



Office for Nuclear Regulation
An agency of HSE

Regulatory inspection of RWMD's provision of disposability assessment and waste packaging advice

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Foreword

This is a joint publication by the Environment Agency and the Office for Nuclear Regulation.

In this document we present a summary of an inspection we undertook to provide us with confidence that the Nuclear Decommissioning Authority Radioactive Waste Management Directorate's (RWMD's) process of disposability assessment is providing the necessary information for licensees to minimise the risk that conditioning and packaging of higher activity wastes now, results in packages that are incompatible with geological disposal in the future.

This work forms part of our continuing programme to review RWMD's work related to geological disposal of higher activity waste. As independent regulators, we are committed to making our work open and transparent.

Executive summary

Government policy for the long-term management of higher activity wastes (HAW) in England comprises geological disposal preceded by safe and secure interim storage, whereas devolved administrations hold different positions. In advance of the availability of an operational geological disposal facility (GDF), the Nuclear Decommissioning Authority's Radioactive Waste Management Directorate (RWMD) is operating a process of disposability assessment to minimise the risk that conditioning and packaging of HAW now, results in packages that are incompatible with geological disposal in the future.

The Environment Agency and the Office for Nuclear Regulation will be responsible for issuing the necessary permits and licences to develop and operate a GDF in England, and we are working together to make sure that a future GDF will meet the required high standards for environmental protection, safety, security and radioactive waste transportation. Prior to any formal applications to develop or operate a GDF, our role is to provide oversight of RWMD's work through our ongoing Technical and Organisational (T&O) scrutiny programme. This includes consideration of RWMD's disposability assessment process which waste producers and the regulators use to assist them in understanding the risks associated with waste packaging processes when permissioning waste management activities.

RWMD's disposability assessment process consists of a series of technical evaluations and safety assessments. Where a waste producers packaging proposals are compliant with RWMD's packaging specifications and safety cases, it endorses their proposals with a Letter of Compliance (LoC). A LoC indicates that RWMD considers the operator's packaged waste is likely to meet the waste acceptance criteria for any future GDF. LoCs can be issued at conceptual, interim and final stage (cLoC, iLoC, fLoC). RWMD undertakes periodic reviews to ensure previously issued fLoCs remain valid.

Through this inspection we assessed how well RWMD's arrangements for disposability assessment and the provision of advice are functioning. We will undertake further site based inspections to assess how licensees are taking appropriate account of advice provided by RWMD in their arrangements (we will report on these separately). These inspections are important to provide us with confidence that HAW currently stored on licensed sites will be suitable for safe handling, transport, storage and disposal.

Our inspection of RWMD covered the following:

- RWMD's assessment of waste packaging proposals and provision of packaging advice to waste producers.
- Whether RWMD's periodic review provides assurance that packages already generated remain compatible with disposal criteria.
- How RWMD manages the integrity of the packaging advice during significant changes.
- RWMD's arrangements for managing discussions and interactions with interested parties.

We held discussions with staff from across RWMD and considered a sample of RWMD's packaging assessments in detail. The work we examined in this sample covered waste streams from the sites that we will be inspecting later, and represented a cross-section of the types of packaging advice provided by RWMD.

We found RWMD's disposability assessment process is generally robust and;

- provides confidence in the advice it gives to waste producers and reduces risks associated with packaging waste before a GDF is available,

- is subject to continuous improvement, and
- supports progress in decommissioning and clean-up.

However, we also identified some areas that could be improved, including, for example:

- The scheduling and prioritisation of disposability assessments.
- Establishing periodic reviews on the same basis as disposability assessment, and in particular resolving the uncertainty in the current status of fLoCs reviewed to date.
- The assessment of innovative packaging proposals.
- The delivery of internal assurance activities associated with RWMD's provision of disposability assessments and waste packaging advice.

In addition we identified some areas of good practice concerning the interactions between RWMD staff and also in their engagement with waste producers which we have highlighted in our report.

We will encourage and support RWMD in its work to continually improve the disposability assessment process and its associated assurance activities to ensure that the waste packaged by waste producers will be suitable for disposal. In particular, we will work with RWMD to address the recommendations we have identified through our inspection.

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1. Introduction

Radioactive waste arises from activities such as the UK's historical and ongoing nuclear power, research and defence programmes. UK Government policy for the long-term management of higher activity wastes (HAW)ⁱ in England comprises geological disposal preceded by safe and secure interim storage [1]. Radioactive waste disposal is a devolved issue and the devolved administrations hold different positionsⁱⁱ. The Nuclear Decommissioning Authority's Radioactive Waste Management Directorate (RWMD) is responsible for implementing a programme to develop a geological disposal facility (GDF). RWMD is undergoing a period of organisational development so that it can evolve into an organisation capable of holding the necessary environmental permits and nuclear site licence to develop and operate a GDF.

To date there is no disposal route for HAW. Instead, HAW is stored on nuclear sites awaiting a disposal solution. In advance of the availability of an operational GDF, RWMD has developed a process of disposability assessment to minimise the risk that conditioning and packaging of HAW in England now, results in packages that are incompatible with geological disposal in the future.

1.1. Our role in geological disposal

The Environment Agency (EA) and the Office for Nuclear Regulation (ONR) will regulate any future GDF for radioactive waste in Englandⁱⁱⁱ. We are working together to make sure that any future facility meets the required high standards for environmental protection, safety, security and radioactive waste transportation.

Currently, we do not formally regulate RWMD. At present, prior to any formal application for a permit or licence to develop or operate a GDF, our role is to provide oversight of RWMD, on matters within our regulatory remit. This will help RWMD understand our regulatory requirements, without compromising our independence or our ability to make regulatory decisions in the future. We provide this oversight through our ongoing programme of work to assess RWMD's geological disposal programme (our Technical and Organisational (T&O) scrutiny programme). Each year we develop a programme to scrutinise RWMD's work relating to geological disposal. This includes work to oversee RWMD's process of disposability assessment through which it provides advice to packagers of HAW and other nuclear materials which may require geological disposal.

Through the T&O scrutiny programme, we provide advice and comment relevant to RWMD's work, and we monitor progress in addressing our findings. We consider RWMD's procedures and guidance relating to its disposability assessments. We also consider the specific advice RWMD gives to waste producers through its

ⁱ Higher activity waste includes High Level Wastes and Intermediate Level Wastes; these are radioactive wastes which have a radioactivity content exceeding 4 GBq per tonne of alpha, or 12 GBq per tonne of beta/gamma activity. It also includes such Low Level Wastes as cannot be disposed of at near-surface disposal facilities.

ⁱⁱ The Welsh Government and Northern Ireland Executive are each reserving their positions on geological disposal and therefore do not confirm that they will support future implementation. Scottish Government Policy is that the long-term management of HAW should be in near-surface facilities, located as near to the sites where the waste is produced as possible.

ⁱⁱⁱ On 1 April 2013, Natural Resources Wales took over the functions previously carried out by the Environment Agency Wales, the Countryside Council for Wales and Forestry Commission Wales. The Environment Agency supported the set-up of Natural Resources Wales and provides a number of services to Natural Resources Wales, including regulation of the environmental permitting and compliance of nuclear licensed sites in Wales.

process of disposability assessment, and any revisions RWMD makes to its waste packaging specifications and supporting documentation, to ensure that appropriate and consistent advice is given. We summarise matters that we have made RWMD aware of, and how they have addressed them, in our annual reviews of our T&O scrutiny programme. Through our T&O scrutiny programme we aim to ensure that such matters are addressed adequately by RWMD, and within appropriate timescales.

Our joint regulatory issues resolution process (RIRP), operated through our T&O scrutiny programme, complements this dialogue with RWMD. We operate our RIRP where we find something that has the potential to affect our ability to make regulatory decisions in the future, and we record and track it via the RIRP. The RIRP captures those issues that may impact on future regulatory decisions that cannot be easily resolved through our routine dialogue with RWMD. The RIRP does not capture all matters that we identify as a result of our scrutiny work, the majority of which are progressed through routine dialogue.

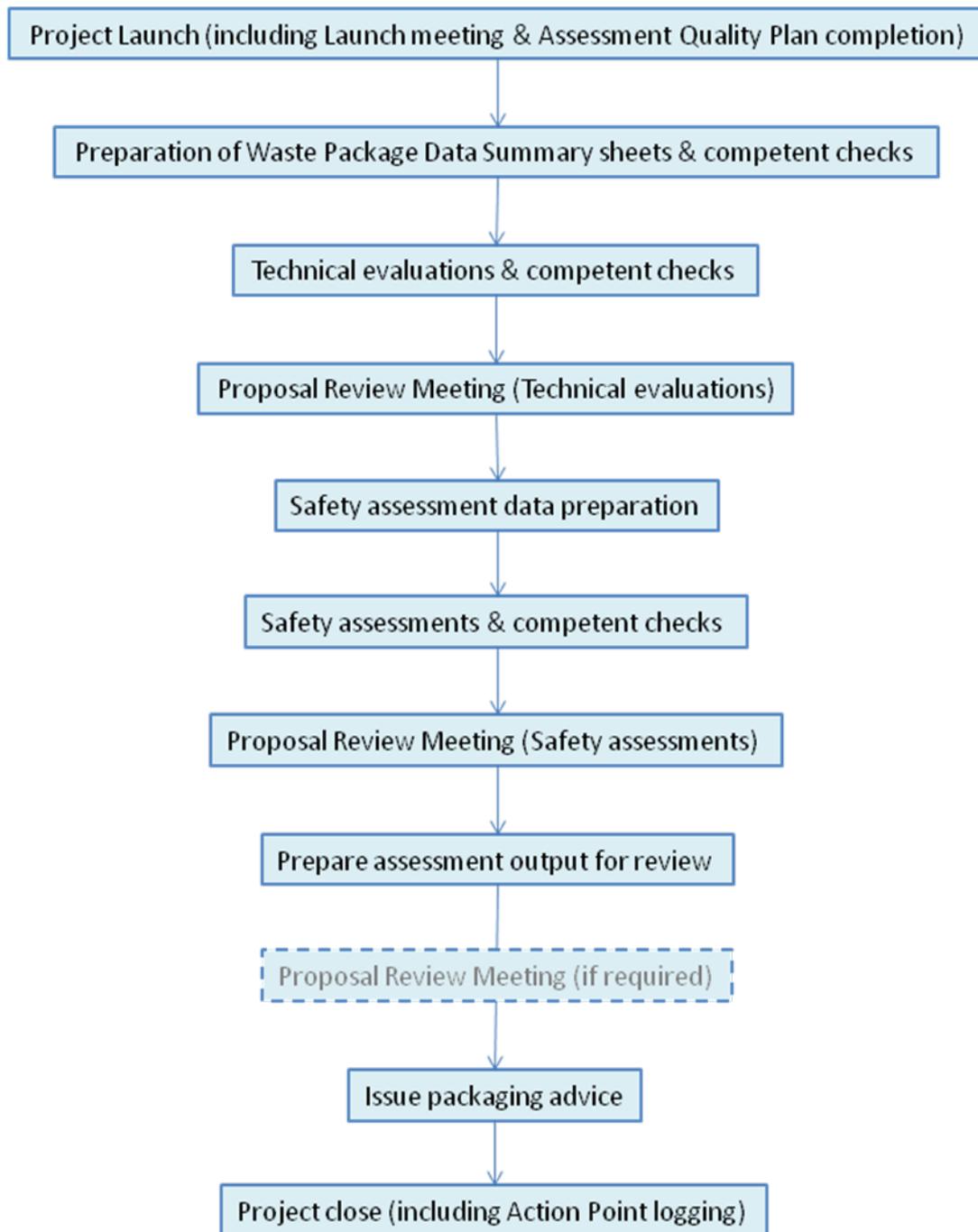
1.2. Disposability assessment

When requested by waste producers^{iv}, RWMD provides them with advice on the packaging of their HAW through its process of disposability assessment, in order to minimise the risk that waste packaged now will not be compliant with future transport and disposal system requirements. RWMD's disposability assessment process consists of a series of 14 technical evaluation topics and 3 safety assessments. The range of the evaluations and assessments is wide, covering for example: container performance; operational safety; and post-closure safety. Where packaging proposals are compliant with its packaging specifications and safety cases, RWMD endorses a waste producer's proposal with a Letter of Compliance (LoC). A LoC indicates that RWMD expects the packaged waste will meet the waste acceptance criteria for any future GDF. LoCs can be issued at conceptual, interim and final stage. In addition to this, RWMD provides 'packaging advice' within an Assessment Report which can also be issued at a pre-conceptual stage. RWMD reviews issued final stage LoCs (fLoCs) to make sure they are appropriately implemented and remain consistent with RWMD's packaging specifications. Waste producers use RWMD's packaging advice to inform their safety cases and they include it as part of their Radioactive Waste Management Case (RWMC) for a particular waste stream [2]. However, it is important to note that a LoC itself has no regulatory standing and we carry out our own assessments of the adequacy of conditioning and packaging arrangements at sites.

When RWMD receives a request for advice from a waste producer it initiates a disposability assessment and appoints a Packaging Assessment Manager to manage the assessment process. Figure 1 shows the sequence of steps in RWMD's assessment process. We refer to some of these steps in this document.

^{iv} For the purposes of this report we use the term 'waste producer' to include waste producers and waste packagers, noting that in some instances the waste packagers may not necessarily be waste producers.

Figure 1: Schematic overview of RWMD's disposability assessment process



1.3. Regulatory inspection

The inspection reported here is part of our work to provide us with confidence that RWMD is operating an appropriate process of disposability assessment to minimise the risk that conditioning and packaging of higher activity wastes now results in packages that are incompatible with geological disposal in the future.

We want RWMD to continue to assess packaging proposals for HAW against clear and consistent published criteria. We also want RWMD and waste producers to share best practice in waste packaging to avoid duplication of effort.

This inspection ('phase 1') considered RWMD's arrangements for disposability assessment including linkages to the GDF design, the provision of packaging advice to waste producers, and its periodic review process. We will undertake further site based inspections^v ('phase 2') to assess how waste producers are taking appropriate account of advice provided by RWMD in their arrangements to package and store HAW in accordance with their safety cases. In phase 2 we will also examine whether the disposability assessment process helps waste producers progress waste packaging in a timely and appropriate manner.

Our inspection of RWMD covered the following:

- To inspect RWMD's assessment of waste packaging proposals and provision of packaging advice.
- To assess how RWMD's periodic review process provides assurance that where a final stage LoC (fLoC) has been granted it remains appropriate, so that packages already generated remain in a disposable form and that future packages will meet the requirements of the fLoC.
- To assess how RWMD manages the integrity of the packaging advice it provides to waste producers during geological disposal system baseline changes and revisions to packaging specifications.
- To assess RWMD's arrangements for managing discussions and interactions with interested parties concerning packaging proposals and its assessments of them.

In conducting our inspection, we considered the evidence we collected against the following areas:

- Programme fit: does the packaging advice support preparation for the implementation of geological disposal?
- Efficiency of advice: Does packaging advice contribute to HAW management by facilitating efficient and timely packaging of wastes?
- Impartiality of advice: Is packaging advice sufficiently protected from undue influence and conflicts of interest?
- Robustness of process: Is the disposability assessment process underpinned by an appropriate management system?
- Currency of advice: Does RWMD's periodic review of fLoCs provide appropriate assurance on the continuing suitability of packaged wastes for geological disposal?
- Assurance of advice: Is packaging advice maintained to a high standard?

The initial part of phase 1 of our work involved identifying the areas to focus on during the inspection. To assist in this preparation we requested and reviewed information from RWMD. This information included RWMD's procedures related to undertaking disposability assessments, as well as information on internal assurance and examples of quality assurance documentation.

We also observed a meeting of RWMD's Nuclear Safety and Environment Committee and viewed the Packaging Assessment Team's filing structure.

We then met staff from across RWMD and sampled a selection of packaging assessment work to consider in more detail. This sample covers waste streams from the sites that we will be inspecting in phase 2 of this work, and represents a cross-section of the types of packaging advice provided by RWMD.

^v These inspections are to take place at a number of sites later in FY 2013/2014.

The following RWMD personnel were involved in the discussions^{vi}:

- HSSE Director
- Engineering Director
- Science Director
- Head of Packaging Assessment
- Head of Design
- Head of Disposal System Specification
- Head of Disposal System Assessment
- Head of Safety and Environment
- Senior Packaging Assessment Managers
- Packaging Assessment Managers
- Waste Package Specification and Guidance Manager
- Technical Audit and Periodic Review Manager
- Data Assurance Manager
- Internal Assurance Manager
- RWMD staff assigned to Competent Checker roles

We also viewed work files and held discussions with Packaging Assessment Managers (PAMs) responsible for:

- conceptual stage assessment of the conditioning of plutonium residues by hot isostatic pressing at Sellafield;
- interim stage assessment of packaging of sludges and resins from Bradwell into Ductile Cast Iron Containers;
- interim stage assessment of Sellafield Magnox Swarf Storage Silos Direct Encapsulation Plant;
- periodic review of packaging of Windscale Advanced Gas-Cooled Reactor decommissioning wastes;
- interim stage assessment of packaging of spent ion exchange resins from Sizewell B;
- final stage assessment and periodic review of packaging of plutonium contaminated materials at the Wastes Treatment Complex at Sellafield;
- interim stage assessment of the generic Sellafield 3m³ box; and
- periodic review of packaging of miscellaneous activated components at Trawsfynydd.

RWMD routinely provides us with assessment reports, as part of our scrutiny programme, and we used them as reference material to support of our inspection and validate our findings. Executive summaries from assessment reports are available from NDA's website.

^{vi} Shortly after the completion of the inspection RWMD announced the intention to restructure at Director level. New roles of Science and Technology Director and Waste Management Director were proposed to replace the Science Director and Engineering Director roles involved in the inspection. The Waste Management Director will have responsibility for the provision of disposability assessment and packaging advice.

2. Key findings

2.1. Fit within RWMD's programme

2.1.1. Engagement

From our discussion with both the Senior Packaging Assessment Managers and the Packaging Assessment Managers, it was clear that there was good interaction between the packaging assessment team and other parts of RWMD. This helps to ensure that the disposability assessment process is kept aligned as far as possible with wider GDF design developments, and linked into the geological disposal system change management procedure. We were pleased to find that RWMD considers the Packaging Assessment Managers a key resource to help the Waste Package Specification and Guidance Manager review RWMD's package specifications and guidance.

One of the packaging proposals we inspected had been managed by a Packaging Assessment Manager on secondment from another function within RWMD. We welcome and encourage this as it promotes good interactions and learning between the different organisational functions. However, seconded personnel must be given appropriate training and support, and matters arising from their work (such as follow-up of outstanding action points) should be properly managed. For example, there was only limited evidence of engagement with the waste producer after completion of an assessment we examined which might have been exacerbated by having a temporary Packaging Assessment Manager.

Good Practice 1: There is good interaction between members of the Packaging Assessment Team and other parts of RWMD in relation to disposability assessment.

Development of the newly structured packaging specifications involved early engagement with NDA and waste producers, via the Waste Packagers Liaison Meeting. In the past, RWMD may have presented industry with a 'final draft' packaging specification for comment, which may have resulted in extensive comments needing to be addressed and consequent disagreements on how to resolve them. RWMD believes that early engagement in developing the packaging specifications, giving waste producers the chance to influence proposed packaging specifications, has resulted in less disagreement. RWMD reports that there has been a limited response from waste producers on the published material, which it takes to mean that waste producers are generally content with the proposed suite of specifications. RWMD held internal workshops to elicit views of staff from other functions and ensure full ownership of the specifications within RWMD.

Good Practice 2: The revised packaging specifications have been developed using early engagement with waste producers.

2.1.2. Overall net benefit assessment

RWMD is currently part of the Nuclear Decommissioning Authority (NDA). The purpose of the NDA is to deliver the decommissioning and clean-up of the UK's civil public sector nuclear legacy in a safe and cost-

effective manner, and where possible to accelerate programmes of work that reduce hazard. NDA, not RWMD, assesses the 'net benefit' of novel packaging proposals that may require changes to be made to the GDF design (e.g. Ductile Cast Iron Containers (DCICs)). These assessments include: the impact on sites' decommissioning programmes – operations, schedule and cost; the overall financial impact; and RWMD's disposability assessment. RWMD carries out an assessment of the costs of any changes required to its geological disposal system baseline to accommodate any novel packages and provides NDA with this information. However, RWMD is not involved in the process to determine the full waste lifecycle net benefit. This is undertaken by the NDA. RWMD's process of disposability assessment comprises technical evaluations and safety assessments to consider whether a proposal to package wastes in a particular way could be suitable given RWMD's plans for geological disposal. RWMD does not seek to assess whether there is a strategic case for this HAW management and does not always get visibility of the full lifecycle business case. RWMD does, however, seek to establish that net benefit has been assessed. It was unclear to us whether NDA's review of net benefit considers the less-tangible factors that an increasing complexity of waste package types could affect, e.g. it could possibly make it more difficult to find a GDF site or implement geological disposal.

Where a new packaging proposal initially is rejected on net benefit grounds, RWMD can still work with the waste producer to help develop the package proposal. RWMD is working to ensure better engagement with waste producers as part of the disposability assessment process to minimise the chances of packaging proposals later being rejected. We think that RWMD's Upstream Optioneering programme of work has also made good progress in this respect.

Although the NDA estate covers the majority of the civil nuclear liabilities, there are waste producers outside of the NDA estate (e.g. EdF, AWE), who could also submit packaging proposals, which may require an overall net benefit analysis. It is not clear to us which organisation would be responsible for producing the overall net benefit assessment in such cases.

When RWMD becomes separated from the NDA (initially as a wholly-owned subsidiary), we are uncertain whether either organisation will have all the information necessary to make a judgement of overall net benefit. RWMD and NDA will need to formulate arrangements for these judgements following the formation of RWMD as a subsidiary.

Recommendation 1: RWMD and NDA should formulate arrangements for assessing net benefit for novel packaging proposals when RWMD separates from NDA. This could be undertaken as part of RWMD's ongoing organisational development. Such arrangements should clarify the position for assessing packaging proposals from outside the NDA estate.

2.1.3. Inventory consistency

For the purposes of its disposability assessment RWMD often derives an enhanced inventory from that submitted by the waste producer. RWMD asserts that this 'assessment inventory' is needed to take into account potentially 'under-reported' radionuclides that may be more significant during the post-closure phase of a GDF but not routinely assayed by waste producers, and to account for the expected variability in the inventory of packages from a waste stream. The waste producer's inventory is either taken from the United Kingdom Radioactive Waste Inventory (UKRWI) or from more recent characterisation exercises. We think it is important that any difference between the UKRWI and RWMD's 'assessment inventory' is properly resolved between RWMD and the waste producer, and that it either triggers an agreed update to the UKRWI submission, or the 'mismatch' is properly accounted for and justified in the assessment report. Where a sampling or characterisation campaign has provided the package inventory data, this is not always

fed back to the individuals at the site who are responsible for declaring the data for UKRWI. We think that there is a risk that inconsistencies could lead to inappropriate waste management or lack of confidence in the UKRWI.

Recommendation 2: RWMD and waste producers should develop a process with NDA to ensure that additional inventory information developed and used by RWMD, in its disposability assessment, is reported consistently with the UKRWI.

2.2. Efficiency of packaging advice

2.2.1. Geological Disposal System Change Management procedure

RWMD manages changes to a controlled suite of documentation that it uses to describe and define its geological disposal system baseline through a Geological Disposal System Change Management Procedure [3]. The controlled documentation covered by this procedure includes the Disposal System Specification, which includes a list of the standardised designs of waste containers which RWMD has shown to be suitable for the packaging of specific waste types; and the packaging specifications that RWMD uses to provide guidance to waste producers and to assist RWMD in undertaking disposability assessments. Presently, if a packaging proposal submitted to RWMD for disposability assessment incorporates a waste container which is not included within the Disposal System Specification, RWMD invokes the change management procedure to fully assess its acceptability. This involves a number of steps and research may be required to provide underpinning information for the assessment of the proposed change to allow acceptance of the package. This can increase the length of time required to undertake a disposability assessment. When the change request concerns the inclusion of a new type of waste container in the Disposal System Specification, an important part of the implementation plan is the development of a Level 3 Waste Package Specification. This packaging specification is required to enable any disposability assessments and endorsements beyond conceptual stage to be carried out.

RWMD considers that conducting the change management procedure in series with the disposability assessment process is not working effectively for novel or innovative packaging proposals. Therefore, it is developing an improved process for the assessment of novel or innovative packaging proposals. This process will consider upfront whether any change management is likely to be required as a result of the proposal. RWMD's Disposal System Development Committee will consider and scope the changes. The Disposal System Development Committee is now supported by a subcommittee on 'change control' to increase its efficiency.

Recommendation 3: RWMD should develop and implement an effective and efficient procedure to assess novel or innovative packaging proposals.

2.2.2. Prioritisation of packaging advice

There are currently no criteria to prioritise the undertaking of disposability assessments, although the two Senior Packaging Assessment Managers set priorities for individual Packaging Assessment Managers within their respective teams, based on expected delivery dates. RWMD thinks that the number of packaging proposal submissions is likely to increase in the future. At the inspection we were told that, occasionally, NDA expected disposability assessments requested by 'NDA Strategy' to take priority, and that this can be a

source of tension where Packaging Assessment Managers have already agreed timescales for site-based assessments.

We consider that it would be beneficial to have a transparent prioritisation process that would enable Site Licence Companies (and other waste producers) to understand the priority attached to their proposals. RWMD has recognised this and is working with NDA on developing the planning and prioritisation process. We would encourage RWMD to involve other (non-NDA) waste producers in this dialogue. The development of a prioritisation process should take into account input from the management level discussions that RWMD is having with waste producers described in Section 2.2.5. Such prioritisation should be described in the procedure produced in response to Recommendation 6.

2.2.3. Tracking of action points and advice to waste producers

When RWMD has completed a disposability assessment the Packaging Assessment Manager enters any action points into a database maintained by the packaging assessment team. Packaging Assessment Managers can use this database to update details and close-out action points in the future. RWMD cannot issue a fLoC if there is still an outstanding action on the database. However, qualifications (caveats, conditions or exclusions) can be attached to LoCs, including fLoCs, that require further action.

The WAGR Periodic review assessment report contained no new actions points [4]. However, we identified a number of recommendations provided by RWMD to the waste producer which we think resemble actions. In labelling these as recommendations we think there is the potential for the operator to not recognise them as priority 'actions'. Generally, we consider that the descriptions of action points within the periodic reviews are inconsistent. The WAGR recommendations were not entered on the database in the way that other action points are. We think this could give the impression that these assessments are less significant than other disposability assessments. However, we consider that periodic reviews should be given a high degree of importance as they relate to maintaining the assurance of the continued disposability of packaged wastes. We note that this has important safety and environmental implications. Identifying any compliance gaps early makes provision for the GDF design to be modified to accommodate them, or package rework to be carried out if necessary while the packaging plant is still operational, and could help ensure relevant operational experience is shared to the overall benefit of the industry.

While we were auditing a workfile, one Packaging Assessment Manager noted that it was likely that a forthcoming iLoC endorsement would have a caveat subject to RWMD's need to understand the potential impacts associated with voidage development and propagation in relation to the packaging proposal, before it could issue a fLoC. We noted that there were no known timescales for resolution of this issue. We consider that RWMD should ensure that it has the necessary information and assessment tools in place to undertake disposability assessments, in order to minimise uncertainty and risk associated with packaging advice.

Recommendation 4: RWMD should take steps to improve the proactive management of action points in disposability assessment reports and caveats on LoCs.

2.2.4. Resourcing

We found evidence, from some of the disposability assessments examined, that assessments had been delayed because Senior Packaging Assessment Managers were not available to chair timely Proposal Review Meetings, or to review assessment reports. We noted that on occasion the Head of Packaging

Assessment will chair Proposal Review Meetings. RWMD recognises the limitation of having only two Senior Packaging Assessment Managers and they are reviewing the situation.

Recommendation 5: RWMD should review its resource requirements to meet the needs of disposability assessment such that delays are minimised.

From our review of the Assessment Quality Plans we observed several instances where, due to a lack of internal resource, RWMD relied on external contractors to provide internal assurance services. RWMD should have adequate resources in place in order to manage an effective internal assurance programme (see Recommendation 20).

2.2.5. Planning

When RWMD receives a packaging proposal, the assigned Packaging Assessment Manager organises a Launch Meeting to evaluate the level of assessment required; the complexity of the task; and whether contractors should be brought in. RWMD's decision to appoint contractors to undertake an assessment is based on the complexity and magnitude of the task, the availability of appropriate resource in-house, and efficiency. More complex time consuming work tends to be out-sourced. Relatively simple assessments (or parts thereof) tend to be kept in-house.

RWMD attempts to complete Conceptual and Interim disposability assessments in around 26 weeks, and Final Stage assessments within 13 weeks. However, we understand that in practice these timescales are extended if the waste producer fails to provide suitable or sufficient information needed for RWMD to carry out the assessment. Timescales may also be extended if the Nuclear Safety and Environment Committee (NSEC) is required to provide advice on disposability assessment findings. Delays to agreed timescales can also result from internal re-prioritisation.

Some proposals cannot lead to an endorsed proposal because packaging specifications (on which to base the disposability assessment) are not yet available. For example, the Hot Isostatic Pressing plutonium-product proposal could not obtain a cLoC because there are no relevant packaging specifications covering it (i.e. a Level 2 Generic Specification for such a waste type). This has resulted in a paper from the Packaging Assessment Team to the NSEC to propose a way forward for the packaging of such wasteforms. We note that, for the process to operate efficiently, RWMD should make waste producers aware of such blocks that would prevent endorsement, so that they can make an informed decision concerning what they require from the disposability assessment in the first place. At the same time, RWMD should consider how it can better anticipate the needs of waste producers in such circumstances (see Recommendation 3) and be better prepared to receive packaging submissions. For example, RWMD has work ongoing on concept development, but it was unclear to us what linkages there are between this work area and the needs of waste producers as expressed through engagement with members of the Packaging Assessment Team.

Several Packaging Assessment Managers reported significant time and financial over-runs in the completion of periodic review assessments. RWMD noted several reasons for this which included not having a specific procedure to follow (i.e. learning by experience) and unexpected difficulty in locating the necessary records and paperwork as inputs to the assessment. RWMD should take this learning into account when it produces a process to support periodic reviews and consider measures to reduce the risk of undue delay to future periodic reviews, e.g. by better use of technical audits.

We noted a four year delay (approximately) in completing the WAGR periodic review, due to a lack of available resource (see Recommendation 6). We think the start-stop nature of the assessment may have

given the impression to the waste producer, and others, that the review was not a high priority and might have contributed to the limited lack of interaction with the waste producer following completion of the assessment report.

Disposability assessments often generate a considerable number of issues. RWMD usually manages these issues at the Proposal Review Meetings, with significant issues that cannot be closed out being worked up into formal Action Points. We note, therefore, that it is important that the Proposal Review Meetings are attended by the right mix of technically competent and experienced staff to judge the importance of the issues being considered. The Packaging Assessment Manager attends the Proposal review meeting and will have listened to all of the discussions regarding the issue and therefore be expected to have a clear understanding of it, such that they can complete the assessment.

We consider that some waste producers may have unrealistic expectations of timescales and do not fully understand what RWMD needs to do before it can decide whether to issue a LoC. RWMD recognises that early engagement with the waste producers makes the assessment process more efficient by helping to improve the quality of submissions and resolving potential issues before they arise. RWMD has also identified that this early engagement with waste producers will help it better plan its disposability assessments in the future (see also section 2.2.2). We strongly encourage RWMD to continue this early engagement, whilst ensuring that it does not compromise the integrity of RWMD's assessment process. There is currently a high level initiative within RWMD to meet with waste producers at the management level to develop a more integrated schedule for disposability assessments between RWMD and the waste producers. RWMD is looking for opportunities to improve the process and ideally to ensure that disposability assessments do not hold up the progress of packaging projects. However, for this to be achieved, RWMD needs to be confident that waste producers will deliver LoC submissions on time and to the required quality.

Good Practice 3: There is good interaction between members of RWMD and waste producers at several levels in relation to disposability assessment and packaging advice.

Recommendation 6: RWMD should complete its initiatives to improve scheduling and prioritisation of disposability assessments, and in doing so implement a transparent process to plan and prioritise its resources.

2.3. Impartiality of advice

2.3.1. Competent Checking Arrangements

Often, RWMD contracts out the evaluations and assessments, while some assessment areas (such as Quality Management Systems and safeguards) are kept in-house. The contract process is controlled (through RWMD's Quality Management System) to ensure that individuals undertaking the work are suitably qualified and experienced. Furthermore, to avoid conflicts of interest, the contractor must inform RWMD if their staff has any conflicts of interest, such as having contributed to the preparation of the packaging proposal submission. Generally for simple assessments the evaluations and assessments are performed in-house by RWMD staff.

RWMD's disposability assessment process requires that all evaluations and assessment reports (whether done by contractors or in-house) are subject to checking and review (for quality, fitness for purpose, and

consistency) before they are submitted to the Proposal Review Meeting. These checks are performed by Competent Checkers, who currently are named individuals within RWMD. For topics where there is only one competent checker, e.g. non-radiological environmental impact; the assessment might have been undertaken in-house by that individual. In this case the checking is carried out by the relevant Packaging Assessment Manager, who is not listed as competent for this task.

We observed that the evidence from the competent checker's review varies between individuals and projects. Some checkers produce a formal note giving their view of the adequacy of the evaluation or assessment report, while others send an email that might pick on one point of detail. It appears to us that there is considerable flexibility in what RWMD expects individuals to prepare to demonstrate evidence of checking. RWMD told us that the final view on the adequacy of the assessment rests with the Proposal Review Meeting. Our inspection of two Assessment Quality Plans identified the Proposal Review Meeting as the competent checker but noted this was 'due to resource limitations'. Contractors commissioned to review packaging assessments are required to produce a 'contractor-approved draft' report that typically is not published by RWMD, and contractors are rarely requested to correct their submission. This is a pragmatic decision taken by RWMD to save time and money but it also allows the Proposal Review Meeting to potentially see alternative views. Feedback on the quality of work is given at regular meetings with the contractor.

In order to maintain a sufficient number of Competent Checkers and for succession planning, there are instances (e.g. in criticality assessments) where Competent Checkers have been used to mentor Assessors. RWMD's criticality team has managed this well to avoid potential conflicts and maintain impartiality whereby a Competent Checker would be required to check work that they had helped (the Assessor) to produce. As part of the new competency arrangements RWMD should ensure that there is more than one person identified for each work area (see below).

RWMD is in the process of implementing new competency arrangements and have defined a range of competences describing the skills and experience required to carry out RWMD's activities. RWMD is currently checking the competency of individuals performing these activities and defining any training needs in Performance Development Plans. This will help RWMD compile a Competency Matrix which it will use to identify competency gaps and vulnerabilities and progress actions to address them. RWMD expects this process to reduce reliance on individuals with specialist experience and maintain appropriate levels of qualified resource for the future. RWMD intends to revise its Competent Checkers documentation in the light of the new competency arrangements. RWMD reported to us that a recent Lloyds Register Quality Assurance audit noted that *"Significant improvements have been made to develop the competency management process. The arrangements appear to be robust and follow established industry practices."*

Recommendation 7: RWMD should implement its improved Competent Checker arrangements and monitor their effectiveness through its internal assurance function.

2.3.2. Conflicts of interest

From discussions with staff at all levels within RWMD, we found no evidence of RWMD compromising its assessment by responding to improper influence to endorse packaging proposals. RWMD demonstrated that assessments are subject to the appropriate level of technical scrutiny and, where appropriate, packaging proposals are referred to the change management procedure. RWMD's disposal system change management procedure is discussed elsewhere, but we note here that RWMD appears to be applying it correctly, assessing the technical and GDF project implications of any required modifications to be able to accept a package, including seeking the views of the NSEC where required.

New packaging proposals that fall outside, or challenge, the existing suite of packaging specifications are reviewed through RWMD's change management procedure, which is initiated by the relevant Packaging Assessment Manager submitting a concept change request. Generally the Packaging Assessment Manager drives the request through the change management procedure and ensures that enough time is allocated for their assessment to allow for this, and manages the expectations of the waste producer who has made the submission. We examined some good examples of this during the audit, such as the submissions by Magnox and EdF Energy to use Ductile Cast Iron Containers (DCICs). RWMD dealt with these submissions using a modular package assessment approach that addressed specific issues (such as gas generation and impact performance), common to the range of waste streams to be placed in the containers. Once these were completed, they fed into waste stream specific iLoC assessments.

RWMD is currently assessing novel or innovative waste package proposals that require use of the change management procedure, at the same time as it is revising its suite of Waste Package Specifications. This presents a risk that advice to different waste producers will be inconsistent, as there is a constantly changing geological disposal system baseline. However, we noted that this is being carefully managed by RWMD, and we found no evidence of mistakes being made.

We also heard evidence, from the Packaging Assessment Managers, of RWMD maintaining the impartiality of the service they received from the supply chain in undertaking package assessments. Packaging Assessment Managers require contractors to declare any conflict of interest with the submission, including any relevant work that individuals within their organisation have or are undertaking for other areas of RWMD, and to manage this by providing alternative members of staff. RWMD's procurement framework has been designed to support it as a whole rather than disposability assessment specifically, and this has caused some problems with the limited number of contractors available, which can make it difficult to find support from individuals who have not worked for other related areas of RWMD. RWMD should consider asking its contractors to explicitly confirm that it has no conflicts of interest in relation to the specific work area being contracted.

Recommendation 8: RWMD should update its procedures to require contractors to provide explicit statements confirming a lack of conflicts of interest.

RWMD informed us that they are contractually not allowed to share packaging advice between, say, Magnox Ltd and Sellafield Ltd, without prior permission. This is a consequence of the financial contracting model that RWMD has historically had with sites. In our view this arrangement does not encourage licensees to share knowledge, which is disappointing especially since some of these sites are part of the same NDA estate where NDA is the waste owner. However, we note a positive development here in that Executive Summaries of disposability assessments are made publically available on the NDA's website which helps counter this, and NDA encourages its SLCs to share knowledge. Individual evaluations and assessments carried out as part of disposability assessments are not routinely shared with relevant waste producers, although they could be of value to them.

Recommendation 9: RWMD should explore, with NDA, the potential to encourage and promote sharing of packaging advice between waste producers (both within the NDA estate and with other waste producers).

2.4. Robustness of process

2.4.1. General conduct of packaging advice

We found clear evidence, from Director level down to the individual Packaging Assessment Managers, that the package assessment process is applied in a manner that should not fundamentally restrict potential designs of the GDF in the future. To ensure that it does not endorse packaging proposals that could compromise the GDF's nuclear safety and environmental performance, RWMD has developed a set of arrangements for disposability assessment. RWMD's stakeholders need to recognise the importance of maintaining an appropriate level of rigour and understand why the process can take a relatively long time to complete.

In the disposability assessments we examined, it was common practice for the Packaging Assessment Managers to continue to have a dialogue with the waste producer, to explain the output of the assessment and help close out any action points that may have arisen from the assessment. RWMD explained that where issues could not be fully resolved they could be translated into caveats or exclusions, for example controls on the content of waste packages, where this was an appropriate way to progress the assessment. We were impressed by the positive, professional attitude of the Packaging Assessment Managers in helping waste producers progress package proposals at the same time as ensuring the nuclear safety and environmental performance of the GDF. The Packaging Assessment Managers support RWMD's current upstream optioneering process and participate in early dialogue with waste producers on proposals; however, they were clear on their role during the actual assessment process and that the submission is owned by the waste producers. RWMD identified a problem that can arise as a result of the Packaging Assessment Manager's participation in waste producer's options studies (such as Best Practicable Environmental Option meetings) being viewed by waste producers as tacit acceptance by RWMD of a waste packaging proposal. RWMD told us that this can then lead to disappointment being expressed by the waste producer when issues are raised during formal assessment of a packaging proposal. Despite this difficulty, RWMD views it as beneficial to maintain this level of dialogue and support to the waste producers. We support this engagement (see also Good Practice 3).

Our examination of files from a number of disposability assessments indicated that generally there appeared to be good evidence of compliance with the Quality Management System for the process. We found only one case where we could not find a specific Competent Checker's report for an assessment. In some cases the electronic record was more up to date than the paper record. We suggest that RWMD could add a hard-copy file checklist to the front of the file to ensure all relevant parts of the file are in place. We think RWMD should have a clear, consistent approach to what reports/records are held in paper form and what is managed electronically. We note that this problem may have been apparent to us because RWMD is in the process of updating its record management system.

Recommendation 10: RWMD should clarify whether it considers that master documents in packaging assessment files are paper or electronic copies.

2.4.2. Review of the Management System documentation

RWMD told us it was likely that some of its management system documents had not been reviewed within their review period. RWMD is addressing this through an ongoing programme of work to revise much of their management system documentation. We recognise the benefit from a wholesale review of this documentation, as it will allow changes in one document to be adequately captured by other documents as appropriate. However, this presents a large workload which currently puts strain on RWMD's resource. Also, RWMD must ensure that more robust document control arrangements are implemented in future to ensure adequate maintenance of management system documents.

Recommendation 11: RWMD should ensure that the formal review periods for management system documentation, noted within its procedures, are adhered to in order to maintain their currency. This should be assured through its internal assurance and quality functions.

RWMD is currently revising its Waste Packaging Specifications and Guidance Documentation. The new package specifications are being aligned with the gDSSC, so showing clearly how RWMD's packaging requirements help maintain the future safety and environmental performance of a GDF. The content of the specifications have been simplified to remove the supporting information and justifications and to make them easier to understand and use. Over the last 20 years, RWMD and formerly Nirex issued and maintained detailed, prescriptive waste packaging specifications and guidance, based around a set of six standard waste packages. We welcome RWMD's new approach which has reduced the size of the detailed (Level 3) Waste Packaging Specifications by putting the common safety arguments, justifications and safety functional requirements into Level 1 and Level 2 packaging specification documents.

RWMD has defined packaging specifications requirements on the basis of the 'limiting' case (such as waste package stack height and impact performance). RWMD accepts that there are a number of pessimisms in defining packaging specifications on this basis, and that packages might eventually be found to be over-engineered. However, given the absence of a disposal site and a host geology, RWMD believes this approach is necessary to provide confidence to the public and industry. We recognise that on occasion this approach may cause problems.

We discussed the safeguards^{vii} evaluations undertaken in two of the disposability assessments we examined, with Packaging Assessment Managers. We agree with RWMD's conclusion that the packaging proposals did not contain sufficient information to adequately assess safeguards arrangements. We think that RWMD should be in a position to assess whether waste producers have carried out a suitably robust analysis on the application of safeguards to the packaging of wastes and nuclear materials being considered for geological disposal.

Recommendation 12: RWMD should develop and promulgate guidance on the application of safeguards for the packaging of HAW.

2.4.3. Consistency of advice

Some waste streams have been the subject of packaging advice for many years so we explored with RWMD the consistency of its current advice, with advice given in the past by Nirex or RWMD. The Sellafield Magnox Swarf Storage Silos project has involved 57 meetings with RWMD (or Nirex) since 2003. All previous related assessments are reviewed at the beginning of an assessment. RWMD may change its advice as a result of the assessment of new packaging proposals, or new evidence and information. Sometimes during an assessment, a Packaging Assessment Manager may identify a new fundamental issue which may cause delay or be perceived as RWMD changing its mind.

Several Packaging Assessment Managers told us that it is challenging to ensure consistency between the assessments being undertaken, and they try to ensure consistency of advice by regularly discussing matters and assessments amongst themselves.

^{vii} Nuclear safeguards are measures taken to verify that countries comply with their international obligations not to divert civil nuclear materials for nuclear explosive purposes.

2.5. Currency of advice

2.5.1. Periodic Review

At the time of our inspection RWMD had completed six periodic reviews, and several more were on-going or planned over the following months. All these reviews relate to waste packages that have been produced and previously endorsed by Nirex in the late 1980s, and cover the majority of the UK's packaged HAW. However, RWMD had no specific procedure covering the process of periodic review at the time of the inspection. RWMD has, to date, completed periodic reviews following its standard disposability assessment process, and paying particular attention to package records (noting that package records are produced at the site only after a fLoC is issued). It is important to note that RWMD's periodic review is a re-assessment of the disposability of a waste package in the GDF, taking into account any changes in the development of the GDF concept since the original assessment. The waste processing, storage conditions and management of waste packages on a site are important inputs to this re-assessment, which are provided by the waste producer. Waste producers must ensure that their waste packages are managed in accordance with regulatory requirements and that the relevant safety cases are periodically reviewed.

A recent RWMD HSSE assurance report [5] found that additional targeted guidance would be beneficial. RWMD is developing a procedure to address this and hopes to issue it in November 2013. We agree that this should be helpful in addressing many of our concerns noted during our inspection.

Recommendation 13: RWMD should document and implement a procedure for the periodic review of fLoCs.

In this procedure RWMD must address the important matter of timeliness of its periodic reviews and whether and how to differentiate between routine periodic review and those triggered by events. To date, periodic reviews have been programmed on a nominal ten yearly cycle. However, there is a backlog of fLoCs pending periodic review, and some reviews have taken years to complete. RWMD's forward plan for periodic review states that it plans to carry out periodic reviews within 10 years of first endorsements, with subsequent periodic review 10 years later (even though, in the majority of cases, fLoCs had not been re-issued).

We recognise from RWMD's waste packaging guidance documentation [6] that *"periodic review [of a fLoC] should also be triggered by any periodic review of any safety case relevant to the waste manufacture and/or storage and as a result of introduction of new wastes or extension of the terms of an existing LoC endorsement"*; RWMD should include this in its new periodic review procedure. We thought that some RWMD staff appeared unaware of circumstances in which packaging advice and fLoC endorsements should be reviewed outside of a periodic review cycle.

None of the periodic review assessment reports we inspected had resulted in the fLoC being re-issued; this means there are conditions from the fLoC that have not been addressed or new issues have emerged. In such cases, RWMD and the waste producer need to work together to close out the Action Points and allow re-issue of the fLoC. RWMD told us that only one periodic review assessment has resulted in the reissue of the final LoC. This related to packages arising from the Sellafield Waste Encapsulation Plant [7]. However, that early assessment raised similar concerns to other reviews about records and had other similar action points.

We consider that the current status of the fLoCs that have been subject to periodic review is unsatisfactory, not least because it may undermine confidence in the wider disposability assessment process. RWMD should clarify the status of these fLoCs and the waste packages under them and ensure that any lessons

learned are taken into account for its developing periodic review procedure. Several action points relating to some fLoCs and periodic reviews remain open. It is important that RWMD works with waste producers to close these out. Packaging Assessment Managers are responsible for recording when Action Points are closed but it is not their job to 'encourage' the waste producer to close them. We suggest PAMs should take a more pro-active approach with waste producers to ensure action points are closed out.

Recommendation 14: RWMD should work with waste producers to review extant action points associated with fLoCs and periodic reviews to develop a credible plan for their closure.

On completion of the Periodic Reviews, RWMD has not re-issued some fLoCs because of inadequate data recording and package records. This is a matter common to several fLoCs and waste producers. Discussions between RWMD and waste producers, regarding the set of records that constitute the final disposal or lifetime waste package record, are ongoing. It appears to us that a number of waste producer's records may give rise to concern regarding their ability to demonstrate disposability. We suggest there may be the need for greater understanding of the requirements in this area (see, for example, [8][9][10]) which may be achieved through dialogue between the various stakeholders to ensure the right records are collected and managed.

Recommendation 15: RWMD should continue to work with waste producers to ensure that appropriate information is collected and maintained, as part of a waste package record, to demonstrate disposability, and support the long term management and final disposal of wastes.

To date, most of RWMD's periodic reviews have been related to operational packaging plants. Hence, there is opportunity for waste producers to improve their packaging designs and address compliance gaps. RWMD is aware of the knowledge-management challenges that could arise from short-term packaging campaigns where a periodic review may occur after the packaging plant has ceased operations. RWMD informed us that, when wastes could be processed within a short time-frame (within the 10 year period before Periodic Review) it would be useful to review the associated records during or immediately after the processing phase, so that any inadequacies in records could be immediately addressed. We consider it would be useful to apply this approach for all waste streams, so that data recording issues could be recognised and addressed ahead of the periodic review. It is also important that RWMD continuously engage with waste producers, to provide early assurance that the plant is producing packages in line with RWMD's expectations where this may affect disposability, and also help to ensure that appropriate operational realism is fed back into the assessment process; this should form part of the early review. We also consider that expanding this early review to cover close-out of extant action points would be useful.

Recommendation 16: RWMD should improve the use of technical audits, prior to periodic reviews, in order to allow timely resolution of issues regarding records, operational feedback and close-out of any extant action points.

We identified a number of specific challenges arising from the periodic reviews that RWMD should consider in developing its process for periodic reviews. These challenges are detailed in Annex 1.

Recommendation 17: RWMD's procedure for its periodic review of fLoCs, should address the relevant issues raised in our inspection report, including:

- (i) underpinning of package evolution;
- (ii) non-conforming packages;
- (iii) operational experience and feedback; and
- (iv) extensions to fLoCs.

2.5.2. Impacts of changes on disposability

When there is a significant change to the GDF concept, for example arising from a location or locations being selected for consideration, RWMD does not have a defined process to systematically assess the implications on packaging advice it has previously issued. This is because RWMD does not collate information relating to the sensitivity of disposability assessments to concept parameters. Whilst we recognise that RWMD may carry out reviews against the current GDF concept as part of a periodic review, we note that it only applies to fLoCs. No complementary procedure exists to consider advice provided for developing proposals which are yet to receive a fLoC. Discussions with some members of staff on this matter concluded that they were of the view that these considerations would be picked up as part of RWMD's disposal system change management procedure. This seems unlikely, as the outputs of disposability assessments do not form part of the controlled documentation in this procedure.

We think it would be beneficial to have an 'at risk' register of endorsements or containers and/or waste package types which RWMD considers are the most sensitive to changes in the GDF design, or other factors, to help identify where to target additional, fit-for-purpose, periodic reviews. The register should highlight which factors the packaging advice is sensitive to (such as different potential geologies) and their related constraints. This would also help us and other stakeholders more readily to understand the potential consequences from changes.

Recommendation 18: RWMD should consider developing and maintaining a list of disposability assessments and endorsements sensitive to particular changes in a GDF concept or key factors in safety cases.

2.6. Assurance of advice

2.6.1. Nuclear Safety and Environment Committee

RWMD's Nuclear Safety and Environment Committee (NSEC) [11] advises the RWMD Executive and Management Board on matters that may affect safety and environmental protection. NSEC considers disposability assessments according to a graded system, and provides advice on the findings of them. If NSEC does not agree with the conclusions in an assessment, or considers that they are not adequately robust, then RWMD decides how to address this advice, which may involve RWMD re-submitting the paper to NSEC. In other cases, NSEC may agree with the general outcome of the disposability assessment, but may make some specific comments on it. While we were reassured that such comments would be addressed, we note that there is currently no formal process to ensure that comments from NSEC are provided to, and addressed by, the relevant Packaging Assessment Manager. RWMD should rectify this when it reviews its Management System documentation.

We also note that the Packaging Assessment Manager for the WAGR periodic review reported that NSEC had supported the conclusion that following the periodic review the LoC not be re-issued. However, the assessment report and accompanying letter sent to the waste producer suggest that the LoC will be re-issued in "due course" revealing a degree of inconsistency between NSEC advice to RWMD and the advice RWMD provided to the waste producer.

Recommendation 19: RWMD should develop and implement a procedure for capturing and tracking advice issued by NSEC on disposability assessments.

2.6.2. Assurance Function

RWMD's assurance function is not mature, but is developing. Between December 2010 and March 2013 RWMD carried out no internal audits of disposability assessment files, however, it continued to scrutinise disposability assessments [12]. An RWMD review of the scrutiny inputs related to EPR operational ILW (Sizewell C and Hinkley Point C) showed these to be challenging both in terms of the technical issues and adherence to the RWMD assessment procedure. The Assurance function has a forward programme of work which covers a range of activities, including an audit of disposability assessment files, to be conducted by a Contractor.

Recommendation 20: RWMD should consider opportunities to benchmark its own internal assurance.

Recommendation 21: RWMD should ensure that it has in place an appropriately resourced and integrated internal assurance function to manage the activities required of it.

We recognise that RWMD is working to resolve findings from recent RWMD HSSE assurance reports [13]. Examples of these findings are:

- Consider the potential to improve clarity of record keeping requirements to increase the efficiency of future periodic reviews as part of the update of the disposability assessment scrutiny process; and
- Clarify the requirements for review/sign-off of Assessment Quality Plans in the update the disposability assessment scrutiny process.

We encourage RWMD to continue to close out assurance findings and we suggest that more robust procedures to address: agreement on the actions that will resolve the issue; tracking of the progress of these actions; and a plan for formal close-out, would help.

Recommendation 22: RWMD should review its process to close-out assurance findings.

In addressing the findings from the recent internal assurance reports, we suggest RWMD first tries to identify any root causes for non-compliances, as they may point to more systemic factors that need addressing e.g. a poorly written or ambiguous procedure; that the same information is requested several times in different places; or time constraints from the Packaging Assessment Manager.

We found evidence that where problems had arisen with respect to applying and maintaining the Assessment Quality Plans, such as sign off of topic assessment and Competent Checker reports, RWMD had taken action to revise the template to resolve the problems and make them more useful. The Assessment Quality Plan is now at Issue 4 and this reflects improvements to the process from experience. We also

found evidence of leadership being applied to revise the package assessment procedures so that they were more useable, and then ensure that there was full compliance with them.

3. Conclusions and Recommendations

The NDA is responsible for planning and implementing geological disposal for higher activity waste, and has established RWMD as its delivery organisation. RWMD is undergoing a period of organisational development so that it can evolve into an organisation capable of holding the necessary environmental permits and nuclear site licence(s) to develop and operate a GDF. Throughout this period RWMD will need to continue to provide appropriate packaging advice to waste producers to minimise the risk that conditioning and packaging of HAW now results in packages that are incompatible with geological disposal in the future. This inspection forms part of an ongoing programme of regulatory work to scrutinise RWMD's work in this area.

On the basis of the information obtained during our inspection, we believe that RWMD has in place a systematic process to provide an important means of reducing risks associated with waste packaging in advance of an operational GDF. We found RWMD's process of disposability assessment to be generally robust, providing confidence in the advice RWMD gives to waste producers. RWMD has a programme of continuous improvement in its provision of disposability assessment and waste packaging advice.

Throughout the course of our inspection we observed the following areas of good practice:

No.	Good practice observed
GP1	There is good interaction between members of the Packaging Assessment Team and other parts of RWMD in relation to disposability assessment.
GP2	The revised packaging specifications have been developed using early engagement with waste producers.
GP3	There is good interaction between members of RWMD and waste producers at several levels in relation to disposability assessment and packaging advice.

However, we also identified some areas where we recommend improvements could be made. Our recommendations are:

No.	Recommendation
R1	RWMD and NDA should formulate arrangements for assessing net benefit for novel packaging proposals when RWMD separates from NDA. This could be undertaken as part of RWMD's ongoing organisational development. Such arrangements should clarify the position for assessing packaging proposals from outside the NDA estate.
R2	RWMD and waste producers should develop a process with NDA to ensure that additional inventory information developed and used by RWMD, in its disposability assessment, is reported consistently with the UKRWI.
R3	RWMD should develop and implement an effective and efficient procedure to assess novel or innovative packaging proposals.

- R4 RWMD should take steps to improve the proactive management of action points in disposability assessment reports and caveats on LoCs.
- R5 RWMD should review its resource requirements to meet the needs of disposability assessment such that delays are minimised.
- R6 RWMD should complete its initiatives to improve scheduling and prioritisation of disposability assessments, and in doing so implement a transparent process to plan and prioritise its resources.
- R7 RWMD should implement its improved Competent Checker arrangements and monitor their effectiveness through its internal assurance function.
- R8 RWMD should update its procedures to require contractors to provide explicit statements confirming a lack of conflicts of interest.
- R9 RWMD should explore, with NDA, the potential to encourage and promote sharing of packaging advice between waste producers (both within the NDA estate and with other waste producers).
- R10 RWMD should clarify whether it considers that master documents in packaging assessment files are paper or electronic copies.
- R11 RWMD should ensure that the formal review periods for management system documentation, noted within its procedures, are adhered to in order to maintain their currency. This should be assured through its internal assurance and quality functions.
- R12 RWMD should develop and promulgate guidance on the application of safeguards for the packaging of HAW.
- R13 RWMD should document and implement a procedure for the periodic review of fLoCs.
- R14 RWMD should work with waste producers to review extant action points associated with fLoCs and periodic reviews to develop a credible plan for their closure.
- R15 RWMD should continue to work with waste producers to ensure that appropriate information is collected and maintained, as part of a waste package record, to demonstrate disposability, and support the long term management and final disposal of wastes.
- R16 RWMD should improve the use of technical audits, prior to periodic reviews, in order to allow timely resolution of issues regarding records, operational feedback and close-out of any extant action points.
- R17 RWMD's procedure for its periodic review of fLoCs, should address the relevant issues raised in our inspection report, including:
(i) underpinning of package evolution;
(ii) non-conforming packages;
(iii) operational experience and feedback; and
(iv) extensions to fLoCs.
- R18 RWMD should consider developing and maintaining a list of disposability assessments and endorsements sensitive to particular changes in a GDF concept or key factors in safety cases.
- R19 RWMD should develop and implement a procedure for capturing and tracking advice issued by
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NSEC on disposability assessments.

R20 RWMD should consider opportunities to benchmark its own internal assurance.

R21 RWMD should ensure that it has in place an appropriately resourced and integrated internal assurance function to manage the activities required of it.

R22 RWMD should review its process to close-out assurance findings.

We will progress these recommendations either through our dialogue with RWMD via the ongoing T&O Scrutiny programme, and if appropriate via our joint regulatory issues resolution process, as discussed in Section 1.

Annex 1. Specific challenges identified for Periodic Review

We identified the following specific challenges arising from RWMD's periodic reviews. RWMD should consider these in the development of its process for periodic reviews:

1. Underpinning of package evolution. In the assessments we reviewed, we found comparatively little firm consideration of how the actual evolution of the packages may impact on the assessment of disposability. Many of the uncertainties associated with the effects of package ageing on disposability are generic, and we think that RWMD may be best placed to address these in its R&D programme. For example, the WAGR periodic review assessment assumed the packages still to be in 'pristine' condition. Many of these packages are nearly 20 years old and we could not establish the validity and implication of this assumption to some of the assessments areas (e.g. accident performance) from the assessment files we inspected. We understand that RWMD has identified the need for an R&D "knowledge base" to address this issue. It is important that this R&D work is carried out properly; that the issue is closed out; and account is taken of ageing effects in future assessments, if appropriate. RWMD has raised additional concerns about how the environmental conditions during storage may be affecting disposability; we understand that it is progressing work to addressing this.
2. Non-conforming packages. RWMD has raised concerns within periodic reviews about the management of non-conforming packages that have been identified since the initial fLoC was issued. RWMD's developing procedure for periodic review should set out how RWMD will address the matter of non-conforming packages, to help minimise the risk that the packages will not meet the Waste Acceptance Criteria for a GDF. With the Store Operations Forum now owning the Industry Guidance document on interim storage there are opportunities for RWMD to ensure practical guidance is available more widely.
3. Operational experience and feedback. RWMD told us that it welcomes the opportunity to engage with people on sites who are responsible for packaging and storage operations, during periodic reviews. Without prejudicing our regulatory locus, we consider it is important that RWMD maintains and strengthens such interactions both to preserve a sense of realism within the disposability assessment process and as an opportunity for RWMD to enhance its operational understanding as it continues developing towards becoming a SLC. The disposability assessment process works most effectively when the waste producer and RWMD engage well and proactively. It is promising to note the good interactions cited by RWMD with Trawsfynydd site, as Magnox Limited seek to close out extant actions and whilst records on campaign information is still lacking, generally the quality of package specific records was reported as having improved recently.
4. Extensions to fLoCs. We also noted, from our interactions with RWMD, that waste producers often seek to extend the previously endorsed 'envelope' for fLoCs, including during periodic reviews. We note the similarities and differences between periodic reviews and extension of fLoCs. We recommend that RWMD takes this into account when developing a procedure for periodic review and considers whether requests for extension of an fLoC could be considered as another trigger for periodic review.

4. List of abbreviations

AWE	Atomic Weapons Establishment
cLoC	conceptual stage Letter of Compliance
CoRWM	Committee on Radioactive Waste Management
DECC	Department for Energy and Climate Change
DSS	Disposal System Specification
DSSC	Disposal System Safety Case
EA	Environment Agency
EdF	Electricité de France
ESC	Environmental Safety Case
fLoC	final stage Letter of Compliance
GDF	Geological Disposal Facility
gDSSC	generic Disposal System Safety Case
GWPS	Generic Waste Package Specification
HAW	High Activity Waste
HSE	Health and Safety Executive
iLoC	interim stage Letter of Compliance
ILW	Intermediate Level Waste
LoC	Letter of Compliance
MRWS	Managing Radioactive Waste Safely
NDA	Nuclear Decommissioning Authority
ONR	Office for Nuclear Regulation
R&D	Research and Development
RIRP	joint Regulatory Issues Resolution Process
RWMC	Radioactive Waste Management Case
RWMD	Radioactive Waste Management Directorate
SLC	Site Licence Company
T&O	Technical and Organisational
WAC	Waste Acceptance Criteria
WPS	Waste Package Specification

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