Geological Disposal

Optimising the management of Higher Activity Wastes (HAW) workshop

March 2014
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Bibliography

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Executive Summary

A workshop was hosted by the Nuclear Decommissioning Authority’s Radioactive Waste Management Directorate (RWMD) at the Birchwood Golf Club, Warrington on 19th February 2014. The aim was to present work being done by RWMD to support the optimised management of higher activity waste and to invite feedback and future engagement.

Representatives from the following organisations were present:

- Cavendish Nuclear Limited
- Environment Agency (EA)
- EDF Energy
- Energy Solutions
- International Nuclear Services (INS)
- Low Level Waste Repository (LLWR)
- Magnox Limited
- National Nuclear Laboratory (NNL)
- Nuclear Decommissioning Authority (NDA)
- Sellafield Limited

The morning session consisted of presentations by RWMD staff which gave an update of recent activities conducted by RWMD.

Simon Wisbey spoke of the benefits of early and sustained engagement between RWMD and Site Licence Companies (SLCs). Ciara Walsh gave an overview of the Upstream Optioneering project, gave examples of recent work which should benefit SLCs, and confirmed the benefits of sharing information. Amy Young presented the process of ‘change control’, which allows the RWMD technical baseline to be changed in a structured manner. Lorraine McDermott described the system in place to capture issues raised by all external stakeholders.

In the afternoon, attendees were free to choose which of 2 parallel discussion sessions to be involved with.

Ciara Walsh chaired 3 Upstream Optioneering discussion topics; cost normalisation; a general update on Upstream Optioneering; and orphan waste.

Simon Wisbey chaired 3 disposability assessment discussion topics; recent endorsements by the assessment team; records management; early engagement.

Discussion was held during each afternoon topic, with many questions being answered, and many useful points being made.
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1 Introduction

This is the second workshop to be held into optimising the management of higher activity wastes (HAW). The first was held in July 2012\(^1\) and the delegates at this workshop requested that a similar workshop should be held again. As a result this workshop was again hosted by the Nuclear Decommissioning Authority’s Radioactive Waste Management Directorate (RWMD) at the Birchwood Golf Club, Warrington on 19\(^{th}\) February 2014, to present work being done by RWMD to support the optimised management of HAW and to invite feedback and future engagement.

The workshop was attended by representatives from the Nuclear Decommissioning Authority (NDA), RWMD, Cavendish Nuclear Limited, Environment Agency (EA), EDF Energy, Energy Solutions, International Nuclear Services (INS), Low Level Waste Repository (LLWR), Magnox Limited, National Nuclear Laboratory (NNL) and Sellafield Limited.

2 Aims of the workshop

The main aims of the workshop were to ensure that staff within the wider nuclear industry understand the work that the NDA’s RWMD does, how it can be of benefit to them and to provide updates on recent work to help them engage on future work.

This report records the key discussion points made at the workshop. Comments are not attributed. Copies of the presentations used are included in Annex 1.

3 Welcome and introductions

John Dalton (Stakeholder Engagement Advisor, RMWD) as Chairperson for the event, welcomed everyone to the workshop, and thanked them for their attendance. He reminded everyone of the aims and objectives of the workshop, explained the agenda and said that a report would be produced. See Annex 1 for copies of the slides used.

Alun Ellis (Science and Technology Director, RWMD) gave an update on the ‘Managing Radioactive Waste Safely’ site selection process, recent government decisions on higher activity waste management, and recent public feedback.

Alun confirmed that the RWMD mission was twofold:

1. To deliver a geological disposal facility (GDF)\(^2\) and
2. To deliver waste management solutions.

He also explained that RWMD will be set up as a wholly owned subsidiary of the NDA on 1 April 2014, which may result in a change in name. The organisation will largely retain the same staff and way of working. A new Waste Management Director has been appointed, who will be responsible for RWMD’s disposability assessment and Upstream Optioneering work and for identifying opportunities for RWMD to make a broader contribution to HAW management.

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\(^1\) [https://www.nda.gov.uk/stakeholders/newsletter/upstream-optioneering-workshop-success.cfm](https://www.nda.gov.uk/stakeholders/newsletter/upstream-optioneering-workshop-success.cfm)

4 Morning session

4.1 Disposability assessment

Simon Wisbey (Head of Packaging Assessment, RWMD) confirmed Alun’s message that RWMD is keen to work with waste owners and that early and sustained engagement between site licence companies (SLCs) and RWMD would support the delivery of waste management solutions (see A.2 Disposability assessment). RWMD provides guidance and support with a range of activities, including options studies.

Work to date has focused on higher-activity, more challenging waste, and Simon confirmed that in the UK much of this waste has been through or is currently within the disposability assessment process. He also confirmed the availability of an efficient route to gaining a final stage Letter of Compliance (LoC), if the waste package fits within the defined envelope of an endorsed waste package description. Once a LoC has been issued, this will be periodically reviewed (every ~10 years) in the period up to disposal of the waste package.

4.2 Upstream Optioneering

Ciara Walsh (Project Manager Upstream Optioneering, RWMD) gave an overview of the Upstream Optioneering project, and presented some examples of recent work (see A.3 Upstream Optioneering).

Ciara confirmed that RWMD has been able to share information provided as part of the disposability assessment process between waste producers, but that specific approvals have had to be obtained to support this in the past to avoid commercial sensitivities. The NDA strongly encourages information sharing between its sites, and learning from disposability assessments is included.

Upstream Optioneering also provides good opportunities for RWMD to work with non-NDA waste producers. No charge is made by RWMD for support provided through Upstream Optioneering project or early/sustained engagement with the RWMD Packaging team.

4.3 Change control

Amy Young (Disposal System Specification Manager, RWMD) presented the process of ‘change control’ within RWMD (see A.4 Issues management and change control). This process allows the RWMD technical baseline to be changed in an integrated, structured manner which ensures plans remain consistent and robust. Having this process in place enables RWMD to support the development of optimal waste management solutions by working with waste producers, rather than constraining them to deliver solutions which fit within the current plans for the GDF.

For example, recently the package drop height was reduced from 25m to 11m, and now waste packages are assessed against the lower height in the disposability assessment process. Reduced conservatisms might reduce the need for additional R&D; it was noted that waste packaging plans are unlikely to pass or fail on the basis of one criterion, but it was confirmed that RWMD does not keep a list of why proposals have failed to be endorsed, so it is not easy to say which proposals have been rejected that may now be accepted. The need to communicate changes to the RWMD technical baseline with stakeholders was highlighted during discussion.

The duration of the RWMD change control process for a new and significant change could take 6-12 months; historically, changes have taken longer to approve and RWMD is
working on more efficient evaluations and developing a schedule to manage increased numbers of change requests.

A question was raised about plans to speed up the change control process, and if the process had become faster over time. It was confirmed that changes are now going through quicker than before, and that the change control process was improving over time.

4.4 Issues management

Lorraine McDermott (Disposal System Issues Manager, RWMD) described the system in place to capture issues raised by all external stakeholders (see A.4 Issues management and change control). The ‘issues register’ is publicly available on-line\(^3\), so stakeholders can see how issues are being dealt with and addressed. People can track their own ‘issue’ to ensure it is addressed in a satisfactory way. Actions raised on RWMD through the disposability assessment process are not included on the issues register, as this would duplicate the internal working system used by the Packaging Team.

The RWMD Technical Programme\(^4\) was published in September 2013; however, few attendees had seen it. Discussion was held on how to improve communication when reports like this are released. Awareness could be raised using NDA web alerts system or through articles in the “Insight” magazine. The waste producer representatives at the Waste Packaging Liaison Group Meeting may not have mechanisms for information transfer within their organisations.

The structure of the change management and issues management processes was welcomed, and it was explained that a small team manages each process, with support from the wider RWMD staff to evaluate issues or change requests. It was confirmed that although SLCs pay for disposability assessments, issues management and change control is paid for internally by RWMD.

4.5 Waste Package Database

Chris Naish (A Packaging Assessment Manager) gave a demonstration of the waste package database. It gives details of all Letter of Compliance assessments performed by RWMD, with an overview of the waste stream and package type. It is intended to help SLCs with future plans and proposals, to give more transparency on techniques that have been endorsed. This database will be sent out to all attendees.

5 Afternoon session

After lunch, two parallel discussion sessions were held to discuss specific topics with an Upstream Optioneering or disposability assessment focus. Attendees were able to choose which sessions to attend.

5.1 Upstream Optioneering

Within the Upstream Optioneering session, three topics were covered:

- Cost normalisation study.

\(^3\) http://www.nda.gov.uk/geological-disposal/issues/

• General update on Upstream Optioneering, focusing on potential future work areas.
• Orphan wastes.

5.1.1 Cost normalisation study

Elizabeth Kay (Project Controls Manager, RWMD) gave an overview of a recent project to create standardised costs for waste management (see A.5 Cost Normalisation Study). The resulting spreadsheet calculates a £/m³ of packaged waste for many management options. The tool is intended for use in high-level scenario planning, to help with business cases and to enable sites to compare their own costs with costs from other sites.

The tool is designed for strategic studies and option studies, not short-term planning. If the tool is used inappropriately, a lot of time could be wasted explaining differences from other cost calculations. These points highlight that this tool has definite limitations, and should be used by an 'intelligent user'.

Each site could have a tool ‘owner’ to ensure correct use and version control. An annual ‘get together’ for users would be good. As well as providing training and updates, information can be fed back on what decisions have been made using the tool. The spreadsheet could be peer reviewed by the estimating community within the nuclear industry.

Delegates were encouraged to ‘road test’ the tool.

The following additional points were raised during discussion:

• The NDA could use this tool to help judge business cases put forward by sites.
• Capital costs (e.g. building a waste store) can have a huge impact on the waste management cost per m³ of packaged waste. The capital expenditure is therefore kept in a separate tab on the spreadsheet, so can be added if needed. This capital expenditure will be site-specific, as it depends on existing site infrastructure.
• It was acknowledged that waste segregation costs can vary significantly depending on the waste stream and the method of characterisation and processing.
• For NDA sites, the NDA is absorbing the fixed price cost of building the GDF. Non-NDA sites will pay a proportion of these fixed price costs. There is a possibility that, if only marginal prices are used in cost calculations, disposal to the GDF could look more attractive than other alternatives. This could have a significant impact on Best Available Techniques (BAT) assessments.
• Caveats stated on the spreadsheet are extremely important. Assumptions used can make a significant difference to conclusions.

5.1.2 General update on Upstream Optioneering

Ciara Walsh gave some examples of projects that have been completed by the RWMD Upstream Optioneering team, and stated that there was currently only one more year planned for the project (see A.6 General Update on Upstream Optioneering). She asked for feedback on whether the project was useful, if it should stop after next year, if it should continue with a similar remit, or if the scope should be expanded.

There was a perception that Upstream Optioneering should not just be a project with a fixed term, it should be a cultural and behavioural change at RWMD. It should ensure continuous improvement at RWMD, which will help interactions between RWMD and SLCs.
The distinction between the Upstream Optioneering team and the Packaging Assessment team at RWMD was not significant to SLCs, but the interaction between the SLC and RWMD was.

The critical success factors for the Upstream Optioneering project were discussed. It was agreed that a culture change in how SLCs and RWMD work together would be a major success, but that this was not currently measured.

Secondments of people from RWMD into site project teams could improve communication and understanding. Secondments of staff from sites to RWMD may also be of benefit.

Ideas for how to identify new opportunities for inclusion in the Upstream Optioneering work programme were discussed. NDA SLCs deliver their Technical Baseline underpinning Research and Development (TBuRD) every March, and this could provide a good time for engagement between SLCs and RWMD. One potential opportunity that should be identified was supercompaction.

Assumptions used by safety case authors, engineers and operators at sites should be consistent to those used by RWMD. For example, different release fraction and inventory data is sometimes used by RWMD and waste producers, which leads to different conclusions being drawn.

The Upstream Optioneering team could get involved with RWMD site audits, which could improve engagement with sites.

The RWMD communication strategy was not clear to waste producers. For example, Upstream Optioneering updates are published infrequently on the NDA website and only one person in the room had signed up to the NDA web alerts. Therefore, currently attendees did not know when to check the website for updates. It was concluded that, after today, people are more likely to pick up the phone and speak to someone at RWMD.

5.1.3 Orphan wastes

Matt Buckley (Upstream Optioneering Engineer, RWMD) presented a project that has been completed on the optimised management of orphan wastes. He discussed the main conclusions and recommendations of the work and how these could be implemented (see A.7 Orphan wastes).

A question was raised on the acceptability of a very small quantity or orphan waste being packaged in a less robust wasteform, if it was the BAT. It was agreed that good engagement should provide a solution that is acceptable for operations as well as for disposability. An example of mercury-contaminated waste was given, where RWMD are currently looking at the impacts of disposing of untreated and simply-treated mercury-contaminated wastes. This is also being done for decontamination agents. Both pieces of work could potentially help make a case for not treating low volumes of ‘hard to treat’ waste.

In order to prioritise which orphan wastes need a more immediate management solution, more engagement with sites is needed. Some orphans will not need to be dealt with for many years. After more engagement with sites, a business case could be made for the treatment of some orphans.

It was agreed that RWMD should be involved in providing credible options for orphan waste treatment. The NDA would need to take the lead on the potential sharing of treatment facilities, and the potential for some waste to be treated by a different site. INS has
developed a brochure for transport containers. This details containers that are suitable for the transport of raw waste. Many 'Type B' transport containers could be used.

5.2 Disposability assessment

Within the disposability assessment session, three topics were covered:

- Recent endorsements by the RWMD Packaging Team;
- Requirements, guidance and approaches to records management and
- Experience of early engagement between the RWMD Packaging Team and waste producers.

5.2.1 Recent endorsements by the RWMD Packaging Team

Andy Harris (Senior Packaging Assessment Manager, RWMD) provided examples of innovative waste packaging proposals received by RWMD, described a new procedure developed to facilitate assessment of these proposals and the links to RWMD’s change management process (see A.8 Update on recent endorsements). Examples given included the use of ductile cast iron containers (DCICs), flexible disposal bags, TruShield containers and 6m³ concrete boxes.

Attendees were asked to suggest other innovations that RWMD should address and discussions included:

- Innovations in wasteform, such as use of non-immobilised waste, vitrified or ceramic wasteforms for intermediate level wastes (ILW), are currently being assessed by RWMD.
- Innovations in Geological Disposal Facility (GDF) design are being addressed within an integrated project on disposal concept development, which includes a range of innovative disposal concepts. Examples include the use of multi-purpose containers for storage, transport and/or disposal, and the use of silos rather than vaults for disposal of ILW.
- Innovations in the GDF safety case were requested, to reduce constraints on free water, voidage or drop heights that are placed on waste packages. It was noted that:
  - Drop heights have recently been reduced by RWMD.
  - Work is currently ongoing to develop better underpinned voidage requirements; however, these are likely to be dependent on the geological environment in which a GDF is sited and so the most constraining requirements will need to be adopted until a site is selected.
  - Assessments have moved from specifying "no free liquids within a waste package" to asking whether the presence of liquids affects the package and disposal system performance. The amount of free liquids that can be accommodated within the facility is likely to be site-specific and design-specific.
- The inclusion of a “hospital wing” for non-conforming packages within the GDF was suggested, as an alternative to package reworking. RWMD has recognised that selective emplacement may provide benefit for the management of certain packages. A list of issues, such as handling features for a specific container type or the need to emplace similar packages to reduce criticality risks, will be taken
through change control. Overpacking could also be used to address unexpected evolution of a waste package.

- It was emphasised that a holistic view of the waste management lifecycle, developed collaboratively by waste producers and RWMD, using best available techniques/ best practical environmental options (BAT/BPEO) assessments, disposability assessments and radioactive waste management cases (RWMCs), would help to justify waste processing decisions involving innovative proposals that avoid incurring real doses now to prevent hypothetical future doses.

- Use of existing transport flasks to dispose of high level waste (HLW) was proposed; such flasks hold up to 28 waste containers. RWMD considers that SLCs are responsible for design of compliant transport packages, to meet all applicable regulations, but encourage discussion with RWMD team developing smaller multi-purpose containers for HLW and with the container manufacturers.

5.2.2 Records management

Jon Shatwell (Packaging Assessment Manager, RWMD) described the development of waste package records and the need for access to them over an extended time period. He gave an overview of current requirements, guidance and initiatives to improve records management approaches, including development of a community of practise (see A.9 Records management). RWMD guidance on records management is being revised in the next few months to reflect the range of waste package types in use.

Attendees were asked to share their current approach to waste package records, including ownership, storage, maintenance and updating, and to request any additional guidance needs.

A recent trial by an SLC to assemble records for historical waste packages identified the following lessons:

- The same records are not needed for package production and disposal.
- Explanatory information is needed to place the records into context and provide instructions for use of the records, explaining why each document was retained.
- Existing guidance does not specify which records need to be kept (instead 17 classes of data are specified), but it would be useful for RWMD to identify information that will be needed; however, this is likely to be dependent on the waste. It was agreed that it may be useful to discuss the content of package records with RWMD before waste packages are produced.

Various IT platforms and databases are being used to develop and organise waste package records, site historical records and campaign records and databases at different SLCs. This diversity should be captured as an issue by NDA and the use of standardised IT systems considered in future. Within the current system, the need to retain the capability for migration and compatibility with PDF-A file formats was emphasised.

Martin Robb, the NDA Information Governance Manager, described the new national programme to meet the challenge of managing historical waste package records and the role of the National Nuclear Archive, due to open in 2016, as a library for records. Waste package records will be retained in three formats (paper/electronic/microfiche), but need to be indexed and rationalised. Incentives to encourage SLCs to develop waste package records include making this a high-profile activity at director level across the SLCs, with regular reporting of progress to the NDA Board and DECC. If records are not available to
support assessment of a waste package against the GDF Waste Acceptance Criteria, it may be necessary to sample or repackage the waste.

5.2.3 Early engagement

Chris Naish (Packaging Assessment Manager, RWMD) explained that the RWMD Packaging Team has been encouraging early and sustained engagement with waste producers to support the disposability assessment process, which is available at no charge to waste producers (see A.10 Benefits of early engagement). A 6m³ reinforced concrete waste package user group was formed to discuss issues that RWMD had identified with waste producers who were considering use of these waste packages. This group developed a coordinated approach to addressing these issues.

A database of existing disposability assessment submissions has been developed as a tool to assist waste producers in identifying opportunities for early engagement with the RWMD Packaging Team, to access previous experience and historical information for a similar waste or package type. This database was demonstrated at the workshop (see record of morning session) and will be distributed to all attendees at the meeting. Feedback on usability and usefulness is requested. It is not intended to drive waste producers to propose that waste is packaged in the same way as a similar waste at a different site.

Positive examples of early engagement with the RWMD Packaging Team were given by attendees. Packaging team members have supported BAT studies at waste packaging plants, aiding decision making, reviewed drop-testing and modelling work, and provided appropriately-caveated written advice to support regulatory approval to start up a waste packaging plant. It was noted that RWMD advice is well-regarded by regulators, but it is helpful to SLCs to have written statements, rather than meeting minutes.

It is noted that early/sustained engagement is not a step in the process, but a tool to assist in the development of disposability assessments of waste packages, so RWMD would be as happy to discuss R&D programme development following a conceptual Letter of Compliance (LoC) assessment, or at any other time.

Several projects at one SLC did not consider obtaining RWMD input into BAT/BPEO studies, and may have missed opportunities as a result. RWMD volunteered to visit sites to raise awareness of the disposability assessment process and early engagement at a project level, without cost to the SLC. RWMD could be engaged at a very early stage in projects, for example in developing plans for a sampling campaign using a Data Quality Objectives (DQO) approach.

The need to distinguish between engagement and assessment was raised. RWMD review of draft documents and use of issues resolution strategies to close out action points helped to move towards a successful LoC submission for an innovative packaging approach with a very challenging waste, including fissile limits through challenges to assumptions, but both RWMD and waste producers need to identify the appropriate point to prepare a submission for formal assessment.

The cost of disposability assessments for NDA-owned SLCs was queried by attendees, as raising funding can cause delays in starting assessments. An assessment should only start when a contract is in place, so payment is guaranteed. It was noted that the commercial strategy for the NDA subsidiary company was currently being developed. One attendee explained that an SLC purchase requisition was sufficient to provide confidence that payment would be forthcoming, to avoid delays. Other SLCs have placed enabling contracts with RWMD.
A. Annex 1 – Presentations given at the workshop

This Annex contains copies of the presentations given at the workshop:

A.1 Welcome and introductions
A.2 Disposability assessment
A.3 Upstream Optioneering
A.4 Issues management and change control
A.5 Cost normalisation study
A.6 General update on Upstream Optioneering
A.7 Orphan waste
A.8 Update on recent endorsements
A.9 Records management
A.10 Benefits of early engagement
A.1 Welcome and introduction

Optimised management of higher activity waste workshop

19 February 2014

Objectives for the day

- Aims
  - To ensure that staff within the wider nuclear industry understand the work that the NDA’s RWMD does, how it can be of benefit to them and to provide updates on recent work to help them engage on future work

- Objectives
  - To raise awareness of RWMD’s work that is relevant to the wider nuclear industry
  - To work in conjunction with the waste owners to understand the wider benefits that can be delivered in working together.

Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>09.30</td>
<td>Refreshments</td>
</tr>
<tr>
<td>10.00</td>
<td>Welcome and introductions</td>
</tr>
<tr>
<td>10.10</td>
<td>Introduction to the event</td>
</tr>
<tr>
<td>10.35</td>
<td>Disposability assessment</td>
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<tr>
<td>11.00</td>
<td>Upstream optioneering</td>
</tr>
<tr>
<td>11.25</td>
<td>Change control and issues management</td>
</tr>
<tr>
<td>11.55</td>
<td>Conclusion of morning session</td>
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<tr>
<td>12.15</td>
<td>Buffet lunch and networking session</td>
</tr>
<tr>
<td>13.00</td>
<td>Two parallel discussion sessions</td>
</tr>
<tr>
<td>13.25</td>
<td>Plenary feedback</td>
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<tr>
<td>16.00</td>
<td>Close of workshop</td>
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</table>

Two parallel discussion sessions

- Two parallel sessions, thus need to keep to time

Mayflower Room | XIX Room

Upstream optioneering focus | Disposability assessment focus
13.05 Cost normalisation Update on recent endorsements
13.30 General update on UO Records management
14.35 Orphan wastes Benefits of early engagement

A.2 Disposability assessment

Packaging Assessments – Current Trends

Simon Wisbey
Head of Packaging Assessment
RWMD Harwell

February 2014

UK radioactive wastes

The problem:

- Historic wastes from the 1950s
- Geological disposal still decades away
- Need to improve safety

Key questions:

- What should be done?
- How do we protect the investment?
- Is the evolved product suitable for disposal?

The solution:

- Disposability assessment and endorsement
Developing geological disposal

- RWMD remit to deliver a geological disposal facility and provide waste management solutions:
  - engage with government and communities to identify a site for the facility
  - develop the specification, design, safety case and environmental and sustainability assessments and obtain regulatory support
  - work with waste producers to optimise the management of higher activity waste
  - deliver a focused R&D programme to support geological disposal and optimised packaging solutions

Geological Disposal Facility

RWMD baseline programme

Stages of waste management

Disposability assessment process
History of responses …

Bad old days: ‘NO, because …’

More recently: ‘Yes, if …’

Going forward: ‘Let’s talk about it …’

Early and sustained engagement

We can see the big picture, so …

- Let us help you:
  - Consider alternatives
  - Make use of previous work
  - Prepare submissions
- Draw on the experience:
  - Set up a contact group
  - Invite us to brief new staff
  - We are here for the long haul

Managing innovation

- NDA encourages innovation:
  - RWMD works with waste owners to facilitate innovation
  - deliver optimum solutions and value for money
- When faced with innovative proposals we ask:
  - ‘could we …?’ (technical assessment of disposability)
  - ‘should we …?’ (overall net benefit from a change)
- Application of disposal system change control process

Packaging assessment products

A range of services:

- Options studies
- ‘Single issue’ assessments
- Periodic review

Pick up a leaflet

Key roles for PA and UO

How RWMD can help with practical waste management:

Pick up a leaflet

What’s new

- Re-work of guidance:
  - Guide to the Disposability Assessment process (WPS/650)
  - How to make a submission (WPS/908)
- New RWMD procedures to cover:
  - Innovative proposals: easing the process
  - Periodic review: clarifying responsibilities
  - Technical audit: setting the scope
### Progress to date – by volume

ILW in LoC process by conditioned volume (379,000 m³)

- Packaged ILW with Final LoC: 5%
- ILW with Final LoC, awaiting packaging: 23%
- ILW within process (no Final LoC): 21%
- ILW not covered by advice: 22%
- Commercial reactor final stage decommissioning: 7%
- Other: 5%

### Progress to date – by activity

ILW in LoC process by A2 multiples (6.52E+07 A2 multiples)

- Packaged ILW with Final LoC: 5%
- ILW with Final LoC, awaiting packaging: 23%
- ILW within process (no Final LoC): 21%
- ILW not covered by advice: 22%
- Commercial reactor final stage decommissioning: 7%
- Other: 5%

### Coverage – further examples

<table>
<thead>
<tr>
<th>Category</th>
<th>Final LoC</th>
<th>In process</th>
<th>Not in process</th>
</tr>
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<tbody>
<tr>
<td>Sellafield (ILW)</td>
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<td>23</td>
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<td>Magnox (ILW)</td>
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<tr>
<td>Scotland</td>
<td>1</td>
<td>7</td>
<td>92</td>
</tr>
</tbody>
</table>

### The need for records

- Records are needed:
  - To demonstrate compliance with regulatory requirements
  - To help protect workers and public
  - To support the Waste Acceptance process
  - To meet our obligations to future generations

- Key issues for records:
  - Scope and content
  - Metadata (provides context and necessary evidence)
  - Choice of media
  - Maintenance and updating

### Summary and conclusion

**Packaging Assessment – 30 years and counting:**

- **Key focus:**
  - Improved process: early engagement
  - Dealing with innovation: open for business
  - Records: key to disposability

- **Afternoon sessions:**
  - Introductory slides
  - Questions for discussion
A.3 Upstream optioneering

Upstream Optioneering

Ciara Walsh
Project Manager Upstream Optioneering

Why is this work needed?

- Historic assumptions/perceptions around requirements for disposal and ‘quasi-regulator’ approach
- Conservatisms in packaging requirements that present challenges to waste producers (financial, technical etc)
- Lack of communication regarding disposability across the industry
- Potentially wasted effort with SLCs repeating work that has already been completed across the industry, and that has already been assessed through the disposability assessment process

Current study: disposability of decontamination agents?

- Range of chemical products that could help optimise decommissioning:
  - Decontamination agents
  - Strippable coatings
  - Fixatives
  - Expanding foams
  - Flocculants
- Are they disposable?
- Study complete. Deliverable is a Letter of Compliance submission
- Assessment due to start in January

Current study: disposability of sources?

- The aim of the work is to develop methods of packaging each type of source, so they are suitable for disposal.
  - Collate R+D, assessments etc already undertaken on a range of sources
  - Use the ‘orphans’ work to identify those sources not covered by an LoC
  - Develop novel packaging concepts for the sources so as to enable packaging for disposal without significant pre-treatment
- Deliverable is a Letter of Compliance submission to cover the range of sources across the estate, using conventional packaging approaches, and entombment approaches.

Waste life cycle

“In conjunction with other functions within RWMD and waste producers, identify and deliver solutions to optimise the management of Higher Activity Waste, including collaboration with NDA Strategy, NDA Programmes”

Culture change is happening

Historically:
Waste producers prepare waste management proposals-RWMD assess them. Potential for multiple iterations/cost/time.

Future:
Work together to produce proposals and waste treatment or management plans that lead to disposable waste packages.
Example opportunities

- Optimum packaging approach for disposal of decommissioning waste arisings
- Increased rate of waste emplacement at the GDF
- Decay store short-lived ILW to allow disposal to near surface facilities
- Use of superplasticisers in encapsulated waste packages
- Optimised management of orphan wastes
- Disposability of mercury wastes
- Waste hierarchy at what cost (size reduction)?

See hand-outs of project summaries and the recent update on the Upstream Optioneering progress.

Key work areas

- Studies on specific opportunities identified by the industry
  - 3 year programme of work
- Technical analysis and advice to NDA Strategy
  - Specific enabling studies to inform strategy development
- Support to waste producers when preparing waste management proposals for wastes requiring geological disposal
  - Working together to maximise potential of developing disposable waste solutions

Work programme

Three year programme has been developed

- Phase 3: Delivery of opportunities
  - Now into year 2 of a 3 year programme
- What next?
  - Stop the project and reallocate resources
  - Continue as now with current scope
  - Increase scope of project
- Discussion session this afternoon (General update on UO) – all inputs welcome

Technical analysis and advice to NDA Strategy

Complete:

- Review of baseline for core graphite wastes
- Scoping study on optimised management of HLW
- Management of orphan wastes (discussion later)
- Higher Activity Waste cost norms (discussion later)

Ongoing:

- Wastes at boundary of ILW and LLW
- Export rates of ILW to GDF - benefits of increased emplacement rate
- Feasibility of the use of mobile plant across the industry

Support to waste producers: Sellafield Waste Treatment Complex

Example of work undertaken with Waste Treatment Complex at Sellafield (plant to treat plutonium contaminated wastes and package for disposal)

- Existing situation
  - Significant number of feed drums not covered by existing Letter of Compliance (issued in late 1990s)
  - Significant effort required to identify and retrieve feed drums that could be processed

Direct support to waste producers: Sellafield Waste Treatment Complex

- The outcome
  - A disposability assessment submission document that benefited from close working
  - A disposability assessment which concluded that more wastes could be processed.
  - To date this has allowed a greater range of feed drums to be considered within the plant feed envelope, allowing in the interim several thousand more drums to be sent forward for processing.
  - This allows:
    - more efficient transfer of drums from the store to WTC
    - reduced dose uptake to operators
    - ultimately moves towards further hazard reduction on the Sellafield site, one of the key strategic drivers of the NDA.
A4. Change control and issues management

RWMD Change Control and Issues Management

Optimised Management of Higher Activity Waste Workshop

Amy Young, Disposal System Specification Manager
Lorraine McDermott, Disposal System Issues Manager
19 February 2014 RWMD

Overview

• RWMD’s Technical Baseline
• Disposal System Change Management Procedure
• Sources of Change Requests
• Example Change Request

• RWMD’s Technical Baseline
• Disposal System Change Management Procedure
• Sources of Change Requests
• Example Change Request

• Aims of the issues management process
• Issues register - Improvements to the process
• Technical Programme - overall process for technical work programme identification and delivery

RWMD’s Technical Baseline

• RWMD has produced and published a suite of documents which record the technical baseline for the current stage of the GDF implementation programme.
• Basis for making key decisions and providing information and advice to NDA, Government and Waste Producers.

Disposal System Change Management Procedure - RWPR40

• Provide a robust and consistent basis to support decision making.
• RWPR40 provides a framework for raising, categorising, evaluating and implementing proposed changes.
• The documentation produced as a part of the procedure then forms a robust audit trail.
• The impacts of a change are assessed against the range of potential geological settings and range of geological disposal concepts.

Sources of Change Requests

• Change in regulations – e.g. 2012 IAEA Transport Regulations
• Update to the UK RWI – e.g. the 2013 UK RWI
• Capturing the outputs of RWMD’s technical work programme – e.g. Reduction in pessimisms in the Operation Safety Case and addressing stakeholder’s Issues e.g. Waste Packagers
• Capturing the outputs of the Disposability Assessment Process – e.g. introduction of a novel waste container
• Realising the opportunities identified by Upstream Optioneering e.g. Vitrified ILW
Example Change Request

Reduction in pessimisms in the UILW waste package impact drop heights

- The bounding release fraction used in the generic Operational Safety Case was derived for a waste package from a height of 75m.
- A change request was raised to revise the impact accident conditions to:
  - Drop onto a flat unyielding target from a height of 11m
  - Drop onto an aggressive target from a height of 10m
- Change was evaluated and approved for implementation via RWPR40

Making Improvements to RWPR40

- Updated Disposal System Change Management Procedure launched in March 2013
- Change Control Improvements Plan
  - A more efficient procedure ensures the work of our ongoing Technical Programme is fed back into the Technical Baseline

Aims of the issues management process

- Capture externally raised issues or concerns
- Provide opportunity for all who take an interest to provide input on our approach and influence our work programme
- Seek to ensure our approach is open and transparent
- Evolve the issues management process to ensure it meets the needs of our stakeholders

Definition

- Issue - We use the term ‘issue’ to mean any challenge or concern that is raised externally that could affect the implementation of a geological disposal system. They can be scientific, technical or environmental in their nature, although they may also be economic, social or ethical.

Issues register

- Online interface for all users available from March 2013
- Filter and browse options updated in August to improve search functionality
- Feedback from stakeholders encouraged

Summary of issues management process

1. Capturing issues raised
2. Grouping issues into topics and recording on the issues register
3. Issue evaluation
4. Reporting and monitoring planned work to address issues
5. Periodic update of the issues register and evaluation responses

Tracking progress

To assist in monitoring the status of each issue and the reporting on progress to our stakeholders, we use a flagging system

- One of the following flags is assigned to each issue
  - Active: Work is ongoing to address this issue
  - Active: Work is planned for future phases of our work programme to address this issue
  - Active: Work to address this issue is under review
  - Non-active: Work to address this issue is complete
  - Non-active: No work is planned to address this issue
The Technical Programme presents a comprehensive view of RWMD’s work programme in a style that is designed to be accessible and informative to both internal and external stakeholders.

- RWMD’s principal objective in publishing the Technical Programme is to ensure that all of its stakeholders have a reference document that describes in clear language:
  - The work which is being undertaken by RWMD as part of the Technical Programme
  - The structure and scope of the work programme
  - The key outputs produced
- Continuous process under development and we would welcome feedback.

Version 1 published October 2013

The hierarchical structure of the Technical Programme document

- Includes our work to address issues
- Functionality update to the issues register expected March/April 2014 which will include hyperlinks

Programme development & delivery

Thank you

Questions and feedback:
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amy.young@nda.gov.uk
samantha.king@nda.gov.uk

RWMD Issues register
http://www.nda.gov.uk/geological-disposal/issues/

Technical programme
**Afternoon sessions**

In the afternoon there were two parallel streams; upstream optioneering and disposability assessment, each with three discussion sessions. The slides that were used to stimulate discussion can be found below:

**Upstream optioneering**

**A.5 Cost normalisation**

<table>
<thead>
<tr>
<th><strong>Upstream Optioneering</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Higher Activity Waste Cost Norms</strong></td>
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<table>
<thead>
<tr>
<th><strong>Cost Norms Overview</strong></th>
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</thead>
<tbody>
<tr>
<td>• Cost normalisation involves taking derived cost data and adjusting it to a uniform basis (e.g., £ per m$^3$ waste)</td>
</tr>
<tr>
<td>• Purpose of HAW Cost Norms</td>
</tr>
<tr>
<td>• Caveats</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Benefits of Cost Norms</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Consistent norms for use in ILW management across the NDA estate</td>
</tr>
<tr>
<td>• Tools for NDA/RWMD and waste producers to explore ILW management opportunities in greater detail</td>
</tr>
<tr>
<td>• Centralisation and update of cost information</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Objectives and Scope</strong></th>
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</thead>
<tbody>
<tr>
<td>• Development of consistent cost norms across a range of waste management activities and scenarios, covering key stages of the waste management lifecycle</td>
</tr>
<tr>
<td>• Waste types currently included</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Exclusions to the Work Scope</strong></th>
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<tbody>
<tr>
<td>• ILW only</td>
</tr>
<tr>
<td>• Limited to normal activities, no special conditions</td>
</tr>
<tr>
<td>• Exclude any decontamination activities</td>
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<thead>
<tr>
<th><strong>Discussion Topics</strong></th>
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</thead>
<tbody>
<tr>
<td>• Uses of the Cost Norms</td>
</tr>
<tr>
<td>• Nominated &quot;intelligent user&quot; at SLCs</td>
</tr>
<tr>
<td>• Cost norms community</td>
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</tbody>
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19
A.6 General update on upstream optioneering

General update on Upstream Optioneering

Ciara Walsh
Project Manager Upstream Optioneering

What next?

- How might we better use the current resource?
- Is such a resource needed in the future?
- What else could we do?
- Based on today, are you more likely to pick up the phone to seek our assistance?
- How better might we communicate our work?

3 year programme

- In year two of a three year programme
- Opportunities can be grouped as follows:
  - Access to tools and information
    - Cost norms
    - Diquest
    - LoC database
    - Decommissioning waste packaging approaches

3 year programme

- Opportunities can be grouped as follows (continued)
  - Strategic studies
    - Core graphite management
    - ILW/LLW boundary waste study
    - Orphan waste management
    - Scoping study into options for HLW management
    - Mobile treatment/characterisation plant
    - Waste hierarchy at what cost (size reduction)?

3 year programme

- Opportunities can be grouped as follows (continued)
  - Enabling studies
    - Neutron poisons
    - Decontamination agents
    - Superplasticisers
    - Larger size transport containers
    - Disposal of sealed sources

Reactive work

Our role in supporting NDA strategy and waste producers

- Support in developing waste management strategies
- Decision tree and ‘risk matrix’, avoidable vs unavoidable waste
- Engagement with the industry
- Identification of relevant Research and Development for waste types

Support to developing packaging assessment for Disposition Assessment

- Identification of key waste streams associated with the proposed packaging processes to assist risk assessment
- Identification of constraints that may inhibit the use of the waste packaging system
- Identification of any issues associated with the waste packaging system

Waste Packaging Specifications

- Identification of gaps in existing solutions
- Identification of key barriers to waste management
- Identification of key drivers for waste management

This list is not exhaustive. Each query will be considered on its merits and waste producers are encouraged to discuss their requirements with the team.
Reactive work

- Why is there benefit in Upstream Optioneering staff and Packaging Assessment staff both attend the same optioneering/BAT meeting?
  - PAM: What might be needed to demonstrate compliance with current concept, design assumptions, current requirements, with a view on predictable changes in the future.
  - UO: What might be needed to demonstrate compliance if RWMD assumptions were changed / what opportunities might exist with enabling work.

So what next?

- How might we better use the current resource?
- Is such a resource needed in the future?
- What else could we do?
- Based on today, are you more likely to pick up the phone to seek our assistance?
- How better might we communicate our work?

A.7 Orphan wastes

Upstream Optioneering

Optimised Management of Orphan Wastes

Discussion Group

Matt Buckley
19th February 2014

Introduction - Opportunity #64

- Wastes requiring additional treatment (WRATs) or without a defined treatment or disposal route.
- Orphans – unknown provenance
  - Too different – Beyond process capability
  - Low Priority – ‘Small volume’ decom. waste
  - High Hazard – Chemical, Radiological
  - Expense – Beyond funding and not Critical Path

Objective

- Inventory & Justification
- Identification of available routes/technologies
- “Coordinated approach” could mean
  - Wider use of existing LoCs,
  - Knowledge sharing (Technology or Documentation),
  - For specific streams, development of lead sites, use of shared or mobile facilities.

Main Tasks

- Inventory data from SLC-led studies
- Survey of SLCs and non-NDA waste producers
- Technology Survey
- Database, Report, Wiring Diagrams, Technology Tables & Matrix of waste vs. technology
Outcomes & Plans

• Challenging CfA
• WIMS
• Disposability assessment for some ‘orphan’ categories
• Develop and implement Programme Approach

Discussion Topics

• Prioritisation
• Implementation

Disposability assessment

A.8 Update on recent endorsements
Update on Recent Assessments

Dr Andy Harris
Senior Packaging Assessment Manager
RWMD Harwell
February 2014

Agenda

• Disposability Assessment process
  – Innovative packaging proposals
  – Links to Disposal System Change Management
• Examples of recent assessments
  – Innovative or not?
  – Why, and what are the issues?
• Summary
• Questions

Disposability Assessment Process

• Assessment against existing Disposal System Safety Case (DSSC) and Package Specifications
• Innovative packaging proposals are:
  – not covered by existing Package Specification; and/or,
  – not consistent with current safety case/arguments;
  – a source of uncertainty, complexity and/or research needs.
• Disposal of innovative packages incurs costs and dis-benefits (compared to alternatives)
  – need to understand balancing benefits to justify change
• Specific procedure now in place to analyse, prior to Disposability Assessment (RWPRSS)

Innovative Proposal Assessment

• Prior to Conceptual stage Disposability Assessment
• Identify key issues and obtain broad agreement as to means of and timescale for resolving
• Areas to be considered include:
  – GDF design changes and handling challenges
  – Complexity
  – Understanding of balance of costs and benefits
  – Applicability of safety cases/arguments
  – Knowledge gaps

Ductile Cast Iron Containers (i)

Ductile Cast Iron Containers (ii)
A.9 Records management

Waste Package Records

Jon Shatwell
Packaging Assessment Manager
19 February 2014

Is this a disposable package?
**Is this a disposable package?**

- **Final stage LoC Endorsement**
- **Periodic Review / LoC Endorsement**
- **Package Record, & metadata**

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**Development of the package record**

- **Lifetime development of Package Record**
- **GA**
- **Waste Pack**
- **Records**
- **Metadata**
- **Disposal**
- **Transport**
- **Damage**
- **Packaging**

---

**Current requirements and guidance**

- WPS/400: Specification for Waste Package Data and Information Recording Requirements

Other guidance is available:
- NDA Requirements Framework for Managing Information Relating to Radioactive Waste on NDA Sites
- Regulators (EA, ONR, Joint Guidance)

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**Current initiatives**

- **Waste Package Records Workshop (December 2013)**
  - NDA SLCs, EDFE, AWE, Culham:
    - Establishing the current position
    - Looking to the future
  - **ILW Records Trial (January 2014)**
    - RWMD, Sellafield Ltd and Regulators:
      - What records need to be kept
      - What supporting evidence needs to be kept
      - Quality issues
      - How to “recover” an adequate records set

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**Emerging Themes**

The workshop concluded:

- Information sources – use systems not individuals
- Proportionality – all packages are NOT the same
- Step-wise approach – explore time expiry of records
- Incentivisation – production and retention of records
- Platforms – long-term support to accessible records
- LFE – commitment to learn from other SLCs

A further meeting is planned for April 2014
Questions …

What is your current approach to package records? Their ownership? Their storage?

What problems/concerns do you have with producing complete package records? What about updating them?

How would you use a ‘community of practice’ in this area?

What additional guidance do you need?

A.10 Benefits of early engagement

Early Engagement

Dr Chris Naish
Packaging Assessment Manager
RWMD Harwell
February 2014

What is Early Engagement?

- Early and sustained dialogue between RWMD Packaging Assessment Team and SLC:
  - from the earliest point that waste recovery, treatment and packaging is considered
  - including the recovery, treatment and packing of wastes to reduce risk
  - ensure the widest advice is available and disposability is not compromised

Benefits of Early Engagement

- Reduce risk
- Reduce uncertainty
- Minimise cost
- Benefit from experience across the industry
- Timely awareness of packaging issues
- Timely awareness of implications of GDF developments
- Advice is free

Agenda

- What is early engagement?
- Benefits of early engagement
- Recent example of early engagement
  - 6m³ concrete box
- Waste Package Database – a tool to encourage early engagement
- Summary
- Questions
Recent Example of Early Engagement

6m$^3$ reinforced concrete box
- DSRL, RSRL and CCFE (JET) wish to use 6m$^3$ boxes to package a range of decommissioning wastes
- The Design Authority for the box, previously used for WAGR wastes at Sellafield had lapsed, a number of materials used in the manufacture were no longer available and IAEA Transport regulations have changed.
- RWMD convened a 6m$^3$ box group with invited interested parties from the SLCs and NDA experts, which met twice in the summer of 2013 and, having met its objectives, disbanded.
- Following these meetings, DSRL took on the Design Authority role and is leading on delivering a revised design and liaising on a regular basis with RSRL and CCFE, fully aware of the issues that RWMD will want to see addressed in an LoC submission.

Waste Package Database
- An NDA Direct Research Portfolio project managed by Amec with input from RWMD and waste producers, via the Nuclear Waste Research Forum’s WP&SWG.
- The aim of the database is:
  - To allow a waste producer to identify previous LoC submissions for a given category of waste and, required, package type by linking waste categories (as defined by NDA), package types and, where it exists, LoC advice references.
  - Facilitate identification of how wastes similar to those being considered have been packaged.
  - Acts as a tool to promote early engagement, encouraging the waste producer to discuss the issues raised in the existing LoC advice and how they may apply to the currently considered waste, with RWMD.

Summary
Early engagement benefits the waste producer and RWMD PAT by:
- Reducing risk
- Saving time and effort
- Reducing cost
- Allowing experience exchange across the NDA estate and the wider waste producer community
- Reducing LoC iterations and a higher proportion of submissions result in endorsement

Questions
- What is your experience of early engagement?
- How could we improve it?
- What is stopping you from getting involved?
Certificate No 4002929

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