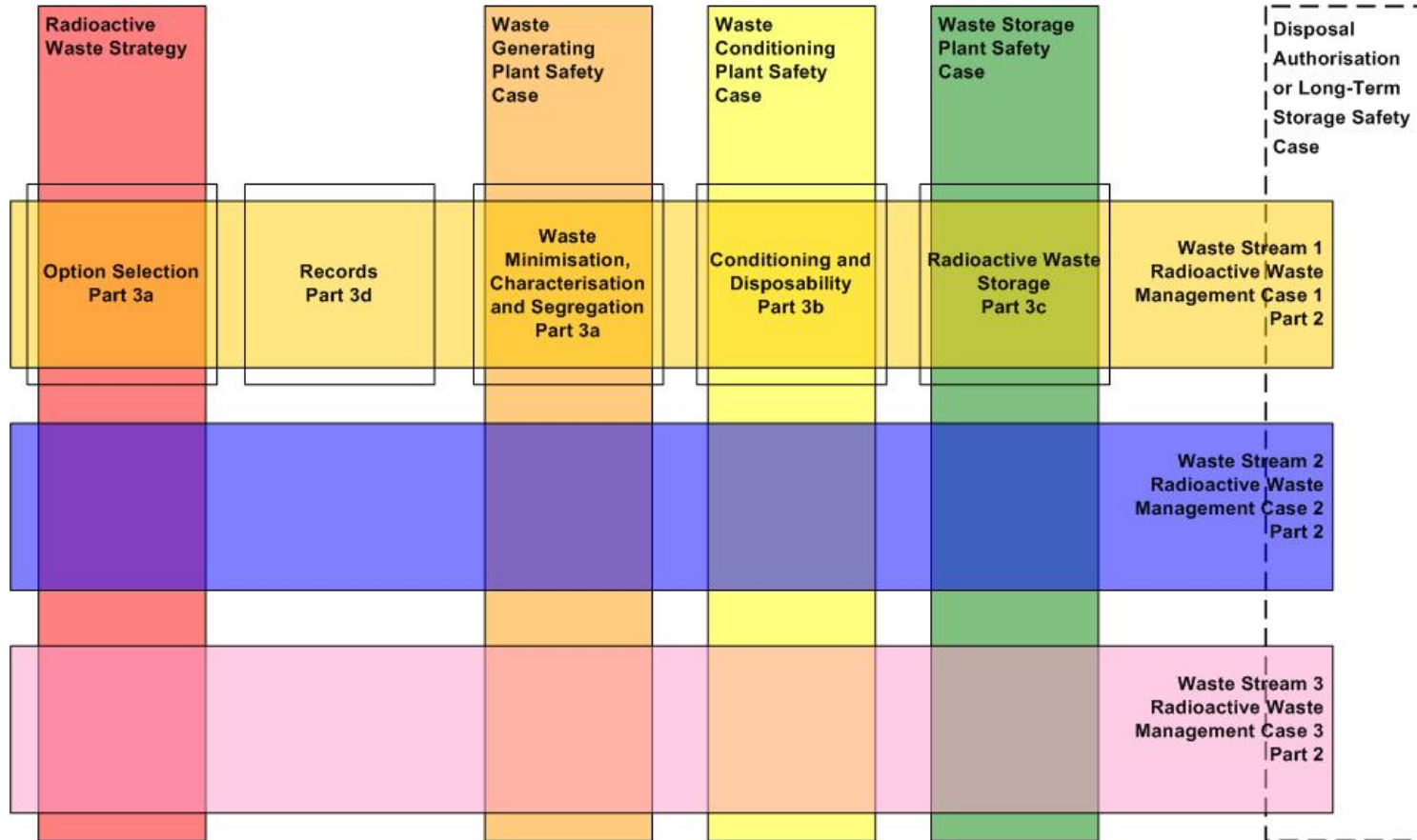


Figure 1 Relationship between specific safety cases and a radioactive waste management case (RWMC)

Notes: Every waste stream should be covered by a RWMC. A single RWMC may deal with a number of similar waste streams.

References to Parts 2 and 3 are to the modules of the Guidance that deal with this section of the RWMC.

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 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 or other supporting documentation as appropriate. Where there is not, at the time of writing, sufficient knowledge to provide the necessary information, or where the need to make improvements is identified, then this should be recorded in the RWMC together with a description of how the matter will be taken forward.

2 The RWMC should describe and substantiate, in a proportionate way (see section 'Proportionate approach in the production of RWMCs') and as appropriate (noting that not all the contents listed will be relevant to all waste streams), the matters described in the following sections.

General contents

3 General contents of a RWMC may include, in summary form:

- the waste streams (including their source of arising, characteristics, inventory and quantities);
- the current ownership of the waste streams;
- the management strategy for the waste streams;
- the proposed waste management processes;
- the relevant buildings and plant involved (eg for conditioning or storage) and their physical state;
- relevant aspects of the facility organisation and the management of radioactive waste (eg the overall waste strategy for the site);
- interdependencies among all steps in generation and management of radioactive waste management;
- how the generation of radioactive waste is minimised;
- how the radioactive waste is adequately controlled and contained;
- how any safeguards and security issues will be addressed;
- how the radioactive waste meets the relevant requirements to enable its transport;
- the quality assurance arrangements; and
- the information and records management arrangements.

4 The RWMC should refer where appropriate to relevant safety and environmental cases or other supporting documentation for detailed information and assessments .

5 The following topics should be summarised, as appropriate, in a RWMC with reference to more detailed supporting documentation. These are the subject of further guidance in this series.

Radioactive waste management strategies

6 The RWMC should summarise how the management of the relevant waste stream(s) fits into the overall waste strategy for the site and, by referencing the integrated waste strategy as appropriate, include:

- any subsidiary or secondary waste streams produced;
- identification of the ultimate destination for the wastes, be it disposal or long-term storage;
- 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 integrated waste strategy;
- 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*¹⁶ for further guidance on waste minimisation and characterisation

7 The RWMC should summarise how the management of the relevant waste stream(s) applies the requirements for minimisation, characterisation and segregation, details of which may include:

- a description of the techniques to be 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 steps to be 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*¹⁷) will provide further guidance on waste conditioning and disposability

8 The RWMC should summarise how conditioning is applied in management of the relevant waste stream(s), in particular how disposability is ensured, details of which 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;

- identification of any significant issues that may challenge disposability. These issues should be set out in detail together with any assumptions made in arriving at that conclusion (eg incompatibility with a specific facility design concept or feature thereof, incompatibility of the transport container with standard designs, or issues that may restrict the future choice of a geological environment for the disposal facility);
- 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 measured, 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 techniques (BAT) to minimise the long-term environmental impact and to ensure associated doses are ALARP;
- a demonstration that the proposed strategy will not lead to significant increases in the possibility of a neutron chain reaction in a disposal facility;
- an assessment of the long-term performance and degradation of the waste containers;
- identification of any potential package failure mechanisms;
- 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 as a result of release from a disposal facility and environmental impacts that might arise during, or as a result of, operations;
- 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;
- the arrangements for quality assurance and records;
- how developments in disposal facility requirements will be taken into account.

Storage of radioactive waste

Other Joint Guidance (*Storage of radioactive waste*¹⁸) will provide further guidance on waste storage

9 The RWMC should summarise how radioactive waste is stored, details of which may include:

- details of the storage capacity requirements;
- estimates of package lifetime and the proposed 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 and records relating to radioactive waste*¹⁹ for further guidance on record keeping

10 The RWMC should summarise how control, accountancy and records of the relevant waste stream(s) are to be applied, details of which may include:

- the arrangements for the identification of information and records 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 and records should be collected and retained; and
- the environmental conditions for storage and long-term preservation of records.

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- 4 *ND guidance on the demonstration of ALARP (as low as is reasonably practicable)* T/AST/005 (Issue 4) HSE July 2008
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17 *The management of higher activity radioactive waste on nuclear licensed sites: Conditioning and disposability* NRW05 HSE, Environment Agency, SEPA.
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Further reading

A Review of the Application of 'Best Practicable Means' within a Regulatory Framework for Managing Radioactive Wastes SNIFFER report UKRSR05 March 2005
www.sniffer.org.uk/themes/environmental-regulation.aspx

Technical Assessment Guide: Periodic Safety Reviews (PSRs) T/AST/050 (Issue 3) HSE April 2004 www.hse.gov.uk/foi/internalops/nsd/tech_asst_guides/tast050.pdf

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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