



**Committee on Radioactive Waste Management**

**COMMITTEE ON RADIOACTIVE WASTE MANAGEMENT**

**EIGHTH ANNUAL REPORT  
2011-12**

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## **INTRODUCTION BY THE CHAIR**

This is the 2011-2012 Annual Report of the Committee on Radioactive Waste Management (CoRWM) to the Secretary of State for Energy and Climate Change, and the Environment Ministers of Scotland, Wales and Northern Ireland.

This is the eighth CoRWM Annual Report. It summarises CoRWM's scrutiny and advice for the financial year ending on 31 March 2012. It also contains the Committee's views on the status of arrangements and plans for the long-term management of higher activity radioactive wastes in the UK at June 2012.

This is the last report that I will be presenting to sponsors, since my term of office will end in October 2012. Over the five years since CoRWM was reconstituted in 2007, the Committee has provided sound, independent advice on the treatment, packaging, interim storage and geological disposal of higher activity wastes, and on the research and development associated with these subjects. The Government's recent Triennial Review of CoRWM showed that the Committee is valued by its stakeholders and concluded that it should continue as an advisory, non-departmental public body.

It has been a privilege for me to work with such a conscientious group of experienced, multi-talented colleagues, whose legal, scientific and technical appreciation has been surpassed only by their empathy for the public interest. All have given of their time and skill as generously as one could have hoped for. I would particularly like to thank Marion Hill for the unselfish way in which she has facilitated and augmented the work of every Committee Member and Tarsam Bains, our Acting Secretary, for his consummate and unstinting efforts on our behalf during a period of unprecedented austerity.

Finally, I would like to thank all those individuals and organisations that have freely interacted with CoRWM to help it to maintain its unique position as a trusted source of impartial information and a friend of last resort. These include concerned citizens; representatives of Campaigning Groups, Industry and Site Stakeholder Groups; and officials of Governments, Local Authorities, the Nuclear Decommissioning Authority and the Regulatory Bodies. All have worked closely and considerately with CoRWM to ensure that it could fulfil its public function in this very important area of national interest.



A handwritten signature in blue ink that reads "Robert Pickard". The signature is written in a cursive style with a large initial 'R'.

Robert Pickard  
25 June 2012

## **EXECUTIVE SUMMARY**

1. This is the eighth annual report of the Committee on Radioactive Waste Management (CoRWM ). The report describes how CoRWM works and summarises its activities during the financial year April 2011 to March 2012. It also gives CoRWM's current (June 2012) views on the status of UK plans and arrangements for the long-term management of higher activity radioactive wastes.

### ***CoRWM's Remit and How it Fulfils It***

2. CoRWM's remit is to provide independent scrutiny and advice on the long-term management of radioactive wastes. It focuses on higher activity wastes (HAW), *i.e.* intermediate level waste (ILW) and high level waste (HLW). Its work also includes waste-related aspects of the long-term management of spent nuclear fuels and nuclear materials.
3. The Committee scrutinises the work of Government and the Nuclear Decommissioning Authority (NDA) on all the steps necessary for the long-term management of HAW in the UK. These steps will typically include treatment, storage, transport and disposal. One of its main tasks is to scrutinise UK Government and NDA plans and programmes for geological disposal of HAW. It also scrutinises the work of the Scottish Government on developing and implementing its policy of near-surface, near-site storage and disposal of HAW. Much of the work that the Committee scrutinises is within the Government's Managing Radioactive Waste Safely (MRWS) programme.
4. CoRWM has a set of five guiding principles that it applies in its work. These principles are about:
  - openness and transparency
  - upholding the public interest
  - fairness
  - a safe and sustainable environment
  - working efficiently and effectively.
5. CoRWM carries out its scrutiny by holding meetings with NDA, Government officials, regulators and various groups of stakeholders, and by reviewing documents that these organisations produce. It visits one or more nuclear sites each year, where it sees radioactive waste management facilities, has discussions with site staff and holds a public meeting.
6. The Committee provides both formal and informal advice to Government. In the case of formal advice it usually consults its stakeholders to gather and check evidence, to inform itself of their views and to obtain their comments on its proposed advice. Such consultations are part of the public and stakeholder engagement (PSE) that CoRWM carries out to support its work programme. Members give informal advice verbally and in writing, not only to Government but also to NDA and others. Such advice is usually given without prior consultation because of the short timescale on which it is required. Experience has shown that there is more need for informal advice than for formal advice.

### ***Scrutiny and Advice on Treatment, Packaging, Storage and Transport***

7. CoRWM's work under the heading of waste treatment, packaging, storage and transport also covers waste-related aspects of the management of spent fuels, plutonium and uranic materials.

#### *NDA Work on Management of HAW*

8. In 2011-12, CoRWM continued its scrutiny of NDA's work to further develop its strategy for managing its HAW. This is part of NDA's integrated waste management strategy development programme. The Committee welcomed NDA's intention to produce strategic guidance for its Site Licence Companies (SLCs) on HAW treatment, storage and disposal. It was also pleased to see NDA taking a more strategic approach to the management of graphite wastes and starting to develop a national lifecycle management approach for alpha-contaminated HAW.
9. The Committee continued to take an interest in the production of Industry Guidance on the interim storage of HAW. This Guidance is sponsored by NDA but its production involves all HAW owners and producers. Regulators also take part as observers. Early in 2011-12, CoRWM commented informally on a draft of the first version of the Guidance. Towards the end of the year, it participated in a workshop about the second version of the Guidance, which will take into account the results of trial use of the first version by store operators and designers. CoRWM considers that the Industry Guidance project has been very successful so far and encourages NDA to adopt a formal approach to ensuring that its SLCs make use of the Guidance.
10. Throughout the year, CoRWM monitored progress in planning and preparing for retrieval of wastes and fuels from the Legacy Ponds and Silos at Sellafield, and for treating and packaging these wastes to make them suitable for interim storage and geological disposal. The Committee recognises the importance of retrieving the bulk of the wastes and fuels as soon as is practicable. It is also aware that it may be necessary to adopt less than optimal management methods in order to make progress with bulk retrievals.
11. At a meeting in March 2012, CoRWM was given a presentation on the Upstream Optioneering project being carried out by NDA's Radioactive Waste Management Directorate (RWMD)<sup>1</sup>. This is so-named because it involves RWMD looking upstream of a geological disposal facility (GDF) to enable optimisation of the management of HAW throughout its lifecycle. CoRWM considers that, to date, this has been a very useful and successful project and expects it to continue to be so. It is important that the results of the project are integrated into NDA's further development of its HAW strategy.
12. CoRWM saw a number of plants used for ILW management during its visit to Trawsfynydd in September 2011, including the new store for packaged ILW. The

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<sup>1</sup> CoRWM engages with various parts of NDA. These include RWMD, which carries out NDA's programme of work on geological disposal and is developing into NDA's delivery organisation for a geological disposal facility (or facilities if more than one is needed). Throughout the annual report, RWMD is referred to specifically where this is appropriate and the term NDA is used for the whole organisation or parts of it other than RWMD. This is consistent with NDA practice.

Committee was impressed by the innovative approaches to radioactive waste management at the site.

#### *NDA Strategies for Spent Fuels and Nuclear Materials*

13. CoRWM held two meetings with NDA to discuss its strategies for managing spent fuels and nuclear materials. NDA made major steps forward in 2011-12 in developing and implementing these strategies. These steps included publication of its Credible Options document for oxide fuels and exploration of contingencies for use if the capability to reprocess Magnox fuel is lost. They also included stakeholder engagement on options for Dounreay Fast Reactor (DFR) fuel and for Harwell exotic fuels, publication of summaries of stakeholder responses to consultations and announcement of decisions on preferred options for these fuels. In addition, NDA published its Credible Options paper for the remaining exotic fuels at Dounreay.

#### *Ministry of Defence*

14. While CoRWM does not scrutinise the Ministry of Defence (MOD), it keeps itself informed about MOD plans and activities, particularly its co-ordination with NDA. CoRWM held two meetings with MOD in 2011-12 and also commented informally on a draft of MOD's Nuclear Liabilities Management Strategy. One of the meetings was held at Rosyth and was preceded by a visit to a laid up submarine (HMS Resolution) and to the Active Waste Accumulation Facility (AWAF).

#### ***Scrutiny and Advice on Geological Disposal***

15. CoRWM scrutinises the Government-led work to carry out the process of establishing a GDF (the "MRWS process") and work by NDA (primarily RWMD) on the implementation of geological disposal.

#### *The MRWS Process*

16. During the year CoRWM attended, as an observer, two meetings of the Government's Geological Disposal Implementation Board (GDIB) and several meetings of the Geological Disposal Steering Group (GDSG). The Committee is of the view that GDIB and GDSG, and the production by the Department of Energy and Climate Change (DECC) of an annual report to Parliament on the MRWS programme, have improved the transparency and accountability of Government work on the implementation of geological disposal.

17. The Government invitation to communities to express an interest in entering, without commitment, discussions about the possibility of hosting a GDF remains open. Government continued to work throughout 2011-12 to increase awareness of the invitation. For example, DECC gave a presentation at NDA's national stakeholder event about the MRWS process and also gave presentations to several Site Stakeholder Groups (SSGs), at their request.

18. CoRWM continued its scrutiny of Government and NDA engagement in the MRWS process in West Cumbria, which is still the only area from which there have been Expressions of Interest about hosting a GDF. CoRWM attended meetings of the West

Cumbria MRWS Partnership as an observer, provided information to the Partnership on a number of topics and met the Partnership's Steering Group to obtain its views on the support it was receiving from Government and NDA.

19. The Committee's view is that, in the main, the Partnership received all the support it required from Government. However, there was some tension in the relationship between the Partnership and Government during the year. Overall, NDA provided good support to the Partnership's work but there were occasional difficulties with the quality and timeliness of NDA's responses to the Partnership's requests for information.
20. CoRWM commented informally on a number of drafts of the Government consultation document on the framework for desk-based identification and assessment of potential candidate sites for geological disposal (Stage 4 of the MRWS process). After publication of the consultation document, the Committee wrote to DECC reiterating its view that, without geophysical surveys in Stage 4, there is a risk that there will not be enough geological information to identify optimum combinations of sites for surface and underground parts of a GDF.
21. The final version of the framework document was published in 2012, with the Government response to the consultation. CoRWM remains of the view that the framework does not give enough emphasis to the geological and hydrogeological characteristics of potential GDF sites or to the likely need for geophysical surveys in Stage 4.

#### *Accelerating the Implementation of Geological Disposal*

22. In 2011, in response to a Ministerial request, RWMD carried out an assessment of options for accelerating the implementation of geological disposal. CoRWM scrutinised the RWMD work and provided formal advice to Government on the way forward.
23. The Committee expressed the view that it is not practicable or desirable to bring forward the current planning date of 2040 for the first emplacement of any wastes in a GDF. It stated that, rather than adopting a specific option to bring forward the 2040 date, it would be better to continue efforts to make the implementation of geological disposal as efficient as possible, consistent with technical, stakeholder and public needs.
24. However, CoRWM also advised Government that, in its view, there would be considerable advantages in bringing forward the 2075 planning date for first emplacement of HLW and legacy spent fuels and the 2130 planning date for first emplacement of new build spent fuels. It would also be worthwhile to shorten the emplacement programmes for HLW and all spent fuels.

#### *Generic Disposal System Safety Case*

25. At the request of DECC, CoRWM carried out an assessment of the RWMD suite of documents on its generic Disposal System Safety Case (gDSSC). The assessment also included three documents with which the gDSSC interfaces: the RWMD Technical Strategy, its Site Characterisation Status Report and its Site Characterisation Strategy.

26. CoRWM concluded that the gDSSC shows that, in most of the relevant technical areas, RWMD's underpinning knowledge is sufficiently comprehensive for the current stage of its work. The principal exceptions are in the areas of the characteristics and evolution of geological barriers and groundwater movement, where it appears that RWMD's understanding and ability to use knowledge will need to be increased before any site specific DSSC has to be produced. However, the Committee believes that it will be straightforward for RWMD to make any improvements that are required. On research and development (R&D), the Committee concluded that RWMD has, or will have, appropriate processes in place to fill gaps in its knowledge. CoRWM also concluded that, while RWMD's site characterisation strategy and plans are not yet comprehensive, they are developing in appropriate directions.

#### *Other RWMD Work*

27. Other areas of RWMD work that CoRWM scrutinised in 2011-12 included:

- its organisational development, including plans for RWMD to become a wholly-owned subsidiary of NDA
- its preparations for Stage 4 of the MRWS process
- its development of a process for selecting a geological disposal concept
- its approach to making assumptions about the inventory of wastes for geological disposal
- its Issues Management Process
- its development of a Strategic Environmental Assessment (SEA) for the geological disposal project.

#### ***Scrutiny and Advice on Scottish Government HAW Policy and Strategy***

28. In September 2011, CoRWM published its paper giving its views on the process used by Scottish Government to develop its HAW policy of near-surface, near-site storage and disposal. This covered Scottish Government work from the first statement of policy in 2007 to the publication of the policy document in January 2011.

29. Throughout 2011-12, CoRWM scrutinised Scottish Government's programme of work to develop a strategy to implement its HAW policy and provided advice. The Committee was an observer of meetings of the Project Board for development of the implementation strategy and a member of the Technical Advisory Group. It held update meetings with Scottish Government at which it provided informal advice.

#### ***Scrutiny and Advice on R&D***

30. In the first few months of 2011-12, CoRWM gave written and oral evidence to the House of Lords Select Committee on Science and Technology (HoLSTC) for its inquiry into UK nuclear R&D capabilities. Early in 2012, following the publication of the HoLSTC's report on its inquiry and the Government response to the recommendations in the report, CoRWM prepared a paper commenting on both the report and the response.

31. The paper was intended to provide input to further work by Government and the Government's Chief Scientific Advisor on capabilities for and coordination of nuclear

R&D. It built on one that CoRWM had prepared in the latter part of 2011 for the DECC Chief Scientific Advisor and contained comments about:

- the proposed Advisory Board for nuclear R&D
- the nuclear R&D roadmap
- facilities for research with highly radioactive materials
- co-ordination of R&D for the long-term management of HAW, spent fuels and nuclear materials
- skills.

32. CoRWM attended two meetings of the NDA Research Board, as an observer. It also met the Chair of the Research Board and the senior NDA R&D team to discuss issues arising from the Committee's paper for the DECC Chief Scientific Advisor.

33. CoRWM attended several meetings of the NDA-sponsored Nuclear Waste Research Forum (NWRWF), as an observer, and commented on proposed new terms of reference for NWRWF. The Committee also observed meetings of the RWMD's Research Advisory Panel. It attended the conference on science and technology for geological disposal that was held in Loughborough in October 2011. It continued to monitor the programmes of the Research Councils that are relevant to the long-term management of HAW, including geological disposal.

#### ***Scrutiny and Advice on Wastes from New Nuclear Power Stations***

34. CoRWM followed developments relevant to the management of new build wastes (spent fuels and ILW) and published papers summarising the information that it had obtained. It met the regulators' Generic Design Assessment (GDA) team to discuss progress on ILW and spent fuel management aspects of GDA and of licensing and permitting of the proposed new PWR station at Hinkley Point. The Committee continued to express the view that there is a need for a holistic optimisation of all the steps in the management of new build spent fuel, from arising through to and including geological disposal.

#### ***Scrutiny and Advice on Public and Stakeholder Engagement***

35. CoRWM monitored developments in the PSE of other organisations, particularly those related to the views the Committee expressed in its March 2011 position paper on PSE. It attended the NDA national stakeholder event and took note of NDA's plans for future general and topic-specific stakeholder engagement. In meetings with RWMD, CoRWM discussed planned PSE around the SEA and MRWS Stage 4. It commended RWMD for anticipating potential problems by developing a draft engagement and communications plan for use after any Decision to Participate.

36. The Committee observed the third round of PSE conducted by the West Cumbria MRWS Partnership (PSE3). One or more CoRWM members attended most of the PSE3 public events. They found that DECC and NDA made constructive inputs and provided information and assistance on factual matters.

### ***Status of UK Plans and Arrangements for Managing HAW***

37. The final section of the annual report contains CoRWM's comments on the current (June 2012) status of UK plans and arrangements for the management, including the disposal, of HAW. It also covers the management of those spent fuels and nuclear materials that may need to be dealt with as waste.
38. In its previous two annual reports, the Committee commented on various aspects of HAW management plans and arrangements without reference to particular milestones or timeframes. The approach this year is to comment in the context of the strategic position that the UK needs to reach by summer 2015. This date was chosen because it is the deadline for the first UK report to the European Commission on its national programme for the responsible and safe management of spent fuel and radioactive waste under Directive 2011/70/Euratom. It is also a time when NDA will be preparing to issue a consultation draft of its third Strategy, so that it can be agreed and published by the start of April 2016.
39. CoRWM takes the view that the best way for the UK to demonstrate compliance with the Directive would be to have in place clear strategies for the management of all its spent fuels and radioactive wastes, together with programmes of work to implement those strategies. NDA's strategies for the management of the spent fuels and radioactive wastes for which it is responsible will need to form the principal parts of these UK strategies. The Committee suggests that the following steps be taken to achieve this strategic position by summer 2015:
- develop a UK nuclear industry HAW strategy, including treatment, storage, packaging and disposal
  - bring together this HAW strategy, the UK nuclear industry low level waste (LLW) strategy and the UK strategy for radioactive discharges to produce a UK nuclear industry integrated waste strategy
  - improve integration of the geological disposal programme with nuclear industry plans for managing legacy and new build HAW, spent fuels and nuclear materials
  - ensure that sufficient R&D on the long-term management of legacy and new build HAW, spent fuels and nuclear materials is included in the UK nuclear R&D roadmap and that there are suitable arrangements in place for strategic co-ordination of this R&D and on-going assessment of its adequacy.
40. The Committee makes the following suggestions for work on geological disposal over the next three years:
- establish the methodology for dealing with uncertainties about geological conditions before the start of MRWS Stage 4 in any area that has made a Decision to Participate
  - plan for the expansion of the UK's R&D programme on geological disposal, on the basis that there will be a need for a larger RWMD-funded R&D programme and a complementary programme of independent research
  - make skills for implementing geological disposal part of the UK nuclear skills agenda

- ensure that best use is being and will be made of international knowledge, expertise and experience, taking account of NDA's success in doing this in other areas of its work.

41. Overall, CoRWM considers that, since the Committee was reconstituted in 2007, the UK has made substantial progress in developing plans and arrangements for the management of HAW, spent fuels and nuclear materials. Taking the actions that the Committee outlines would ensure that this progress is maintained and enable the UK to demonstrate readily that its national programme complies with the EU Directive when the time comes to do so in summer 2015.

## **1 INTRODUCTION**

- 1.1 This is the eighth Annual Report of the Committee on Radioactive Waste Management (CoRWM). It describes the Committee's work in the financial year from April 2011 to March 2012, summarises its 2012-13 work programme and outlines CoRWM's current (June 2012) views on the status of UK plans and arrangements for the long-term management of higher activity radioactive wastes.
- 1.2 CoRWM's remit is given in its Terms of Reference (Annex A, CoRWM doc. 2235). These state that:
- ".....The role of the reconstituted Committee on Radioactive Waste Management (CoRWM) will be to provide independent scrutiny and advice to UK Government and devolved administration Ministers on the long-term management, including storage and disposal, of radioactive waste. CoRWM's primary task is to provide independent scrutiny on the Government's and Nuclear Decommissioning Authority's proposals, plans and programmes to deliver geological disposal, together with robust interim storage, as the long-term management option for the UK's higher activity wastes."*
- 1.3 During the year, Andrew Sloan stepped down from the Committee and Stephen Newson was appointed on an interim basis to provide expertise in underground engineering. The current membership of CoRWM is given in Annex B.
- 1.4 CoRWM's sponsors are the Department of Energy and Climate Change (DECC) for the UK Government, the Scottish Government, the Welsh Government and the Department of the Environment in Northern Ireland.
- 1.5 The Committee's work programme for 2011-12 (CoRWM doc. 2919) was agreed with its sponsors. It was carried out within CoRWM's agreed budget (Annex C).
- 1.6 Section 2 of this report is about CoRWM's working methods. Sections 3-8 describe the Committee's scrutiny and advice work during 2011-12 and its results. Section 9 contains information about CoRWM's work programme for 2012-13. Section 10 gives CoRWM's views on the current status of arrangements and plans for the long-term management of higher activity wastes (HAW) in the UK.
- 1.7 During its work, CoRWM engages with various parts of the Nuclear Decommissioning Authority (NDA). These include the Radioactive Waste Management Directorate (RWMD), which carries out NDA's programme of work on geological disposal and is developing into the delivery organisation for a geological disposal facility (or facilities, should more than one be needed). Throughout this report, RWMD is referred to specifically where this is appropriate and the term NDA is used for the whole organisation and for parts of it other than RWMD. This is consistent with NDA practice (e.g. NDA, 2012a).

## **2 HOW CORWM WORKS**

### ***CoRWM's Principles***

2.1 CoRWM has five guiding principles that it applies in its work (CoRWM doc. 2248). These principles are about:

- openness and transparency
- upholding the public interest
- fairness
- a safe and sustainable environment
- working efficiently and effectively.

2.2 The Committee has a transparency policy and a publication scheme (CoRWM doc. 2249).

### ***Scrutiny***

2.3 The Committee scrutinises the work of Government and NDA on the long-term management of HAW. This includes UK Government and NDA work on the implementation of geological disposal and work of the Scottish Government on developing and implementing its policy for the management of HAW. It also includes NDA work on treatment, storage and transport of HAW and on waste management aspects of the management of spent fuels and nuclear materials. Much of the work that the Committee scrutinises is within the Government's Managing Radioactive Waste Safely (MRWS) programme (Defra *et al.*, 2008).

2.4 CoRWM covers existing HAW, committed HAW (*i.e.* waste that is expected to be produced from the operation and decommissioning of current nuclear facilities) and HAW that could arise from new nuclear facilities<sup>2</sup>. In addition to scrutinising the work of NDA, the Committee also monitors the progress and plans for HAW management of other organisations that own or produce these wastes.

2.5 CoRWM carries out its scrutiny by holding meetings with NDA, Government officials, regulators, and various groups of stakeholders, and by reviewing documents that these organisations produce. The Committee visits one or more nuclear sites each year, where it holds discussions with site managers and staff and sees radioactive waste management facilities. During the site visits it usually holds a meeting with local people. These meetings are open to the public and participants typically include members of the Site Stakeholder Group (or equivalent), representatives of Local Government and local residents. CoRWM also monitors developments in other countries, with the objective of checking that the UK is making full use of international experience.

### ***Formulation of Advice***

2.6 All CoRWM's formal advice is to Government. It is mostly given in reports on particular topics (*e.g.* CoRWM doc. 2543) but can also be in shorter documents such as position

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<sup>2</sup> Existing and committed wastes are frequently referred to as "legacy wastes" and wastes from new nuclear facilities as "new build wastes".

papers (e.g. CoRWM docs. 2850, 2994), responses to consultations (e.g. CoRWM doc. 2925) and comments on Government documents (e.g. CoRWM doc. 2995). Members of the Committee also give informal advice, both verbally and in writing, to Government, NDA and others. It is important that CoRWM's advice is timely in order to provide the greatest assistance and have the most impact. Experience has shown that, because of the speed of developments, there is more need for informal advice than formal advice. The Committee has discussed the implications of this for its ways of working (CoRWM doc. 2970).

2.7 The procedures CoRWM uses to formulate its advice are summarised in a document produced in March 2010 (CoRWM doc. 2806). The methods it uses to gather and check evidence that underlies its advice depend on whether the advice is formal or informal. In the case of formal advice, CoRWM usually consults its stakeholders, firstly to inform itself of their views and secondly to obtain their comments on its proposed advice. Informal advice is usually given without prior consultation because of the short timescale on which it is required. Where possible it is subsequently published. Where publication is not possible (e.g. because the advice is about a document that is not in the public domain), CoRWM states in a publicly available document that the advice has been given.

2.8 The views expressed in CoRWM's documents are always the Committee's own. It has quality control procedures for its documents (CoRWM doc. 2771).

### ***Public and Stakeholder Engagement***

2.9 CoRWM undertakes public and stakeholder engagement (PSE) to support its work programme and in general uses PSE to:

- assemble evidence on particular topics
- obtain the views of stakeholders and the public on these topics
- check the factual accuracy of its draft documents
- seek comments on its proposed advice.

2.10 The Committee holds about six plenary meetings per year that are open to the public. At each meeting, there is an opportunity for the public to ask questions as part of the formal meeting and to talk informally to Committee members during refreshment breaks. CoRWM also asks stakeholders and the public for their views on its performance and ways of working.

2.11 In September 2011, at the end of a visit to the Trawsfynydd nuclear site in North Wales, CoRWM met with the Site Stakeholder Group (SSG). The two issues that dominated the discussion were concerns about future employment in the area, as decommissioning of the site progressed, and the MRWS process for siting a geological disposal facility (GDF). The SSG had little knowledge of this process in general and specifically of the community benefits that might be available to an area that agreed to host a GDF. Overall, CoRWM was impressed by the positive working relationship between the SSG and Magnox Ltd, who operate the site under contract to NDA (CoRWM doc. 2992).

- 2.12 In March 2012, before its plenary meeting the next day, CoRWM held an open evening at Birchwood Science Park for stakeholders and the public to discuss issues of interest to them that are within the Committee's remit. Although the meeting was advertised quite widely by email and on the CoRWM website, it was sparsely attended and failed to fulfil the intended purpose of engaging more people in CoRWM's work. Nevertheless, there was a useful discussion with those stakeholders who did attend.
- 2.13 Other CoRWM engagement with stakeholders and the public has been largely informal and carried out during scrutiny of Government and NDA activities. For example, members of CoRWM meet local residents and others when they attend West Cumbria Managing Radioactive Waste Safely Partnership meetings and events as observers (Section 4.)
- 2.14 E-bulletins with updates on CoRWM's progress and plans are regularly posted on its website ([www.corwm.decc.gov.uk](http://www.corwm.decc.gov.uk)) and circulated to a wide range of stakeholders. The website document store contains all the documents that CoRWM has published since its reconstitution in October 2007 and key documents produced prior to this.

### ***Use of International Experience***

- 2.15 CoRWM uses several means of keeping in touch with international developments. Through literature and websites, it monitors progress in various countries on the long term management of HAW, especially progress with geological disposal. It also monitors the work of the European Commission, the Nuclear Energy Agency (NEA), and the International Atomic Energy Agency (IAEA). When opportunities arise, it meets with those involved with HAW management in other countries. CoRWM members also gather information when they visit other countries as part of their non-CoRWM work.
- 2.16 Some members of the Blue Ribbon Commission on America's nuclear future visited the UK on a fact-finding trip in summer 2011. The Commission was set up by the United States Secretary of State for Energy, at the direction of the President, to review policies for the back end of the nuclear fuel cycle and recommend a new plan. Two members of CoRWM were present when the Commission met the Steering Group of the West Cumbria MRWS Partnership in June 2011 (CoRWM doc. 2971).
- 2.17 CoRWM subsequently took note of the draft reports of the Blue Ribbon Commission and its subcommittees and familiarised itself with the contents of the Commission's final report when it was published in January 2012 (BRC, 2012). CoRWM also read with interest the reports of the US Nuclear Waste Technical Review Board (NWTRB) on experience gained in managing high level waste (HLW) and spent fuel, and on technical advances and issues associated with HAW disposal (NWTRB, 2011a,b).
- 2.18 CoRWM met with a representative of the Swedish waste management organisation SKB in London in July 2011 (CoRWM doc. 2962) to obtain an update on the SKB programme for the implementation of geological disposal of spent fuel. In March 2011, SKB had submitted its application to the Swedish Radiation Safety Authority and the Environmental Court to construct a GDF for spent fuel at Forsmark. They have three

years to consider the application. The Swedish Government will make the final decision on whether or not the GDF should be constructed.

2.19 When the president and vice president of the Canadian Nuclear Waste Management Organisation (NWMO) visited RWMD in October 2011, CoRWM was invited to attend. NWMO described progress with implementation of 'Adaptive Phased Management' of spent fuel, which is a strategy for geological disposal in which there are hold points and opportunities to change course. NWMO had carried out extensive PSE in developing both its implementation plan and its site selection process. At the time of the meeting, nine communities had expressed a wish to learn more about hosting a GDF, of which one had been rejected because it was known to be geologically unsuitable. NWMO also summarised progress in establishing a GDF for low and intermediate level waste (LLW and ILW) at Kincardine, Ontario, near the Bruce nuclear power station (CoRWM doc. 2986).

### ***CoRWM Review of Its Effectiveness***

2.20 CoRWM reviews its effectiveness each year using the following success criteria (CoRWM doc. 2555):

- CoRWM is a trusted and authoritative source of advice
- CoRWM has carried its work out to a high standard, and to time and budget
- CoRWM has had a demonstrable positive effect on the management of the UK's HAW.

2.21 As a result of its effectiveness review for 2010-11 (CoRWM doc. 2916), the Committee agreed that it would reconsider the objectives and methods that are used for these reviews (CoRWM doc. 2922). This reconsideration began at CoRWM's plenary meeting in January 2012 (CoRWM doc. 3009) and continued at the next plenary meeting (CoRWM doc. 3028).

2.22 The Committee decided to conduct a "light touch" effectiveness review for 2011-12, using its existing success criteria. It also decided to develop a "performance narrative" for the five years since CoRWM was reconstituted in October 2007. The performance narrative will be published in autumn 2012. The results of the effectiveness review are given below.

### ***Trust and Authoritativeness***

2.23 The Committee's perception is that it is regarded as a trusted and authoritative source of advice. The evidence for this view is that the number of requests for advice increased during the year. They ranged from requests that entailed major pieces of work (e.g. the advice for Government on options for the acceleration of the geological disposal programme, para 4.29) to requests for information that could be met by correspondence (e.g. information for people in West Cumbria, para 4.22) and invitations to comment on draft documents (e.g. on the draft nuclear industry guidance on interim storage, para 3.16; on a draft of the Ministry of Defence's Nuclear Liabilities Management Strategy, para 3.58).

*Standard of Work*

2.24 The major documents that CoRWM produced during the year were:

- its Annual Report for 2010-11 (CoRWM doc. 2922)
- a description of the Committee's scrutiny and advice related to Scottish Government's development of its HAW policy (CoRWM doc. 2807)
- evidence to the House of Lords Select Committee on Science and Technology for its inquiry into nuclear research and development (R&D) capabilities (CoRWM doc. 2927)
- a paper for the DECC Chief Scientific Advisor on strategic co-ordination of R&D (CoRWM doc. 2973)
- an assessment of RWMD's generic Disposal System Safety Case (gDSSC) (CoRWM doc. 2994)
- advice to Government on the acceleration of the geological disposal programme (CoRWM doc. 3006).

2.25 The principal evidence that these documents were regarded as of a high standard is that the advice in them was generally welcomed and much of it was taken into account by Government, NDA and others.

2.26 The progress reports produced for each plenary meeting show that the Committee has carried out its work programme to time. As described in Annex C, the Committee has kept within its budget and has met Government requests to reduce its expenditure.

*Positive Effects on HAW Management*

2.27 This success criterion (para 2.20) is taken to include positive effects on plans and arrangements for HAW management, as well as positive effects on actual HAW management activities. As in previous years, the Committee found in 2011-12 that it was too soon to judge whether its advice was having effects of this type. However, there were a number of instances where CoRWM's work had an outcome that may, in time, help to improve HAW management plans, arrangements or activities.

2.28 Table 1 shows examples of developments in plans and arrangements for HAW management in 2011-12 that CoRWM believes were influenced by its work in that year or previously. In most cases, CoRWM's advice was only one influence on the development.

**Table 1 Developments Influenced by CoRWM's Work**

<i>CoRWM Work Item*</i>	<i>Development in 2011-12 that CoRWM Influenced</i>
UK-wide strategic coordination of conditioning, packaging and storage of HAW (CoRWM docs. 2500, 2807, 2922)	<ul style="list-style-type: none"> <li>• Production of nuclear industry guidance on interim storage (Issue 1 published in August 2011; Issue 2 in preparation).</li> <li>• Work by NDA and its SLCs on strategic provision of storage capacity and on consolidation; some liaison with MOD and EDF Energy.</li> </ul>

CoRWM Work Item*	Development in 2011-12 that CoRWM Influenced
UK-wide strategic coordination of the management of spent fuels and nuclear materials (CoRWM doc. 2500)	<ul style="list-style-type: none"> <li>• NDA development and implementation of its strategies for Magnox, oxide and exotic fuels, liaising with MoD and EDF Energy where appropriate.</li> <li>• NDA work on options for the long-term management of plutonium.</li> <li>• NDA work on options for management of uranics.</li> </ul>
Provision of information to the public about HAW management, including store security (CoRWM doc. 2500)	<ul style="list-style-type: none"> <li>• NDA publication of its HAW Overview Report (February 2012).</li> <li>• Various NDA publications on credible strategic options for management of HAW, spent fuels and nuclear materials.</li> <li>• Improvements to website information on work of the security regulator.</li> </ul>
MRWS Stage 1 – inviting expressions of interest (CoRWM docs. 2807, 2922)	<ul style="list-style-type: none"> <li>• Continuing DECC efforts to encourage communities outside West Cumbria to express an interest.</li> </ul>
GDF site identification and assessment (MRWS Stage 2 and preparations for Stage 4) (CoRWM docs. 2807, 2922)	<ul style="list-style-type: none"> <li>• Government framework for MRWS Stage 4 distinguishes between sites for surface and underground facilities, and mentions the possibility of geophysical investigations in Stage 4.</li> </ul>
RWMD assessment of options for geological disposal (CoRWM doc. 2550)	<ul style="list-style-type: none"> <li>• RWMD development of its concept selection process.</li> <li>• Consideration of a range of concepts in RWMD's work on options for accelerating the geological disposal programme.</li> </ul>
RWMD integrated process for GDF design, site assessments and safety case development (CoRWM doc. 2550)	<ul style="list-style-type: none"> <li>• RWMD development of its Technical Strategy and planned development of a Technical Plan.</li> </ul>
UK-wide strategic coordination of R&D on the long-term management of HAW, spent fuels and nuclear materials (CoRWM docs. 2543, 2927, 2973, 2995)	<ul style="list-style-type: none"> <li>• Reconstitution of the NDA Research Board with independent Chair and wider remit and membership.</li> <li>• Establishment of <i>ad hoc</i> Advisory Board on nuclear R&amp;D, chaired by Government Chief Scientific Advisor, with a remit that includes R&amp;D related to management of legacy and new build radioactive wastes.</li> </ul>
Facilities for research with highly radioactive materials (CoRWM docs. 2543, 2927, 2973, 2995)	<ul style="list-style-type: none"> <li>• Business case being made for Phase 3 of Central Laboratory.</li> <li>• Facilities likely to be considered further by <i>ad hoc</i> Nuclear R&amp;D Advisory Board.</li> </ul>
R&D on geological disposal (CoRWM docs. 2543, 2927, 2973, 2994, 2995)	<ul style="list-style-type: none"> <li>• RWMD plans to consult widely on its next R&amp;D strategy and programme.</li> <li>• RWMD held a workshop on underground research.</li> </ul>

<i>CoRWM Work Item*</i>	<i>Development in 2011-12 that CoRWM Influenced</i>
Stakeholder information on R&D and involvement in establishing R&D requirements (CoRWM doc. 2543)	<ul style="list-style-type: none"> <li>• RWMD set up its Issues Management Process.</li> <li>• NDA publishes minutes and papers for its Research Board.</li> <li>• Conference on geological disposal R&amp;D held in Loughborough, sponsored by RWMD.</li> </ul>

\*References are to the main CoRWM documents where scrutiny is summarised and advice given.

### **Government Triennial Review of CoRWM**

2.29 Triennial reviews of non-departmental public bodies (NDPBs) are carried out by Government as part of fulfilling its commitment to ensuring accountability in public life. The triennial review of CoRWM, which is an advisory NDPB, began in March 2012. Its aims were:

- to challenge the continuing need for CoRWM to carry out its role, both in terms of its function and form
- if it is agreed that CoRWM should remain as an advisory NDPB, to review its control and governance arrangements to ensure it is complying with recognised principles of good corporate governance.

2.30 The triennial review included a short stakeholder consultation in which the following questions were posed.

- Do the key functions performed by CoRWM continue to be necessary and appropriate for the successful management of HAW in general and the successful implementation of the MRWS programme in particular?
- If you consider that CoRWM's functions remain valid, are these functions best delivered by an NDPB?
- If you consider that an advisory NDPB is the right delivery mechanism for the functions of CoRWM, what improvements could be made to support the effective and efficient delivery of CoRWM's remit?

2.31 The review was completed in May 2012<sup>3</sup> and its results will be summarised in CoRWM's next annual report.

<sup>3</sup> [www.decc.gov.uk/en/content/cms/news/wms\\_corwmtrier/wms\\_corwmtirer.aspx](http://www.decc.gov.uk/en/content/cms/news/wms_corwmtrier/wms_corwmtirer.aspx).

### **3 SCRUTINY AND ADVICE ON TREATMENT, PACKAGING, STORAGE AND TRANSPORT**

3.1 CoRWM's task in 2011-12 on treatment, packaging, storage and transport (CoRWM doc. 2919) was:

**Task A**

*Scrutinise and advise on treatment and packaging of higher activity wastes (HAW), on storage and on transport. Carry out similar work for waste-related aspects of the management of spent fuels and nuclear materials. Sub-tasks were:*

**A1** *scrutinise the NDA's development of its topic strategy for management of HAW, including strategic co-ordination of its work with that of other organisations that own or produce HAW*

**A2** *as A1 for spent fuels*

**A3** *as A1 for nuclear materials.*

3.2 Much of CoRWM's work on this task was carried out through regular (approximately every 3-4 months) meetings with NDA (separate meetings with its HAW and spent fuels – nuclear materials teams) and regulators (Office for Nuclear Regulation (ONR) safety, security and transport teams), Environment Agency (EA) and Scottish Environment Protection Agency (SEPA). The Committee also met twice with the Ministry of Defence (MOD) to discuss its work on the management of its HAW, irradiated fuel and nuclear materials.

#### ***Development and Implementation of NDA's HAW Strategy***

3.3 CoRWM discussed NDA's HAW strategy with NDA (CoRWM docs. 2935, 2987, 3031) and with regulators (CoRWM docs. 2965, 2993). The discussions covered NDA's overall approach to strategy development and implementation, as well as specific topics. The Committee also saw HAW management activities during its visit to Trawsfynydd (CoRWM doc. 2991).

#### ***NDA Approach to HAW Strategy Development***

3.4 NDA's further development of its HAW strategy is part of its programme of work on development of its strategy for integrated waste management. In February 2011, NDA published a document on credible options for HAW (NDA, 2011a), which was intended to provide a framework for further development and delivery of its HAW strategy (CoRWM doc. 2935). Plans for development of the HAW strategy were then included in NDA's Integrated Waste Management Strategy Development Programme, which was published for comment in December 2011 (NDA, 2011b).

3.5 CoRWM welcomed NDA's plans for producing strategic guidance to its Site Licence Companies (SLCs) and to RWMD on HAW treatment, storage and disposal, and for

guidance on specific waste streams (NDA, 2011b). However, the Committee was disappointed that there was no firm plan to produce an NDA HAW Strategy as such.

3.6 CoRWM agreed with regulators that there is a need for a UK HAW Strategy, of which the NDA HAW Strategy would be the largest part (CoRWM docs. 2965, 2993, 3031). The UK HAW Strategy would in turn be part of the UK integrated strategy for the management of all its radioactive waste that is required for compliance with the European Directive on the safe management of spent fuel and radioactive waste (EU, 2011).

#### *Consolidation of Treatment and Storage of HAW on Fewer Sites*

3.7 NDA updated CoRWM on its work on consolidation of treatment and storage of HAW on fewer sites at various meetings during the year (CoRWM docs. 2935, 2987, 3031). The NDA position is that it will only explore consolidation where there would be a clear business benefit in terms of infrastructure optimisation, supporting early site clearance, reduction of site footprint, or reductions in hazard, risk or security levels. It is considering EDF Energy sites and MOD sites, as well as its own.

3.8 From its work to date, NDA has concluded that there is limited scope for consolidation (CoRWM doc. 3031). Following stakeholder consultation, it has taken decisions on moving some exotic fuels and nuclear materials from Dounreay to Sellafield, and on moving exotic fuels, nuclear materials and some intermediate level waste (ILW) from Harwell to Sellafield (para 3.47). Other potential consolidation opportunities include moving ILW from Winfrith to Harwell, consolidating storage of southern and central Scottish ILW, and local initiatives (between A and B stations).

3.9 In the light of these developments, CoRWM considers that there is no need for an NDA estate-wide consolidation strategy. Further consolidation opportunities can be pursued as part of the tactics of HAW management.

#### *Graphite Wastes*

3.10 NDA summarised its work on graphite wastes at a meeting in November 2011 and updated the Committee in March 2012 (CoRWM docs. 2987, 3031). Until the last few months of 2011-12, much of NDA's work focused on end solutions for graphite. This work had produced some interesting results. For example, it had shown that bulk graphite might only occupy a few per cent of the footprint of a geological disposal facility (GDF) and that geological disposal of bulk graphite could be much less expensive than previously thought (CoRWM doc. 2987).

3.11 Recently, NDA has been taking a more strategic approach. It is now giving separate consideration to near-term arisings of graphite (the fuel sleeves at Sellafield and Hunterston), medium-term arisings (from test reactors) and long-term arisings (bulk graphite from Magnox reactors and AGRs). NDA plans to produce a preferred options document for fuel sleeves and a credible options document for bulk graphite. Both documents will include options for managing graphite wastes in Scotland in line with the Scottish Government policy of near-surface, near-site storage and disposal. The latter document will focus on whether there is a case for change from the baseline approach of packing bulk graphite in boxes and emplacing it in a GDF. There will also be a forward

programme of R&D and other work, including international collaboration (CoRWM doc. 3031). CoRWM welcomed this more strategic approach.

### *National Alpha Waste Strategy*

3.12 CoRWM understands that NDA intends to establish a preferred lifecycle management approach for alpha-contaminated HAW, especially plutonium contaminated materials (PCM), including retrieval, conditioning and storage (NDA, 2011b). To assist it in this work, NDA has established a National Alpha Waste Group, which includes NDA and non-NDA producers of these wastes (CoRWM doc. 3031). CoRWM welcomed this development.

### *Thermal Treatment*

3.13 At a meeting in April 2011 (CoRWM doc. 2935), CoRWM heard about progress with NDA's Integrated Project Team (IPT) on thermal treatment, in which Sellafield Ltd is playing a major role. It was told that two thermal treatment processes had been identified for detailed investigation for wastes with a high metal content: GeoMelt and plasma arc. These investigations followed trials conducted in 2009 on sludges and solid wastes using various thermal processes.

3.14 After the meeting, there was a presentation on GeoMelt and CoRWM members observed a trial of the process with inactive, simulated waste (CoRWM doc. 2935). Subsequently, CoRWM sent informal comments on the trial to Sellafield Ltd, who had commissioned it, and also discussed some of the issues it raised with regulators (CoRWM doc. 2965). The Committee found this opportunity to see technology assessment at first hand very valuable.

3.15 CoRWM understands that NDA is now developing a business case for use of thermal treatment for HAW, focusing on alpha contaminated waste in the first instance (CoRWM doc. 2935). This is related to the work on a national alpha waste management strategy (para 3.12).

### ***Industry Guidance on Interim Storage***

3.16 Production of the Industry Guidance on interim storage of HAW was sponsored by NDA, through an IPT, but involved all the organisations that own or produce HAW and all the nuclear regulators. CoRWM commented informally on a draft of the first version of the Guidance. The Committee was pleased that many of its comments were taken into account in finalising this first version, which was published in August 2011 (NDA, 2011c).

3.17 The first version of the Guidance then underwent a period of roadtesting by store operators and designers. The results were discussed at a workshop in March 2012, which was attended by representatives of NDA, most nuclear site licensees and all the regulators. CoRWM participated as an observer. The workshop identified and prioritised potential improvements to the Guidance. The improvements with the highest priority will be made when the second version of the Guidance is produced during 2012-13.

3.18 CoRWM considers that the project to produce industry guidance on interim storage has been very successful. The first version of the Guidance (NDA, 2011c) contained much useful material. It is anticipated that the second version will improve on it in terms of ease of use, inclusion of some material that is currently in companion documents, and more signposting of related guidance produced by non-NDA organisations.

3.19 The Committee welcomes the intention to maintain the Guidance as a living document, and to hold regular meetings of a Store Operations Forum to review it and exchange experience in its use. CoRWM understands that NDA is considering how to ensure that its SLCs use the Guidance. The Committee encourages NDA to adopt a formal approach to this, such as including a requirement to use the Guidance in the Site Strategic Specifications for SLCs.

### ***Upstream Optioneering***

3.20 CoRWM had a presentation on this RWMD project at a meeting in March 2012 (CoRWM doc. 3031). The project was given its name because it involves RWMD looking upstream of a GDF to enable optimisation of the management of HAW throughout its lifecycle. The project involves collaboration between RWMD, SLCs and NDA Strategy and Programmes.

3.21 The project began in 2010 and initially consisted of option studies for specific waste streams. It now includes technical analyses to support further development of NDA HAW strategy and studies for the NDA National Programmes team. Examples of topics on which work has been carried out are:

- use of superplasticisers in waste packages and in a GDF
- increasing the throughput of the Sellafield Waste Treatment Complex
- the use of larger waste containers for storage and transport
- disposal of bulk graphite in a GDF
- optimising rates of emplacement in a GDF (CoRWM doc. 3031).

3.22 NDA told CoRWM in March 2012 that the phase of consolidation, analysis and prioritisation of opportunities for optimisation was expected to be completed in early 2012-13 and the results of this phase would be published. The next phase would focus on delivery of optimisation opportunities (CoRWM doc. 3031).

3.23 CoRWM considers that, to date, this has been a very useful and successful project and expects it to continue to be so. The Committee encourages NDA to publish progress reports on the project in future, rather than waiting for completion of a major phase. It is important that the results of the project are integrated into the further development of NDA HAW strategy (para 3.4).

### ***Wastes in Legacy Ponds and Silos at Sellafield***

3.24 Throughout 2011-12, CoRWM monitored progress in planning and preparing for retrieval of wastes from the Legacy Ponds and Silos (LP&S) at Sellafield and for treating and packaging the wastes to make them suitable for interim storage and geological disposal. The Committee noted the publication of the Sellafield Plan in summer 2011

(Sellafield Ltd *et al.*, 2011) and discussed LP&S aspects of it with regulators (CoRWM doc. 2993). It held a meeting with NDA in February 2012 to obtain an update on plans for LP&S waste retrieval, treatment and packaging, including RWMD progress with disposability assessments of proposed waste forms (CoRWM doc. 3020).

- 3.25 Retrieval of wastes from the Magnox Swarf Storage Silos is expected to begin in about 5 years time. CoRWM understands that plans for treating these wastes are well-advanced and that RWMD is continuing to engage with Sellafield Ltd on waste forms. A formal disposability assessment for an interim Letter of Compliance (LoC) for the packages that will be produced is expected to take place during 2012. Wastes from the Pile Fuel Cladding Silo are to be placed in boxes after retrieval and stored pending decisions on their treatment prior to disposal. Various options are under consideration, including injecting polymer or cement into the boxes before sealing them, and simply sealing the boxes ungrouted (CoRWM doc. 3020).
- 3.26 The contents of the legacy ponds consist of irradiated fuels (metal and oxide), sludges and solid ILW. Treatment options for the fuels include reprocessing<sup>4</sup> and alternatives such as encapsulation in a cement or a polymer. Options for the sludges and solid ILW include encapsulation in cement, encapsulation in a polymer, thermal treatment (para 3.13) and vacuum drying. There is time to carry out R&D on these options because sludges from the Pile Fuel Storage Pond will be placed in buffer tanks after retrieval and sludges from the First Generation Magnox Storage Pond will not be retrieved until the early 2020s.
- 3.27 The Committee recognises the difficulty of retrieving wastes and fuels from the LP&S and the importance of completing bulk retrievals as soon as is practicable. It welcomes the priority that NDA is giving to the LP&S (NDA, 2012a). CoRWM also recognises that it may be necessary to adopt less than optimal waste management methods in order to make progress with retrievals.

### ***Letter of Compliance Process and Waste Package Specifications***

- 3.28 During its regular update meetings with RWMD, CoRWM heard about plans for improving the LoC process (CoRWM docs. 2961, 2979, 3007). The changes include earlier and increased interactions between RWMD and waste producers, for example to resolve issues during LoC assessments rather than waiting until the assessments are completed. Guidance and procedures for the improved LoC process are being produced (CoRWM doc. 3007). CoRWM welcomed this development and the strengthening of the RWMD packaging assessment team.
- 3.29 CoRWM noted that NDA issued its report for 2010-11 on the interactions between RWMD and waste packagers (NDA, 2011d). This stated that, of a predicted total volume of 378,000m<sup>3</sup> of ILW (NDA and DECC, 2011), 26,100m<sup>3</sup> (about 7%) had been conditioned and packaged by the end of March 2011. Although the volume of ILW conditioned and packaged was greater than that reported for the previous year (24,200m<sup>3</sup>), the percentage of the total was smaller (it was about 9% at the end of March

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<sup>4</sup> Metallic fuels would be reprocessed in the Magnox reprocessing plant and oxide fuels in THORP.

2010) (NDA, 2010a). This was because the predicted total volume of ILW had increased by 103,000m<sup>3</sup>, mainly as a result of a re-evaluation of Sellafield decommissioning waste (NDA and DECC, 2011).

- 3.30 In addition to the ILW already conditioned and packaged, there was another 16,700m<sup>3</sup> of ILW that was covered by a final stage LoC by the end of March 2011. The total volume of ILW covered by a final stage LoC was thus about 42,800m<sup>3</sup>. Of this, about 11,600m<sup>3</sup> consisted of packages from the Sellafield Magnox Encapsulation Plant (MEP), for which the final stage LoC was under review (NDA, 2011d).
- 3.31 RWMD has informed CoRWM that the volume of ILW conditioned and packaged in 2011-12 was similar to that in 2010-11. Rates of conditioning and packaging depend on the number of plants in operation. They are expected to increase over the next 2-3 years as major new plants come on stream and ductile cast iron containers (DCICs) come into use at a number of Magnox sites. At present, the rate of conditioning and packaging ILW is approximately equal to its rate of arising (about 2,000m<sup>3</sup> per year (NDA and DECC, 2011)). The commissioning of new plant and the introduction of DCICs should enable faster progress to be made in dealing with stocks of raw waste.
- 3.32 RWMD work on updating its package specifications continued in 2011-12. The new Level 1 Generic Waste Package Specification was published in March 2012 (NDA, 2012b). It is planned to publish several Level 2 and Level 3 specifications in 2012-13.

### ***Transport***

- 3.33 CoRWM considered RWMD plans for transport of wastes to a GDF as part of its assessment of the generic Disposal System Safety Case (DSSC) (para 4.35). It found that the Transport Safety Case report (NDA, 2010b) did not give sufficient recognition to the large scale of transport operations that will be needed for a GDF compared to current transport operations for fuel and for low level waste (LLW) (CoRWM doc. 2994). CoRWM noted that ONR had also commented that RWMD should refocus its Transport Safety Case on logistics, infrastructure and strategic issues, leaving waste consignors to deal with compliance with the transport regulations (EA and ONR, 2011).
- 3.34 CoRWM noted developments in IAEA regulations for the transport of radioactive materials. The new version of the regulations will include revisions to the criteria for packages containing small quantities of fissile materials. These were proposed by the UK and have the potential to save waste packaging costs without any reduction in safety standards. The new IAEA regulations are due to be published in early 2012-13 and will form the basis of revised UK legislation, which is expected to come into force in 2015 (ONR, 2012a).
- 3.35 CoRWM also noted the publication of the latest review by the Health Protection Agency (HPA) of the radiological consequences of transport accidents and incidents in the UK. This report described 30 accidents and incidents, none of which resulted in any significant radiation doses to workers or members of the public (HPA, 2011).

### ***Provision of Information on HAW to the Public***

3.36 In February 2012, NDA published an overview document<sup>5</sup> on its HAW (NDA, 2012c). This provides a summary of information on the quantities and characteristics of the HAW on each NDA site, and of plans for treating, packaging and storage of each major group of wastes.

3.37 CoRWM considers that this is a useful and accessible document that should be of value to a range of stakeholders. It complements the information on NDA HAW in the UK Radioactive Waste Inventory (NDA and DECC, 2011) and addresses one of the recommendations in CoRWM's 2009 report to Government on interim storage (CoRWM doc. 2500). The Committee notes that, like the Inventory, it is a snapshot of information at a particular point in time and does not attempt to describe the work that is in progress to inform future treatment, packaging and storage decisions.

### ***HAW Management at Trawsfynydd***

3.38 During its visit to Trawsfynydd in September 2011 (CoRWM doc. 2991), CoRWM heard about major HAW management operations on the site and saw the new ILW store, the resin solidification plant and plant for packaging fuel element debris (FED). It was informed that good progress was being made with retrieving solid ILW, sludges and resins from the vaults and vessels where they had been stored during the operation of the site's Magnox reactors. Transfer of packaged ILW to the new store had begun. Some FED may be moved to Dungeness for treatment. The Committee was impressed by the innovative approaches to radioactive waste management being developed at the site (*e.g.* for dealing with radioactively contaminated oil).

### ***Spent Fuels and Nuclear Materials***

3.39 CoRWM held two meetings with NDA to discuss its strategies for spent fuels and nuclear materials (CoRWM docs. 2972, 3025). It also discussed these topics with regulators (CoRWM docs. 2965, 2993).

3.40 The Committee is pleased to report that NDA made major steps forward in 2011-12 in developing and implementing its strategies for all types of spent fuels and nuclear materials. Details are as follows.

#### ***Spent Magnox Fuel***

3.41 The NDA strategy for spent Magnox fuel is to complete the reprocessing programme set out in the Magnox Operating Plan (MOP)<sup>6</sup>. NDA has determined that this is the most cost effective approach and considers that it is broadly consistent with the UK Strategy for Radioactive Discharges (DECC *et al.*, 2009) and hence with the UK's obligations under the 1993 Oslo and Paris Convention on the Protection of the Marine Environment of the North East Atlantic (OSPAR). NDA told CoRWM that, if recent performance could be maintained, the MOP would be completed around 2020 (CoRWM doc. 3025).

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<sup>5</sup> This is the document referred to in CoRWM's 2010-11 Annual Report (CoRWM doc. 2922) as the "HAW Roadmap Summary Report".

<sup>6</sup> The current version is MOP8 (NDA, 2009). MOP9 is due to be produced in 2012 (NDA, 2012a).

3.42 NDA is continuing to explore contingencies for use in the event of a loss of reprocessing capability for spent Magnox fuel. CoRWM was told in March 2012 that NDA's most recent work had focused on a contingency arrangement that would involve (CoRWM doc. 3025):

- continuing wet storage of Magnox fuel that was already at Sellafield, then drying this fuel and placing it in interim dry storage
- holding fuel in Magnox reactors pending development of an alternative management route
- transporting fuel that was in Magnox station ponds to Sellafield for drying and dry storage.

3.43 Work on geological disposal of unprocessed spent Magnox fuel is at an early stage. RWMD has carried out a preliminary assessment of disposal of dried fuel in thick metal canisters. NDA is also considering various conditioning options for Magnox fuel, including those being studied for metallic fuels in the LP&S (para 3.24) (CoRWM doc. 3025).

#### *Spent Oxide Fuels*

3.44 NDA published its Credible Options document for oxide fuels in November 2011 (NDA, 2011e). Its work has shown that the current strategy of completing the THORP reprocessing contracts is the most viable and cost-effective. In order to implement this strategy, NDA will need to obtain the required performance from THORP and other plants, and to have reached agreement with regulators on the means of storage of unprocessed spent AGR fuel. When CoRWM met NDA in March 2012 (CoRWM doc. 3025), work on plant performance and storage was well-advanced and NDA expected to take a decision on its preferred option for oxide fuels in summer 2012.

3.45 NDA's preferred option for unprocessed spent AGR fuel is wet storage in the THORP Receipt and Storage Pond. It aims to make a detailed safety case for wet storage for 25 years and to show that such storage could probably be extended to about 80 years, to allow flexibility in the time of dispatch to a GDF. NDA is also investigating dry storage options for use after 25 years of wet storage (CoRWM doc. 3025). Some unprocessed AGR fuel was included in the gDSSC (para 4.35).

3.46 In July 2011, EDF Energy received consent from DECC for the construction and operation of a Dry Fuel Store at Sizewell B to store spent fuel at the station. EDF Energy continued its interactions with RWMD on disposability of the casks it proposes to use for storage.

#### *Exotic Fuels*

3.47 During 2011, NDA carried out stakeholder engagement on options for Dounreay Fast Reactor (DFR) breeder fuel and for Harwell exotic fuels (including some nuclear materials and ILW), published summaries of the consultation responses and announced its decisions on the preferred options (NDA, 2011f-i). It decided that DFR breeder fuel would be transported to Sellafield and reprocessed in the Magnox reprocessing plant. The Harwell exotic fuels would be transported to Sellafield and immobilised for

geological disposal. The first transport of DFR breeder fuel is expected to take place in late summer 2012 and the first transport of Harwell fuels in April 2013 (CoRWM doc. 3025).

3.48 In February 2012, NDA published its Credible Options paper for the remaining exotic fuels and nuclear materials at Dounreay (NDA, 2012d). These consist of irradiated oxide and carbide fuels, unirradiated oxide and carbide fuels and a small quantity of highly enriched uranium (HEU). NDA told CoRWM that there was a strong case for transporting the irradiated and unirradiated fuels and the HEU to Sellafield for storage pending decisions on reuse or treatment and disposal (CoRWM doc. 3025).

3.49 There are a number of other exotic fuels for which NDA is studying management options. These include fuel from the Imperial College Consort research reactor and various MOD fuels (CoRWM doc. 3025).

### *Plutonium*

3.50 Government published its response to the public consultation on the long-term management of UK-owned civil plutonium in December 2011 (DECC, 2011a). This included a statement of its policy, which is that most plutonium should be re-used in mixed oxide (MOX) fuel and the remainder immobilised and disposed of as waste.

3.51 CoRWM discussed the long-term management of plutonium at its plenary meeting in January 2012 (CoRWM doc. 3009). The Committee noted that the aspects of the Government's policy on plutonium in which it has an interest are:

- the need for disposability assessments for spent MOX fuel, and for R&D on interim storage and geological disposal of spent MOX fuel to provide input to these assessments
- the need for R&D on disposability of immobilised waste plutonium
- inclusion of spent MOX fuel in inventories of wastes for geological disposal
- optimisation of the management of MOX fuel, from arising through to and including geological disposal
- consideration of waste aspects when judging the credibility of new options for re-use of plutonium.

3.52 CoRWM heard from NDA in March 2012 that it was talking to utilities and technology suppliers and would be providing Government with information to support a business case for re-use of plutonium in MOX fuel (CoRWM doc. 3025). The Committee also understands that NDA made a request for alternative proposals for plutonium management. As a result of the replies received, NDA contracted GE Hitachi to carry out a feasibility study of the use of a Prism fast reactor to "burn" UK plutonium and is currently considering other proposals.

### *Uranics*

3.53 In December 2011, NDA and URENCO signed an agreement for the future transfer of the NDA-owned site at Capenhurst to URENCO, which operates the adjacent nuclear licensed site. The decommissioning and storage operations undertaken by Sellafield Ltd on the NDA-owned site will transfer to URENCO. NDA and URENCO also signed an

agreement for the processing of Government-owned uranium hexafluoride tails (Hex tails) in URENCO's Tails Management Facility at Capenhurst (URENCO, 2011).

- 3.54 Construction of the Tails Management Facility began in January 2012; it is expected to be completed in 2015. The facility will convert Hex tails to a form of uranium oxide that can be stored more safely pending decisions on its re-use or disposal. Hex tails are currently stored on both the NDA and the URENCO sites at Capenhurst. An application for relicensing the Capenhurst site to reflect its new ownership has been submitted to ONR (ONR, 2012b).
- 3.55 CoRWM was told in March 2012 (CoRWM doc. 3025) that NDA was preparing a paper on the management of uranic materials and that this would be published on the NDA website. Other NDA work on uranics included discussions with Westinghouse on the residues recovery capability at Springfields, a review of management options for LEU, natural and depleted uranium from Harwell, and a review of options for natural and depleted uranium from Dounreay. Geological disposal of surplus uranics was considered in the gDSSC (para 4.35).

### ***MOD HAW, Irradiated Fuels and Nuclear Materials***

- 3.56 CoRWM does not scrutinise MOD but it does keep itself informed about MOD plans and activities, particularly its co-ordination with NDA. To this end, CoRWM held two meetings with MOD in 2011-12 (CoRWM docs. 2937, 3018).
- 3.57 At its meeting with MOD in May 2011 (CoRWM doc. 2937), CoRWM was given an overview of work on management of HAW at the Devonport and Rosyth dockyards, management of HAW at AWE, the MOD Submarine Dismantling Project (SDP) and management of MOD irradiated fuels<sup>7</sup> and nuclear materials. Much of this was in the context of the Nuclear Liabilities Management Strategy that MOD had been developing.
- 3.58 After the meeting, CoRWM was asked for and provided informal comments on a draft of MOD's Nuclear Liabilities Management Strategy. The Committee was pleased that many of its comments were taken into account in producing the final version of the Strategy (MOD, 2011a). CoRWM welcomed the production of the Strategy, which sets out clearly and concisely the challenges that MOD faces in managing its nuclear liabilities and its plans for meeting them.
- 3.59 The second meeting with MOD was held at Rosyth (CoRWM doc. 3018) and was preceded by a visit to a laid up submarine (HMS Resolution) and to the Active Waste Accumulation Facility (AWAF). In this instance, discussions focused on the MOD strategic theme of sites, facilities and submarines.
- 3.60 MOD gave CoRWM a presentation on the SDP, including the public consultation that was held from October 2011 to February 2012 (MOD, 2011b). The presentation covered the proposed option for dismantling nuclear submarines and MOD's continuing work on

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<sup>7</sup> MOD uses the term irradiated fuels to mean fuels that have been produced and irradiated for the purpose of nuclear submarine propulsion, including prototype and research assemblies (MOD, 2011a).

where the resulting ILW would be stored pending geological disposal. This work included discussions with NDA about possible use of its sites. Some CoRWM members had attended, as observers, the two national workshops held as part of the SDP consultation (para 8.9).

- 3.61 There was also discussion of site and facility decommissioning at Rosyth and AWE, and management of the resulting wastes. CoRWM noted and welcomed MOD's increasing co-ordination with NDA, both on a project-by-project basis (*e.g.* on AWE alpha-contaminated HAW) and at the wider level of possible transfer of some MOD liabilities to NDA (CoRWM doc. 3018).

### ***Security of Storage***

- 3.62 CoRWM received periodic updates on security matters from the ONR civil nuclear security (CNS) team (CoRWM docs. 2965, 2993). The Committee is aware of the improvements that are continually being made to security at all nuclear sites and the major improvement programme at Sellafield.

- 3.63 ONR(CNS) informed CoRWM about the plans for, and the results of, the IAEA International Physical Protection Advisory Service (IPPAS) mission to the UK that took place in October 2011. This was the first such mission to a nuclear weapons state. The IPPAS mission team held discussions with DECC and ONR, and visited Sellafield and Barrow. The team's report found the state of UK civil nuclear security to be sufficiently robust, identified many examples of good practice, and made a number of recommendations and suggestions.

- 3.64 CoRWM noted that security matters are now covered in ONR's quarterly bulletins on its work. The Committee views this as a welcome development, which addresses one of its recommendations to Government (CoRWM doc. 2500).

### ***Strategic Coordination***

- 3.65 In its 2009 report to Government on interim storage (CoRWM doc. 2500), CoRWM recommended that there be greater UK-wide strategic coordination of the treatment, packaging and storage of HAW, the management of spent fuels and nuclear materials and future transport arrangements. The Committee noted in its 2009-10 Annual Report (CoRWM doc. 2807) that some improvements in coordination had taken place or were anticipated.

- 3.66 In its 2010-11 Annual Report (CoRWM doc. 2922), CoRWM stated that Government had begun to put in place improved arrangements for the development of policy and legislation on radioactive waste management and for governance of NDA. These arrangements were expected to supersede those described in a 2009 CoRWM paper (CoRWM doc. 2558).

- 3.67 In the event, there were no major changes in arrangements relevant to HAW treatment, packaging, storage and transport<sup>8</sup>. There were some changes to DECC's internal organisation but the only changes involving other bodies were that the Waste Management Steering Group (WMSG) ceased to exist and the Radioactive Waste Policy Group (RWPG) did not meet during 2011-12. As far as CoRWM is aware, the cessation of WMSG and the lack of activity by RWPG have not had any deleterious effects.
- 3.68 CoRWM understands that the Strategy Development and Implementation Group (SDIG), which brings together representatives of Government, regulators and NDA to address matters relating to the development and implementation of NDA Strategy, is working well. SDIG, which was previously called the Strategy Development and Delivery Group (CoRWM doc. 2558), is chaired by DECC and is part of the governance arrangements for NDA. It involves the Shareholder Executive and HM Treasury.
- 3.69 CoRWM also understands that NDA has increased the involvement of other nuclear industry organisations (*e.g.* MOD, EDF Energy) in its Theme Overview Groups (TOGs) and in other aspects of its work. In addition, the Nuclear Legacy Advisory Forum (NuLeAF) has been invited to attend meetings of some TOGs.
- 3.70 CoRWM considers that, overall, there have been improvements in UK-wide strategic co-ordination of the treatment, packaging and storage of legacy HAW, and the management of legacy spent fuels and nuclear materials, in 2011-12. CoRWM is pleased to see these improvements in co-ordination and hopes that they will extend to new build HAW and spent fuels in due course (Section 7).

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<sup>8</sup> Changes relevant to implementation of geological disposal were noted in the 2010-11 CoRWM Annual Report (CoRWM doc. 2922). These were the reconstitution of the Geological Disposal Implementation Board and the formation of the Geological Disposal Steering Group. CoRWM attends both as an observer, as reported in Section 4.

## **4 SCRUTINY AND ADVICE ON GEOLOGICAL DISPOSAL**

4.1 CoRWM had five tasks in 2011-12 relating to geological disposal (CoRWM doc. 2919):

### ***Voluntarism and Partnership***

**Task C** *Scrutinise and advise on the voluntarism and partnership approach to geological disposal facility siting. Sub-tasks were:*

**C1** *scrutinise and advise on Government work to increase awareness of the invitation to communities and monitor responses*

**C2** *scrutinise and advise on Government engagement with, and support for, communities that have expressed an interest.*

### ***Governance and Management Arrangements***

**Task D** *Scrutinise and advise on the governance and management arrangements of Government for implementation of geological disposal.*

### ***Stage 4 of the Site Selection Process***

**Task E** *Scrutinise Government and NDA preparations for stage 4 of the MRWS Site-Selection Process.*

### ***NDA's Preparedness and Plans***

**Task F** *Scrutinise and advise on NDA organisational preparedness and plans for implementation of geological disposal. Sub- tasks were:*

**F1** *understand NDA's plans for the development of RWMD to improve its capability to deliver geological disposal; advise if necessary.*

**F2** *scrutinise the development of the Strategic Environmental Assessment (SEA) for geological disposal*

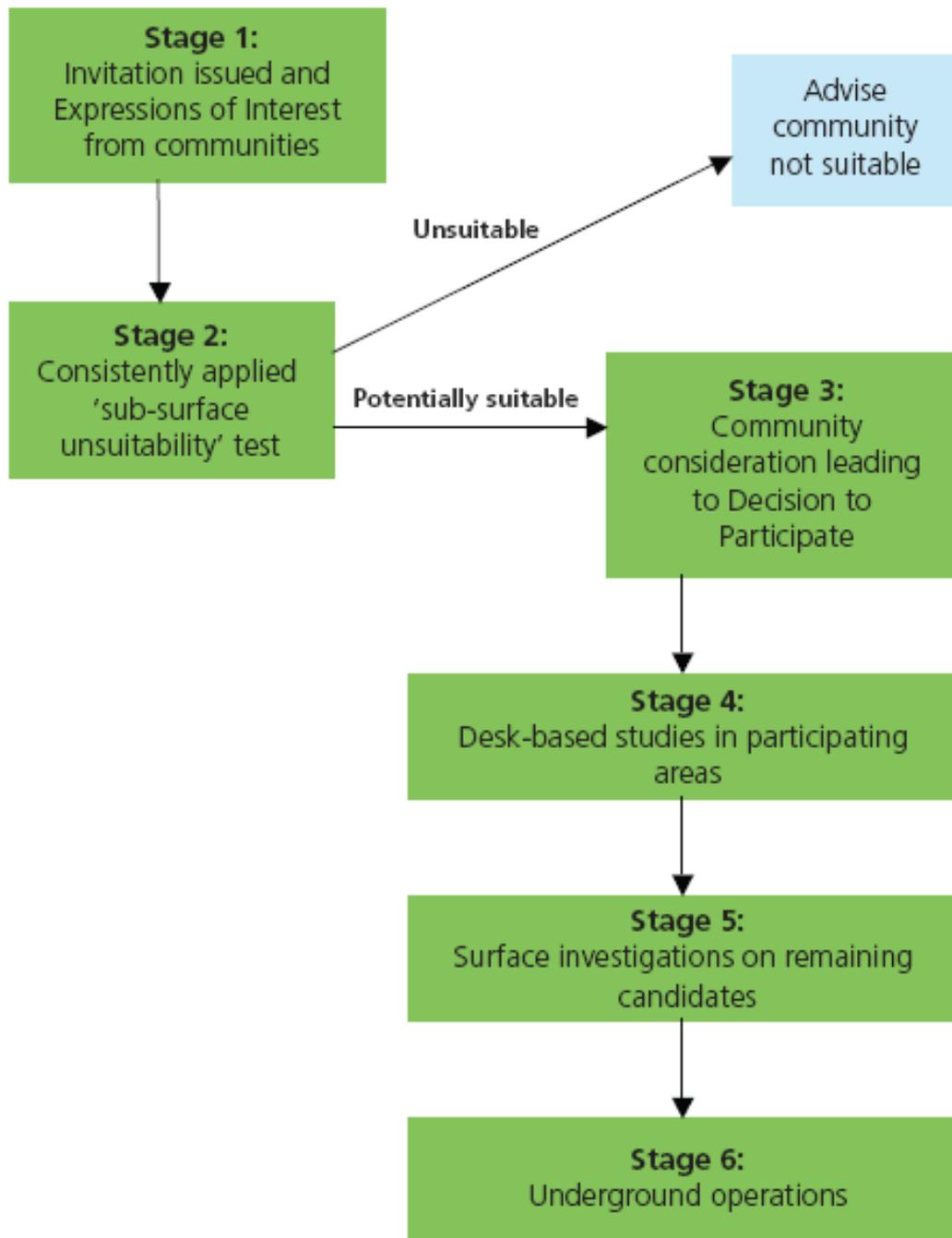
**F3** *gain an understanding of the DSSC suite of documents and form a view on its implications for future UK work on geological disposal, including R&D.*

### ***Reversibility, Retrievability and Recoverability***

**Task H** *Summarise national and international nomenclature on reversibility, retrievability, and recovery in the contexts of geological and near surface disposal.*

4.2 The Committee's work on these tasks is summarised below. To aid understanding, Figure 1 (Defra *et al.*, 2008) shows the stages in the process for establishing a GDF (often briefly referred to as the "MRWS process").

Figure 1 Stages in the Site Selection Process



Source: Defra *et al.*, 2008

### ***Governance and Management Arrangements for Implementing Geological Disposal***

- 4.3 The Geological Disposal Implementation Board (GDIB) met twice during the year. Meetings are chaired by the Minister for Energy; others attending include officials from DECC, MOD, Treasury and Welsh Government; and representatives from NDA, regulators, the Nuclear Industry Association (NIA), waste producers, NuLeAF and Nuclear Waste Advisory Associates (NWAA). An invitation to attend was issued to representatives from West Cumbria, as an area from which interest has been expressed in exploring with Government the prospect of hosting a GDF without commitment, but they chose not to accept it. However, a representative of the West Cumbria MRWS Partnership attended one meeting at the Board's request to give a presentation on the Partnership's local engagement. The CoRWM Chair attends GDIB meetings as an observer.
- 4.4 The GDIB's Terms of Reference provide for interested parties to come together to facilitate dialogue and engagement in order to advise Government on the successful implementation of geological disposal, to foster shared understanding of the issues, to ensure DECC is aware of the views of key stakeholders and to hold DECC to account for delivery of its programme of work. Minutes are made available on the DECC website<sup>9</sup>.
- 4.5 Separately, the Geological Disposal Steering Group (GDSG), comprising officials from DECC, Treasury, Welsh Government, MOD and NDA, met seven times during the year. CoRWM attends as an observer. There is a standing agenda item to review progress in terms of programme and risk management by both DECC and NDA. Also reported are issues that come forward from the West Cumbria MRWS Partnership and continuing efforts to make other communities aware that Expressions of Interest can still be made in entering without-commitment discussions with Government about hosting a GDF. GDSG minutes are published on the DECC website.
- 4.6 In June 2011, Government submitted its first annual report to Parliament on progress in implementing geological disposal (DECC, 2011b). This set out the background to the MRWS programme, summarised progress until the end of 2010-11, and gave an indicative timeline for the future. The Ministerial Foreword to the report stated Ministers' wish to go forward with the ambition of seeing the first waste put into a GDF by the end of 2029. CoRWM's scrutiny of RWMD work on accelerating the geological disposal programme, and the Committee's advice on the way forward, are described later in this section (para 4.29).
- 4.7 It is the view of CoRWM that GDIB and GDSG, and the production by DECC of an annual report to Parliament on the MRWS programme, have improved the transparency and accountability of Government work on the implementation of geological disposal. The Committee considers that GDSG provides a valuable input to both DECC's decision making and the mitigation of risks to the MRWS programme.
- 4.8 During the year, the Office of Government Commerce (OGC) carried out a strategic assessment (OGC Gateway Process Review 0) of the GDF programme. CoRWM

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<sup>9</sup> [www.decc.gov.uk/en/content/cms/meeting\\_supply/nuclear/forums/geo\\_disposal](http://www.decc.gov.uk/en/content/cms/meeting_supply/nuclear/forums/geo_disposal)

provided DECC with comments on the OGC review team's recommendations. The Committee understands that the primary aim of this and future OGC involvement is to assist DECC to manage the GDF programme as effectively as possible.

4.9 CoRWM welcomed the increase in the number of staff in the DECC geological disposal team during the year. However, it notes that the influx of new members and the continuing movement of DECC staff within the department present a challenge in achieving an adequate level of expertise. The Committee considers that meeting this challenge is important to the success of the GDF programme.

### ***Increasing Communities' Awareness of the Invitation to Participate***

4.10 Government continued to work throughout 2011-12 to increase community awareness of the invitation to express an interest in entering discussions about hosting a GDF without commitment (CoRWM doc. 3040). DECC gave a presentation at NDA's national stakeholder event (CoRWM doc. 2990), with the aim of informing representatives of Site Stakeholder Groups (SSGs) about the status of the GDF siting process and the means to engage with Government about it. DECC subsequently gave presentations to a number of SSGs, at their request. There was also an article in the February 2012 edition of NDA's INSIGHT magazine for stakeholders that explained that the invitation to express an interest was still open. In addition, DECC officials met the NuLeAF Steering Group to discuss possibilities for raising the profile of the process with Local Authorities.

4.11 At the end of 2011-12, West Cumbria was the only area from which there had been Expressions of Interest.

### ***MRWS Process in West Cumbria***

4.12 CoRWM's role in respect of the MRWS process in West Cumbria is to scrutinise Government and NDA engagement. The Committee fulfilled its role primarily by attending meetings of the West Cumbria MRWS Partnership ([www.westcumbriamrws.org.uk](http://www.westcumbriamrws.org.uk)) as an observer. Several CoRWM members also attended as members of the public. In addition, a meeting was held with the Steering Group of the Partnership to obtain its views on the support it was receiving from Government and NDA. Progress on the work of the Partnership was a standing item at CoRWM's plenary meetings. CoRWM also provided information to the Partnership on a number of topics.

4.13 During the year, the West Cumbria MRWS Partnership completed its evaluation of the criteria that it had identified to inform its report to the Decision Making Bodies, carried out its third round of public and stakeholder engagement (known as PSE 3) and started to prepare its report on that engagement and its final report.

4.14 At the start of the year, it was planned that PSE3 would be held from September to November 2011 and that the final report on the Partnership's work would be issued in February 2012 (West Cumbrian MRWS Partnership, 2010). However, more work than was anticipated was required to fulfil the criteria on geology and the siting process. PSE

3 therefore took place between November 2011 and March 2012. CoRWM attended several community events that the Partnership arranged as part of PSE3.

4.15 At the time of writing, the Partnership's final report is planned to be issued in July 2012 (West Cumbrian MRWS Partnership, 2011a). CoRWM considers that it was important that the Partnership took the time it needed to consider the relevant issues at the appropriate level of detail.

#### *Government Support to the West Cumbria MRWS Partnership*

4.16 Government continued to support the work of the West Cumbria MRWS Partnership by attending all the meetings of the Partnership itself, providing staff at the PSE events that have been held in the community, and providing information to the Partnership as requested. DECC also attends meetings of the Steering Group and sub-groups of the Partnership when invited, such as the sub-group on community benefits.

4.17 From observing the work of the Partnership, the Committee's view is that the Partnership has, in the main, received all the support from Government that it required, including allowing the Partnership the time to identify the issues that it considers to be important and address them. However, over the last year, there has been some tension in the relationship between the Partnership and Government (CoRWM doc. 3040). CoRWM considers that this has the potential to lead to a breakdown in trust that could hinder future progress.

4.18 During its work, the Partnership identified several issues that will have to be addressed at later stages in the MRWS process but for which it has been necessary at this stage to agree the principles to be used in addressing them. These issues included:

- the development of a Community Benefits Package
- the role of the Community Siting Partnership in the identification of potential candidate sites in Stage 4
- community input to decisions on the inventory to be disposed of in a GDF.

4.19 These three sets of principles were submitted to DECC for agreement. Positive responses were received from the Minister for Energy, albeit with some clarifications and qualifications.

4.20 Last year, CoRWM pointed out to Government the importance of ensuring that the process of submission, assessment and approval of future budgets is completed in a timely fashion. It was pleased that the Partnership's budget for the year 2011-12 was approved by the start of that financial year and that the funding necessary for the Partnership to continue its 2011-12 work was provided at the start of 2012. The budget for the Partnership to complete its work in 2012-13 was agreed shortly after the start of the financial year.

#### *NDA Support to the West Cumbria MRWS Partnership*

4.21 The Partnership has indicated to CoRWM that there have been occasional difficulties with the quality and timeliness of NDA responses to its requests for information and this

has led to some delays in the Partnership's work. However, overall, NDA has provided good support to the work of the Partnership, particularly at its meetings and PSE events.

#### *CoRWM Information to the West Cumbria MRWS Partnership*

4.22 CoRWM responded to a request to explain its work at a Partnership seminar on geology held in June 2011 (West Cumbria Partnership, 2011b). A summary of the presentation was later posted on the CoRWM website.

4.23 The Committee replied to a letter from the Cumbria Association of Local Councils (CALC) about the prospects for finding a suitable site for a GDF in West Cumbria. The reply stated that, while there is a range of host geologies in West Cumbria that may prove to be suitable, there is not enough geological information at the present time to quantify the prospects of finding a suitable site (CoRWM doc 3023).

4.24 The Committee also responded to a request from the Partnership for information on CoRWM's deliberations when developing its 2006 recommendations on which areas in the country should be eligible to make an Expression of Interest. The request arose from PSE3 responses (para 4.12) stating that promising geologies throughout the country should have been identified first and then expressions of interest sought only from these areas. CoRWM's reply explained that the Committee had concluded that this would not be equitable (CoRWM doc. 1703, 2146).

#### **Framework for MRWS Stage 4**

4.25 Following advice from CoRWM (CoRWM doc. 2850), Government took the lead in drafting the consultation document on the framework for desk-based identification and assessment of potential candidate sites for geological disposal in MRWS Stage 4 (Figure 1). CoRWM commented informally on a number of drafts of the consultation document and also discussed it with DECC and RWMD.

4.26 The principal points made by CoRWM in its comments and in the discussions with DECC and RWMD were about:

- the need to identify potential sites for GDF surface and underground facilities in parallel, then assess possible combinations
- the considerable emphasis required on the geological and hydrogeological characteristics of potential GDF sites, because they are key to long-term safety
- the likely need to carry out geophysical surveys in MRWS Stage 4, as well as in Stage 5.

4.27 The consultation document was issued in June 2011 (DECC, 2011c). Many of CoRWM's comments had been taken into account and the Committee considered the document to be largely satisfactory. However, it felt that the issue of geophysical surveys in MRWS Stage 4 did not receive enough recognition. CoRWM therefore wrote to DECC (CoRWM doc. 2975) reiterating its view that, without geophysical surveys in Stage 4, there was a risk that there would not be enough information to identify optimum combinations of sites for surface and underground facilities, and hence that there would be delays and additional costs in Stage 5.

4.28 In March 2012, Government issued its final document on the framework for Stage 4 and its response to the consultation (DECC, 2012a,b). While the document had been improved over the consultation version, CoRWM remained of the view that the framework should have given more emphasis to the geological and hydrogeological characteristics of potential GDF sites, and to the likely need for geophysical surveys in MRWS Stage 4.

### ***Accelerating the Implementation of Geological Disposal***

4.29 In response to the Ministerial request (para 4.6, DECC, 2011b), RWMD initiated a programme of work to explore the possibility of accelerating the implementation of geological disposal. It held two workshops to identify scenarios that could lead to the earlier emplacement of wastes in a GDF. The scenarios included, but were not confined to, bringing forward the date of first emplacement of wastes from about 2040 (the current planning assumption) to about 2029 (the target favoured by Ministers). CoRWM attended these workshops as an observer. RWMD then assessed the resulting scenarios and presented its conclusions to the Minister and GDIB in December 2011. An RWMD report on its work was published shortly after the GDIB meeting (NDA, 2011j).

4.30 CoRWM commented informally on the RWMD paper for GDIB. DECC subsequently made a formal request for CoRWM's views on RWMD's work. The Committee gave its advice in March 2012 (CoRWM doc. 3006), on the understanding that it would publish it after Ministers had considered and decided on the way forward. The advice can be summarised as follows.

#### *CoRWM's Views on the Key Issues*

4.31 CoRWM takes the view that it is not practicable or desirable to bring forward the 2040 date for first emplacement of any wastes in a GDF. Rather than adopting a specific option to bring forward the 2040 date, it would be better to continue efforts to make the implementation of geological disposal as efficient as possible, consistent with technical, stakeholder and public needs. This would ensure that the momentum of the geological disposal programme is maintained, without the disruption that would be caused by adopting a new and overly challenging target date for first emplacement.

4.32 However, in CoRWM's view, there would be considerable advantages in bringing forward the 2075 date for first emplacement of HLW and legacy spent fuels and the 2130 date for first emplacement of new build spent fuel. Further work is required to identify the best means to do this and to determine the optimum dates for first emplacements of HLW and various types of spent fuel. It would also be worthwhile to shorten the emplacement programmes for HLW and spent fuels.

#### *CoRWM's Advice on the Way Forward*

4.33 CoRWM considers that RWMD's future work on acceleration should focus on bringing forward the dates for first emplacement of HLW, legacy spent fuels and new build spent fuels and on shortening the emplacement programmes for ILW, HLW and all

spent fuels. The Committee also considers that RWMD should keep an open mind on disposal concepts other than those for which it expressed a preference in its 2011 report.

4.34 CoRWM encourages Government to follow a structured approach, with stakeholder consultation, for the decision on whether and how to accelerate the geological disposal programme. If this were to be modelled on the current NDA approach to major strategic decisions, the next step would be identification of credible options for acceleration and publication of a report for comment. This would be followed by identification of and consultation on the preferred option. Consultees' views would be considered when Ministers take the decision on acceleration.

### ***Assessment of RWMD's Generic Disposal System Safety Case***

4.35 At the request of DECC, CoRWM carried out an assessment of RWMD's gDSSC suite of documents. These were published in February 2011 (NDA, 2011k) but are dated December 2010.

4.36 CoRWM's assessment covered the whole suite of gDSSC documents and three additional documents with which the gDSSC necessarily interfaces: RWMD's Technical Strategy, the Site Characterisation Status Report and the Strategy for Site Characterisation (NDA, 2011l-n).

4.37 CoRWM's objectives in assessing the gDSSC suite of documents were to determine whether RWMD:

- has a sufficiently comprehensive understanding of the scientific knowledge underpinning geological disposal
- is making full use of this knowledge in its work on the implementation of geological disposal, its development of a DSSC, its planning for site characterisation and its design studies for a GDF
- has in place processes to identify and fill gaps in its knowledge on appropriate timescales (where the judgement on "appropriate" takes into account whether the knowledge gap needs to be filled on a generic, rock-type-specific or site-specific basis).

4.38 The scope of the CoRWM assessment focused on:

- the extent to which the gDSSC inspires confidence that RWMD has the structures and processes in place to enable it to characterise a site, design a GDF, and make a satisfactory safety case with an appropriate balance of qualitative and quantitative arguments;
- RWMD's approach to identifying research and development (R&D) requirements for the implementation of geological disposal;
- RWMD's site characterisation strategy in relation to the gDSSC.

4.39 CoRWM published its assessment as a position paper (CoRWM doc. 2994) in March 2012. Its conclusions can be summarised as follows.

- 4.40 CoRWM concluded from its assessment that the gDSSC shows that, in most of the relevant scientific and technical areas, RWMD's understanding of the underpinning knowledge is demonstrated to be sufficiently comprehensive for the current stage of its work. The principal exceptions are in the areas of the characteristics and evolution of geological barriers, and groundwater movement. For these topic areas the gDSSC does not of itself demonstrate sufficient understanding or use of knowledge. However, this is not to say that RWMD may not have enough understanding or the capability to use knowledge of these topics. CoRWM believes that it will be straightforward for RWMD to make any improvements that are necessary before any site-specific DSSC is required.
- 4.41 From consideration of RWMD's R&D strategy, programme and implementation processes, and its plans to further develop these, CoRWM concluded that RWMD has, or will have, appropriate processes in place to fill gaps in its knowledge. In the topic areas where it has not yet shown sufficient understanding, it also needs to demonstrate that it has, or will have, the capability to be an intelligent client for R&D.
- 4.42 CoRWM concluded that RWMD's site characterisation strategy and plans are not yet comprehensive. They are, however, developing in appropriate directions at this stage of the implementation process, with sufficient provision for taking advantage of new methods and technologies in due course. In communicating its plans for site characterisation, it is important that RWMD does not inadvertently promote unrealistic expectations. While understanding of a site will increase as site characterisation progresses, there may also be increases in uncertainties and these may be large enough to lead to questions about the suitability of the site as a location for a GDF.

### ***Other RWMD Work on Implementation of Geological Disposal***

#### *Organisational Development*

- 4.43 RWMD's organisational structure was discussed at three CoRWM-RWMD update meetings during the year (CoRWM docs. 2961, 2979 and 3007). The new RWMD structure came into operation on 1 June 2011 and CoRWM considers that it is working well. CoRWM notes that RWMD has made good progress with filling the vacancies in its organisation and its work programme has not been delayed by a lack of staff. The Committee also notes that RWMD recognises that it will soon require additional expertise in geosciences (CoRWM doc. 2994; NDA, 2012g).
- 4.44 The business case for RWMD to become a wholly-owned subsidiary of NDA was endorsed by RWMD's Board (the Repository Development Management Board, RDMB) in March 2012 and then submitted to the NDA Executive and Board for approval. It will in due course also be submitted to DECC for consideration under NDA governance arrangements. The business case stated that RWMD would not become a wholly-owned subsidiary of NDA until Government has received a Decision to Participate in the GDF siting process (Stage 3 in Figure 1). It is proposed that the subsidiary would have a similar structure to the current RWMD.
- 4.45 The transition to a wholly-owned subsidiary is expected to take about a year and it is proposed that it will be completed early in MRWS Stage 4 (Figure 1). The latest date for the subsidiary to be in place is determined by the need for it to apply for permissions for

drilling exploratory boreholes in MRWS Stage 5. However, regulators are keen for the subsidiary to be formed earlier and this is what RWMD has proposed.

4.46 CoRWM agrees with the regulators that it is preferable for RWMD to become a wholly-owned subsidiary of NDA sooner rather than later. It also agrees with the RWMD approach of structuring and staffing the subsidiary in a way that is appropriate for MRWS Stage 4 and preparations for Stage 5. This approach recognises that further consideration needs to be given to how RWMD should be structured for the later stages of the implementation of geological disposal.

4.47 CoRWM notes that MRWS Stage 5 will require considerable programme management expertise, both for the surface-based investigation activities and for handling and interpreting the large amounts of site characterisation data that will be generated. MRWS Stage 6 involves construction of surface and underground facilities and is a major nuclear project that needs to be managed as such. The structure and size of organisation required for Stage 5 is thus different to that which is appropriate for Stage 4 and further changes will be needed for Stage 6. The Committee is pleased that RWMD is already giving some thought to organisational options for Stages 5 and 6.

#### *Preparations for MRWS Stage 4*

4.48 RWMD informed CoRWM during the year (CoRWM docs. 2979, 3007) that it was undertaking various items of work in preparation for Stage 4 of the GDF siting process (Figure 1). This work will continue in 2012-13 (NDA, 2012a).

#### *Concept Selection*

4.49 CoRWM met with RWMD, EA and ONR in November 2011 to discuss RWMD's proposed process for selecting a geological disposal concept. Issues discussed included the need for flexibility and pragmatism, so that changes can be made as more information becomes available about candidate sites for a GDF, and the importance of avoiding the selection of an option by default, simply because it is the one on which most information exists. RWMD was well aware of these issues and was taking them into account in its proposed process.

4.50 There was also discussion of the potential need for changes to the design of a GDF after permission had been given to construct it. This was followed up at a CoRWM-RWMD update meeting in February 2012 (CoRWM doc. 3007). RWMD told CoRWM that it had given some consideration to how the possible needs for changes in design would be dealt with in the contexts of Planning Permission and of permissions from EA and ONR to start construction of a GDF. There was also international work on the issue.

#### *Inventory of Wastes for Geological Disposal*

4.51 In its assessment of the gDSSC (para 4.35), CoRWM noted that neither the baseline nor the upper inventory considered by RWMD in the gDSSC was realistic in terms of current Government policy (e.g. on the long-term management of plutonium), current NDA strategy (e.g. for reprocessing AGR fuel) or the plans of potential new build operators (CoRWM doc. 2994). CoRWM had also pointed out to DECC and to NDA that

there were other inventories of wastes for geological disposal in use in various contexts (e.g. in DECC work on the price Government will charge for disposal of new build wastes; in the NDA cost estimate for its Nuclear Provision in its Annual Report and Accounts) (DECC, 2011d; NDA, 2011o).

- 4.52 CoRWM advised DECC and NDA that a scenario approach to the inventory would be desirable for technical reasons and for providing information to stakeholders and the public. It would indicate more clearly that the inventory for disposal is not yet fully known. It might also make it easier to explain that the inventory planned for any particular GDF is something to be determined as site investigation proceeds and that changes in inventory can be expected during GDF operation.
- 4.53 Basing the scenarios on realistic assumptions would demonstrate that the geological disposal programme is consistent with other parts of the UK programme for managing the nuclear legacy and with new build plans. Although different inventories might be needed for different purposes, it is important to ensure consistency throughout Government and NDA work.

#### *Development of a Strategic Environmental Assessment*

- 4.54 CoRWM held meetings with RWMD in July 2011 and March 2012 to discuss the development of a Strategic Environmental Assessment (SEA) for the implementation of geological disposal. At the July 2011 meeting, RWMD outlined how its plans for SEA had been developed in consultation with stakeholders. RWMD had drafted generic statements about potential social, economic and environmental impacts of implementing geological disposal but these could not yet be made site specific. A large number of SEA-related documents would need to be produced to meet the statutory requirements. CoRWM and RWMD agreed that there was a need for an integrated approach to facilitate consultation and make the documents useful to a wide audience.
- 4.55 The March 2012 meeting (CoRWM doc. 3044) focused on RWMD's intentions for an SEA of its Geological Disposal Implementation Plan (GDIP). Work on this would begin when a Decision to Participate (Stage 3 in Figure 1) had been made. It would be assumed that four sites would be identified and assessed in MRWS Stage 4, narrowing down to two in MRWS Stage 5. The finalised GDIP would contain a project definition describing how geological disposal would be implemented at each of the sites taken forward to Stage 5.
- 4.56 Topics discussed at the March 2012 meeting included developing the scope of the SEA, and related assessments, and the co-ordination that would be required between planning for the scoping consultation, engagement plans, and integration of the SEA, site identification and site assessment. As these relationships are highly complex, RWMD had sought legal advice on the relationship between the SEA and site assessment work and the decision-making process at the end of Stage 4.
- 4.57 CoRWM is of the opinion that RWMD is making good progress in its development of a robust and inclusive SEA process. Whilst much of the work that has so far been conducted has been generic in nature, it is clear that considerable thought and effort is

being put into working out how SEA could be implemented if and when a decision to participate is made.

#### *Issues Management Process*

4.58 CoRWM met with RWMD in July 2011 to discuss the RWMD Issues Management Process. The Committee subsequently decided to focus on overall scrutiny of the process and on providing its own issues to RWMD, but not to be drawn into examining how RWMD was handling specific issues raised by others.

4.59 When the RWMD report on its approach to issues management was published (NDA, 2011p), CoRWM sent RWMD informal comments. These covered topics including the accessibility of the process, whether it was likely to meet stakeholders' needs, the grouping of issues, assessment and screening of issues and resolving disputes between RWMD and stakeholders on how issues are being handled.

4.60 The Committee then noted the update given to GDIB on RWMD's approach and the timetable for producing the next version of the RWMD report. It postponed further scrutiny and advice until this version was available.

#### *Preparations for MRWS Stage 5*

4.61 RWMD informed CoRWM that it has started its planning for MRWS Stage 5, surface-based investigations (CoRWM doc. 3007). It has held two integrated planning workshops with the supply chain, at which EA was also present as an observer. CoRWM views such planning as prudent in view of the long lead times for some Stage 5 activities. The Committee considers that it is essential that RWMD's strategy and plans for site characterisation are fully developed and have been subject to review by the regulators and others before the start of the Stage 5 surface-based investigations.

#### *Review of Alternatives*

4.62 Government stated in the 2008 MRWS White Paper (Defra *et al.*, 2008) that NDA would keep alternatives to geological disposal in a mined facility under review. CoRWM was aware that RWMD had carried out some work on alternatives prior to its assessment of options for accelerating the geological disposal programme (para 4.29). In response to a query from CoRWM in March 2012, RWMD stated that it would be progressing its work on alternatives during 2012-13. It would need to take account of insights gained during the assessment of acceleration options (*e.g.* about developments in the use of deep boreholes) and to consult DECC about the scope of what was required to meet the commitment in the White Paper.

#### ***Terminology for Reversibility, Retrievability and Recoverability***

4.63 In January 2012, the Committee reviewed the national and international nomenclature on reversibility, retrievability, and recovery in the contexts of geological and near-surface disposal (CoRWM doc. 3003). It concluded that, where it needed to, the Committee should use the following definition of retrievability derived in a project carried out by the Nuclear Energy Agency (NEA) of the Organisation for Economic Cooperation Development (OECD, 2011).

***Retrievability** is the ability in principle to recover waste or entire waste packages once they have been emplaced in a repository; **retrieval** is the concrete action of removal of the waste. Retrievability implies making provisions in order to allow retrieval should it be required.*

4.64 CoRWM noted that it is important to explain exactly what is meant in each context, rather than relying on terms that may mean different things to different people. In general, it is better to use simple language to explain what the actual processes would be in the operations on the wastes and the start and finish states of the operations and the facilities, rather than specific terms with definitions that not everyone agrees with (CoRWM doc. 3003).

## **5 SCRUTINY AND ADVICE ON SCOTTISH GOVERNMENT HAW POLICY AND STRATEGY**

5.1 The 2011-12 CoRWM task on Scottish Government HAW policy and strategy was:

### ***Task B***

*Report on scrutiny of the development of the Scottish Government policy for the management of HAW, monitor any further development of the policy if required, and scrutinise and advise on implementation of the policy.*

### ***CoRWM's Impact on the Policy Development Process***

5.2 CoRWM published its paper giving its views on the process used by Scottish Government to develop its HAW policy in September 2011 (CoRWM doc. 2818). This amplified the summary given in CoRWM's 2010-11 Annual Report (CoRWM doc. 2922). It covered Scottish Government work from the first statement of the policy in 2007 to the publication of the policy document in January 2011 (Scottish Government, 2011).

5.3 The paper noted that CoRWM had influenced the process in the early stages of preparing the consultation documents by its detailed scrutiny of drafts and advice to Scottish Government. The Scottish Government timetable for publishing documents had subsequently been adjusted to ensure that the most relevant and accurate information had been included. CoRWM also added value to the process by providing stakeholders with information during bilateral discussions (CoRWM doc. 2818).

### ***Development of an Implementation Strategy***

5.4 In 2011-12, Scottish Government began a programme of work to develop a strategy to implement its HAW policy. CoRWM is an observer on the Project Board and a member of the Technical Advisory Group that Scottish Government has set up to assist it to develop the implementation strategy. It also attends, as an observer, the Scottish Nuclear Sites meetings held by Scottish Government.

5.5 During the year, CoRWM provided informal advice to Scottish Government on its implementation strategy work. This included advice on the preparation of project initiation documents.

5.6 Two update meetings were held with Scottish Government in 2011-12 (CoRWM docs. 2966, 2988). These were opportunities to exchange information on recent work, as well as to discuss Scottish Government plans for, and progress with, development of its implementation strategy.

5.7 In the first part of 2011-12, it became apparent to Scottish Government and to CoRWM that neither the Project Board nor the Technical Advisory Group were operating as expected. It was also clear that Scottish Government had only been able to devote limited resources to the development of the implementation strategy. CoRWM was pleased that Scottish Government took steps to address this situation. It carried out a

review of the Board and Group's membership and ways of working and took on, under contract, a fulltime project manager for the development of the strategy. CoRWM also understands that the scope of the implementation strategy is to be reduced so that it focuses on a small number of key issues and that there will be more dialogue with waste producers about how they are already implementing the Scottish Government HAW policy.

## 6 SCRUTINY AND ADVICE ON R&D

6.1 The task on research and development (R&D) set out in CoRWM's 2011-12 work programme (CoRWM doc. 2919) was:

**Task G**

*Scrutinise and advise on the plans, proposals, and arrangements for R&D for treatment, packaging, storage, transport and disposal of higher activity waste (HAW), spent fuels and nuclear materials. Sub-tasks were:*

**G1** *scrutinise and advise on R&D for treatment, packaging, storage and transport of HAW, spent fuels and nuclear materials.*

**G2** *scrutinise and advise on R&D for geological disposal.*

### **Interactions with Government on R&D Issues**

#### *Meeting with DECC Chief Scientific Advisor*

6.2 In August 2011, CoRWM met with the DECC Chief Scientific Advisor, Professor David MacKay (CoRWM doc. 2963). Topics discussed were UK facilities for R&D with highly radioactive materials, NDA co-ordination of its R&D on the long-term management of HAW, engagement of the Research Councils in HAW management R&D, and provision of high level R&D skills.

6.3 As a result of this meeting, CoRWM prepared a paper for Professor MacKay on the strategic co-ordination of UK R&D for the long-term management of HAW (CoRWM doc. 2973). The paper explained why CoRWM considers there is a need to:

- improve and expand the National Nuclear Laboratory's (NNL's) facilities for research with highly radioactive materials
- improve arrangements for co-ordinating R&D on the treatment, packaging, storage and transport of HAW, spent fuels and nuclear materials
- extend geological disposal R&D beyond the programmes of RWMD<sup>10</sup> and the regulators to include independent and wider-ranging research.

#### *House of Lords Inquiry into Nuclear R&D Capabilities*

6.4 In April 2011 the House of Lords Select Committee on Science and Technology (HoLSTC) launched an inquiry into whether the UK's nuclear R&D capabilities are sufficient to meet its future nuclear energy requirements to 2050. CoRWM provided written (CoRWM docs. 2927, 2947) and oral (HoLSTC, 2011a) evidence to the inquiry. The HoLSTC report on its inquiry was published in November 2011 (HoLSTC, 2011b)

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<sup>10</sup> RWMD refers to its R&D programme as "needs driven". CoRWM prefers to avoid this term because it could be taken to imply that only the RWMD-funded R&D is needed, which in the Committee's view is not the case (CoRWM docs. 2973, 2995).

and the Government responded to the recommendations in the report in February 2012 (HoLSTC, 2012).

6.5 CoRWM's key issues in its evidence to the HoLSTC inquiry (CoRWM docs. 2927, 2947, HoLSTC, 2011a) were:

- strategic coordination of UK R&D for HAW management, including disposal
- facilities for working with highly radioactive materials and the NNL
- comparison of the UK's R&D with international programmes and need for greater UK participation in them
- the need for underground R&D for geological disposal
- the roles of NDA and the Research Councils in support of HAW management R&D.

6.6 In March 2012, CoRWM produced a paper (CoRWM doc. 2995) containing comments on the HoLSTC recommendations (HoLSTC, 2011b) and the Government's response (HoLSTC, 2012). The paper was intended to provide input to further work by Government and the Government's Chief Scientific Advisor on capabilities for and co-ordination of nuclear R&D.

6.7 CoRWM's comments (CoRWM doc. 2995) were about:

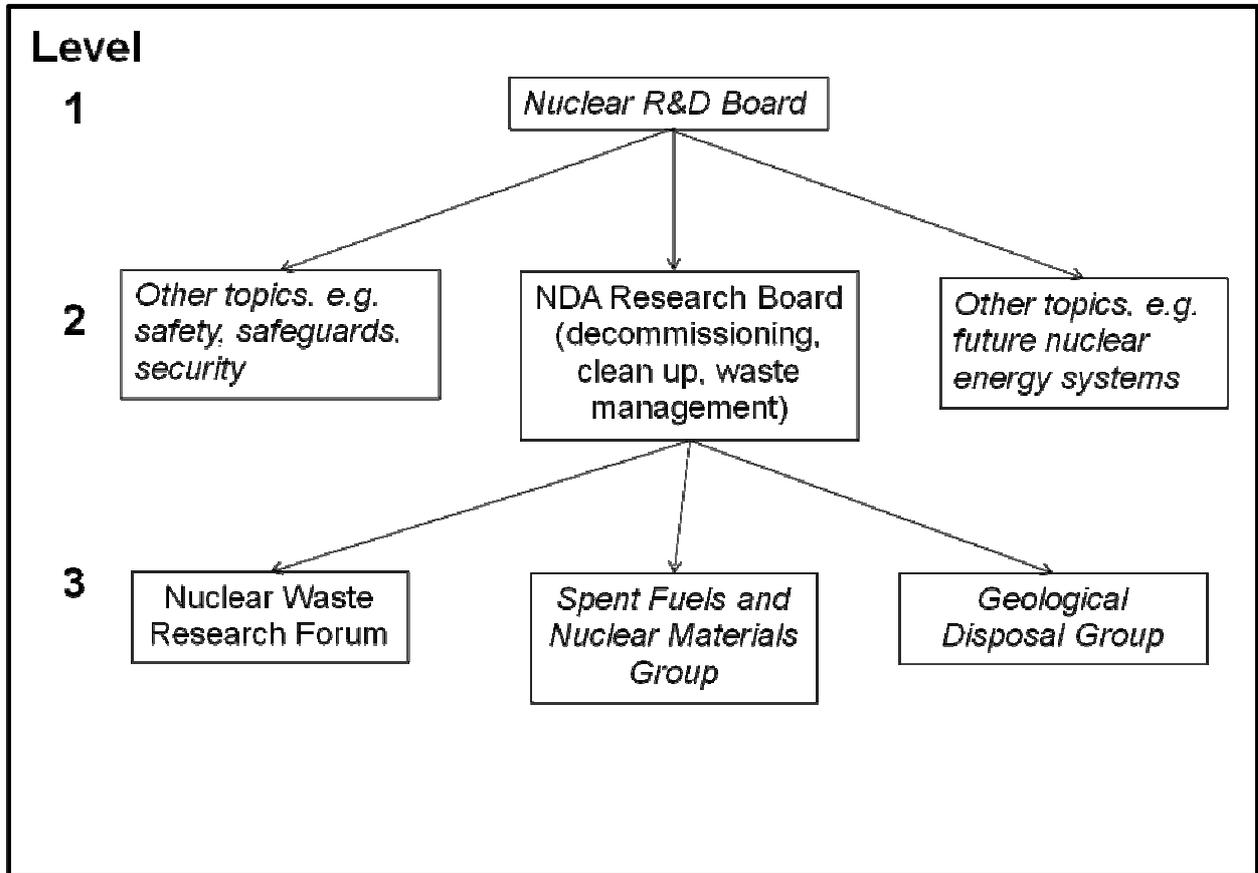
- the Advisory Board for nuclear R&D that was to be created by Government, chaired by the Government Chief Scientific Advisor
- the nuclear R&D roadmap, the development of which was to be led by Government, using the results of a review of existing R&D programmes, facilities and resourcing
- facilities for research with highly radioactive materials
- co-ordination of R&D for the long-term management of higher activity wastes, spent fuels and nuclear materials
- skills.

6.8 In its comments, CoRWM welcomed the establishment of an Advisory Board on nuclear R&D. The Committee stated that it believes there is a need for a body to be responsible for high-level coordination of nuclear-related R&D. It also believes that second level bodies are needed to be responsible for more detailed co-ordination relevant to HAW management, including disposal. CoRWM considers that one of these second level bodies should be the NDA Research Board, which should co-ordinate all decommissioning and clean up R&D, including all R&D on management of legacy and new build radioactive wastes. Bodies reporting to the NDA Research Board, including the existing Nuclear Waste Research Forum (NWRP), should co-ordinate R&D in particular topic areas. The arrangements that CoRWM envisages are illustrated in Figure 2 (CoRWM doc. 2995).

6.9 HoLSTC recommended that a business case be developed to commission Phase 3 of the Central Laboratory operated by NNL. It also recommended that Government extends the remit of NNL to enable it to carry out a programme of applied long-term R&D of national strategic need. CoRWM noted (CoRWM doc. 2995) that the Government response did not address the strategic need to expand NNL's facilities for research with

highly radioactive materials, nor the desirability of enabling>NNL to compete effectively with national laboratories in other countries. CoRWM believes that it is essential to take both these factors into account in decisions on the future of>NNL and its facilities.

**Figure 2 Arrangements Envisaged by CoRWM for Coordination of Nuclear R&D**



Notes for Figure 2

- i) Names of new bodies are in *italics*.
- ii) NDA Research Board and all bodies at level 3 would deal with legacy and new build wastes, spent fuels and nuclear materials.

6.10 HoLSTC recommended that “NDA, the Natural Environment Research Council (NERC) and other relevant funders ensure that sufficient R&D capabilities and expertise are maintained over the longer term to manage legacy and existing systems waste” (HoLSTC, 2011b). CoRWM agreed (CoRWM doc. 2995) that it is necessary to have arrangements in place to maintain R&D capabilities and expertise in the longer term. It considers that such arrangements should cover legacy and new build wastes, spent fuels and nuclear materials, and that the arrangements it favours for co-ordination of R&D (Figure 2) would also be suitable for maintaining capabilities and expertise.

6.11 CoRWM strongly supported (CoRWM doc. 2995) the HoLSTC suggestion (HoLSTC, 2011b) that the Research Councils, working with NDA, should ensure that sufficient fundamental research is carried out on the long-term management of HAW, spent fuels and nuclear materials, particularly on geological disposal.

### *Meeting with BIS Head of Research Funding*

6.12 At the suggestion of the DECC Chief Scientific Advisor, CoRWM met with Graeme Reid, Head of Research Funding at the Department for Business, Innovation and Skills (BIS) (CoRWM doc. 3004). The purpose of the meeting was to discuss the role of BIS in allocating research funds and the engagement of the Research Councils with R&D to support the long-term management of HAW, particularly the implementation of geological disposal.

6.13 BIS is responsible for funding the science and research base in the UK but the Research Councils set their own priorities. BIS advised that, if CoRWM considered that any particular Research Council was not funding enough research on HAW management that was independent of NDA, the Committee would need to communicate its view to that Council.

### ***Interactions with NDA on R&D***

#### *NDA Research Board*

6.14 The NDA Research Board (NDARB) was reconstituted in 2011 with an expanded membership, an independent Chair and new terms of reference. These changes were made largely in response to recommendations in CoRWM's 2009 report to Government on R&D (CoRWM doc. 2543). NDARB met in May and November 2011 (NDA, 2011q, 2012e). At both meetings, CoRWM was present as an observer.

6.15 Outside these meetings, CoRWM met with the NDARB Chair and the senior NDA R&D team to discuss issues arising from the Committee's paper for the DECC Chief Scientific Advisor (CoRWM doc. 2973). Points made by the Committee during the meeting (CoRWM doc. 3021) included the following.

- The structure illustrated in Figure 2 is intended to allow coordination between many bodies with different roles, responsibilities and needs. It is not a structure intended to provide control.
- The top level 'Nuclear R&D Board' should have coordinating and facilitating responsibilities, rather than an executive role as the HoLSTC recommended.
- NDARB should be expanded to include the R&D needs of new build operators and URENCO.
- All the level 3 bodies under NDARB would cover legacy and new build wastes, spent fuels and materials.
- CoRWM believes geological disposal R&D should include independent research, as well as the RWMD R&D programme and regulators' R&D (CoRWM doc. 2973).
- Facilities cut across all user sectors and should therefore be considered at the top level.

6.16 CoRWM considers that the reconstituted NDARB has made a good start. However, there is some way to go before NDARB will be in a position to advise on the adequacy of the R&D being carried out by NDA and its SLCs, or to fulfil the wider role in strategic co-ordination that the Committee believes it should undertake (para 6.8 and Figure 2).

### *Nuclear Waste Research Forum*

- 6.17 NWRF is sponsored by NDA; participants include all NDA's SLCs, some other nuclear site licensees, MOD, ONR, EA and SEPA. CoRWM attends NWRF meetings as an observer. Summaries of NWRF meetings are published on the NDA website (e.g. NDA, 2011r). One of the Co-Chairs of NWRF attends each NDARB meeting and the Chair of NDARB attended an NWRF meeting in 2011.
- 6.18 NWRF is updating its terms of reference following the reconstitution of NDARB and in the light of views expressed by regulators and CoRWM. The intention is that NWRF will be less centred on activities in NDA and its SLCS and that there will be a greater focus on ensuring that R&D that is relevant to several organisations is commissioned and the results disseminated.
- 6.19 During 2011-12, NWRF reconstituted and formalised its Working Groups. There are now six groups covering: characterisation (of wastes, facilities, land), waste treatment, packaging and storage, decommissioning, university interactions, Technical Baseline and Underpinning R&D Documents (TBuRDs), and land quality management. CoRWM has been invited to take part in one or two groups as an observer.
- 6.20 CoRWM considers that NWRF is a valuable means of co-ordinating R&D on management of HAW. It believes that the new terms of reference and reconstituted Working Groups will make NWRF more effective.

### *RWMD Research Advisory Panel*

- 6.21 CoRWM attends meetings of the RWMD Research Advisory Panel (RAP) as an observer. RAP reviews the content and management of RWMD's research programme on geological disposal. It also considers strategic issues such as managing the transition from generic to site-specific R&D, separating site characterisation from R&D, and underground R&D, including the possible need for an Underground Research Laboratory. The Chair of RAP is a member of NDARB.
- 6.22 Through its attendance at RAP meetings, CoRWM received information about RWMD's plans to update its current R&D programme document to include new issues and projects. It also learnt that RWMD is developing an approach to evaluating the success of each R&D project, in terms of the extent to which the project has filled knowledge gaps. In its assessment of the gDSSC (CoRWM doc. 2994), CoRWM stated that, whilst noting that the proposals discussed by RAP do not as yet constitute the agreed position of RWMD, it considered that such an approach is essential to the successful implementation of RWMD's Technical Strategy (NDA, 2011l).
- 6.23 RWMD has told RAP how it intends to revise its R&D Strategy and to develop its next R&D Programme. CoRWM was pleased to learn that RWMD intends to consult extensively on its future R&D Strategy and Programme (CoRWM doc. 2994). Other influences on the future strategy and programme will include the RWMD Issues Management Process (NDA, 2011p) and various national and international conferences. CoRWM also understands that RWMD plans to hold further specialist workshops. These

are valuable for highlighting changes required to the R&D Programme in the short term and in identifying needs for longer term and site-specific work (CoRWM doc. 2994).

6.24 In 2011-12, RWMD reviewed its Advisory Panels, including RAP, and also looked at arrangements in Waste Management Organisations (WMOs) in other countries. As a result, it decided to replace all its Advisory Panels with one Technical Advisory Panel (TAP), which will provide higher level, integrated advice on all RWMD's technical work (CoRWM doc. 3007). TAP is expected to consist of six people and to be chaired by the current RAP Chair. It will cover all the science and engineering areas relevant to the implementation of geological disposal, including social sciences.

#### *NDA R&D on Management of Spent Fuels and Nuclear Materials*

6.25 CoRWM discussed R&D on management of spent fuels and nuclear materials with NDA at meetings with NDA in September 2011 and March 2012 (CoRWM docs. 2972, 3025). It noted that all NDA's work on developing and implementing strategies for management of spent fuels and nuclear materials is underpinned by targeted R&D projects, many of them funded through NDA's Direct Research Portfolio (NDA, 2011s). Recent and current R&D topics include (CoRWM docs. 2972, 3025):

- extending pond storage times for Magnox fuel
- wet and dry storage of AGR fuel
- co-storage of exotic fuels
- HEU properties during storage
- immobilisation of plutonium using hot isostatic pressing (HIP)
- encapsulation of uranics.

#### **Research Councils**

##### *EPSRC*

6.26 In 2011-12, the Engineering and Physical Sciences Research Council (EPSRC) made its final decisions on the geological-disposal-related research projects to be funded jointly with RWMD as part of the joint Research Councils Energy Programme (RCEP) and the projects began. Also in 2011-12, EPSRC appointed a "Nuclear Champion" (Professor Robin Grimes of Imperial College), reviewed its activities and indicated that it expected to maintain the proportion of its spend devoted to nuclear fission. CoRWM notes that within the EPSRC nuclear fission portfolio there are a number of projects that include research related to HAW management (*e.g.* collaborative research with India), in addition to those funded jointly with RWMD.

##### *NERC*

6.27 CoRWM understands that RWMD will be providing funding for the geological disposal element of the Natural Environment Research Council (NERC) Radioactivity and the Environment (RATE) programme (CoRWM doc. 3007). EA also expects to provide some funding for the programme. An expert group has been formed to scope the programme and it will hold a 2-day workshop in May 2012. The call for proposals is expected to be issued in autumn 2012.

## ESRC

6.28 RWMD told CoRWM that it had held discussions with the Economic and Social Research Council (ESRC) about jointly funding research (CoRWM doc. 3007). ESRC had indicated that it would be very willing to consider joint funding but agreed with RWMD that it would be appropriate to wait until there had been a Decision to Participate, so that potential host communities could be involved. CoRWM questioned the rationale for waiting, pointing out that it could be useful to carry out generic research or research in communities so far unaffected by the geological disposal programme.

## Skills

6.29 CoRWM met with the Cogent Sector Skills Council and the National Skills Academy for Nuclear (NSAN) to exchange information about R&D and other high-end skills required for HAW management, including geological disposal (CoRWM doc. 2942). Cogent and NSAN outlined their roles in identifying nuclear skills needs and ensuring they are met. Their work to date had covered decommissioning, new build and the defence sector.

6.30 CoRWM emphasised the need to consider the geoscience and engineering skills required for geological disposal, both in the near future and in the longer term. Cogent indicated that it was in touch with RWMD on such issues and expected to engage with RWMD further in the future. It was noted that the UK would need to find the right balance between drawing on international skills and developing and maintaining its own expertise (CoRWM doc. 2942).

## ***Conference on Geological Disposal of Radioactive Waste: Underpinning Science and Technology***

6.31 Two members of CoRWM attended the conference on science and technology for geological disposal that was held in Loughborough in October 2011 (NDA, 2011t). The conference was organised by the Royal Society of Chemistry, the Geological Society, the Institute of Civil Engineers, the Nuclear Institute, the Institute of Chemical Engineers, the Royal Academy of Engineering and the Mineralogical Society. The aim was “*to showcase and publish research relevant to radioactive waste storage/disposal*”. The conference was supported by RWMD, with additional sponsorship from other bodies.

6.32 The conference was well-attended and CoRWM noted that a large number of young postgraduates were present. In the oral sessions the emphasis was on review papers, rather than cutting-edge science. The poster sessions provided more information on new research but many were about projects that had just started, rather than results of recent work (CoRWM doc. 2986).

6.33 CoRWM welcomed the conference as a means of disseminating information about R&D on geological disposal to a wider audience. The Committee also considers that subjecting the conference papers to peer review prior to publication is an important step. In the past, too many documents on geological disposal R&D have appeared as “grey literature”, rather than being published in peer-reviewed journals.

## **7 SCRUTINY AND ADVICE ON MANAGEMENT OF NEW BUILD WASTES**

### ***Monitoring of Developments***

7.1 CoRWM followed developments relevant to the management of new build wastes (spent fuels and ILW) throughout 2011-12 and published papers summarising the information that it had obtained (CoRWM docs. 2890, 2996).

7.2 In January 2012, CoRWM met the ONR-EA Generic Design Assessment (GDA) team to discuss progress on ILW and spent fuel management aspects of GDA and of licensing and permitting of the proposed new PWR station at Hinkley Point (CoRWM doc. 3005). The discussions covered technical aspects of GDA, the Assessment Findings, and the GDA public involvement process. Topics discussed for Hinkley Point C included decay storage of operational ILW (so that it can be disposed of as LLW), the EDF Energy preference for wet storage of the station's spent fuel, the environmental permitting process and the progress of Town and Country Planning procedures.

### ***CoRWM's Position Statement on New Build Wastes***

7.3 As agreed in 2010-11 (CoRWM doc. 2867), CoRWM considered in 2011-12 whether or not to change its position statement on new build wastes (CoRWM doc. 2749). The Committee decided that the position statement would not be updated or revised.

7.4 The reason for the decision is that CoRWM considers that developments since the statement was produced mean that wastes from new reactors should simply be regarded as part of the inventory of wastes that will have to be managed in due course. CoRWM's scrutiny and advice role relates to the whole of the inventory and it does not need a separate position on new build wastes.

### ***Optimisation of the Management of New Build Wastes***

7.5 In its letter to DECC about waste management issues arising from the Government response to the first consultation on the draft National Policy Statement for energy infrastructure (CoRWM doc. 2878), CoRWM commented that there is a need for a holistic optimisation of all the steps in the management of new build spent fuel, from arising through to, and including, geological disposal. A subsequent CoRWM paper (CoRWM doc. 2890) raised questions about the financial incentives for new build operators and RWMD to carry out optimisation for new build wastes.

7.6 CoRWM noted (CoRWM doc. 2996) that the regulators' GDA Assessment Findings make it clear that they will require new build operators to show that risks have been reduced to as low as reasonably practicable (ALARP) and that best available techniques (BAT) will be used to manage wastes. There is also a specific ONR Assessment Finding for new build operators to work with RWMD to produce a plan for the work necessary to reduce the on-site interim storage period for spent fuel (ONR, 2011a,b). The Government response to the FDP Guidance consultation (DECC, 2011e) also makes some reference to optimisation in the context of spent fuel encapsulation.

7.7 CoRWM considers that, while these developments are encouraging, they are somewhat piecemeal. As yet, there is no evidence of the intention to carry out the type of holistic optimisation CoRWM had in mind.

***Consideration of New Build Wastes in the Implementation of Geological Disposal***

7.8 In a paper published in June 2011 (CoRWM doc. 2890), CoRWM commented that it was unsatisfactory that RWMD was only considering new build spent fuel from a 10 GW(e) programme in its implementation planning and its DSSC, and doing so in less detail than for the Baseline Inventory, in which there is no new build spent fuel. Since then, RWMD has given some consideration to spent fuel from a 16 GW(e) programme (NDA, 2011u). However, it has yet to adopt the type of scenario approach that CoRWM considers is required (CoRWM doc. 2994), in which full account is taken of possible quantities of new build spent fuel in GDF siting, design and safety case development.

7.9 A further development is that RWMD has established a GDF Users Group for waste producers. Prospective new build operators are represented on the group, as well as owners and producers of existing and committed wastes. The Committee welcomes the formation of this group and will attend its meetings as an observer.

## **8 SCRUTINY AND ADVICE ON PSE OF OTHER ORGANISATIONS**

8.1 CoRWM produced a position paper in March 2011 on the PSE of other organisations (CoRWM doc. 2850). The paper described the results of the Committee's scrutiny of the PSE of Government and the NDA up to the end of 2010. In order to give a fuller picture, it also referred to the PSE of other organisations involved in the management of HAW, including regulators and site operators. In 2011-12, CoRWM monitored developments, particularly on concerns raised in the paper, such as the possibility that fewer resources would be devoted to PSE in the current economic climate.

### **NDA**

#### *General*

8.2 NDA's stakeholder and community strategy has three components: national engagement, SSGs and consultations on specific documents (e.g. its Draft Business Plan (NDA, 2011v). In 2010-11, NDA commissioned a review of its national engagement to "reflect on its work with stakeholders and consider whether or not the current arrangements remained fit for purpose". In 2011-12, NDA held its first national stakeholder event under the new arrangements. A CoRWM member attended the event and reported (CoRWM doc. 2990) that it was a smaller, more focused event than previous ones and that feedback from participants suggested that they thought it was better organised and facilitated than in previous years.

8.3 In October 2011, NDA published a Stakeholder Engagement Plan on its website. The plan highlighted where stakeholders would be "*informed, consulted and/or given a chance to engage in the development and implementation of NDA strategy*". It had sections for each theme in the NDA Strategy. CoRWM noted the plans for engagement on HAW strategy, spent fuels and nuclear materials and followed developments as part of its scrutiny of NDA work on these topics (Section 3).

#### *RWMD*

8.4 As reported in Section 4 (para 4.54), RWMD is developing plans for an SEA of its Geological Disposal Implementation Plan, including the engagement mechanisms that could be utilised. A tranche of related studies will need to be conducted, all at the same time, and all of which will require formal engagement. CoRWM has held two meetings with RWMD on this topic (para 4.54), which has allowed the Committee to make comments at an early stage of the development of the proposed process.

8.5 RWMD plans that, after a Decision to Participate (MRWS Stage 3), the SEA and the various consultation stages will be carried out alongside engagement on the approach to site identification and assessment (MRWS Stage 4). The processes will need to be coordinated to avoid confusion and consultation overload. It is expected that the consultation on the approach to site identification and assessment will be more about process rather than content. Given that the two processes will overlap and cover many of the same issues, RWMD will need to avoid duplication of work.

8.6 CoRWM considers that RWMD is to be commended for anticipating potential problems by developing a Draft Engagement and Communications Plan for a post-Decision-to-Participate Scoping Consultation. It will cover not only the legal requirements of engagement in scoping for the SEA but also how engagement will be conducted in the site identification and assessment process. The plan clearly differentiates between communication, consulting and involvement approaches; identifies fifteen different stakeholder groups and the most appropriate methods to engage with them; and indicates how success will be measured.

### ***DECC***

8.7 DECC PSE during 2011-12 included consultation on the framework for MRWS Stage 4 (DECC, 2011c) and two meetings of the Office for Nuclear Development's (OND's) NGO Forum. CoRWM noted that radioactive waste management has not been a major topic at the OND NGO Forum. When it has been discussed, the emphasis has been on new build wastes.

### ***MRWS in West Cumbria***

8.8 The PSE process that has been conducted in Cumbria by the West Cumbria MRWS Partnership is probably one of the most extensive that has ever been undertaken in the UK on nuclear issues. CoRWM considers, from its scrutiny of the process, that NDA and DECC have made constructive inputs to the process. They have provided information and assistance on factual matters and have not attempted to influence the Partnership's final report.

### ***Ministry of Defence***

8.9 MOD carried out a national consultation from October 2011 to February 2012 as part of its Submarine Dismantling Project. The consultation sought views on where dismantling work should be carried out, how the submarines should be dismantled and the type of storage site for the radioactive waste. The consultation was supported by a dedicated website, local consultation events at the two potential dismantling sites (Rosyth and Devonport), and two National Stakeholder Workshops. A CoRWM member attended each of the two national workshops.

### ***Regulators***

8.10 At its various meetings with regulators (CoRWM docs. 2965, 2993, 3005), CoRWM has taken the opportunity to discuss PSE. The Committee has noted that there has been no decrease in the resources that regulators are devoting to PSE. On the contrary, ONR, which was established in April 2011, has emphasised its commitment to openness and transparency. ONR has requested that Government includes in the legislation to set it up as a statutory corporation a requirement to operate in an open and transparent way (ONR, 2011c).

8.11 A dedicated section of the Health and Safety Executive website has been established for ONR (<http://www.hse.gov.uk/nuclear/background.htm>), which gives extensive

information on its structure, work and publications. There is a latest news section and quarterly bulletins are produced. The content is accessible to the general public and stakeholders. The site links to the new nuclear power station website operated jointly with EA (<http://www.hse.gov.uk/newreactors/index.htm>), which contains information on the GDA, including quarterly bulletins.

## **9 2012-13 WORK PROGRAMME**

9.1 CoRWM submitted its proposed work programme to Ministers for approval at the end of March 2012 (CoRWM doc. 3022). The work programme for 2012-13 had to be particularly flexible in order to allow for a new Chair and potentially seven new members of the Committee in the second half of the year. In addition, a Cabinet Office Triennial Review of CoRWM began in March 2012, which could have resulted in changes to the size or remit of the Committee.

9.2 The proposed priorities for scrutiny and advice in 2012-13 were (CoRWM doc. 3022):

### *Treatment, Packaging, Storage and Transport*

- NDA's further development of its strategy for the management of higher activity wastes.

### *Geological Disposal*

- The current stage of the process for siting a geological disposal facility (the MRWS process), with potential decisions in West Cumbria on whether or not to participate further in the process.
- Government and NDA preparations for Stage 4 of the MRWS process
- Proposals for acceleration of the geological disposal programme.

### *Implementation of Scottish Government Policy for Higher Activity Waste*

- Development of a strategy to implement the Scottish Government higher activity Waste policy (of near-surface, near-site storage and disposal).

### *Research and Development*

- Monitoring developments following the Government response to the House of Lords Select Committee on Science and Technology report on nuclear research and development capabilities.

9.3 The proposed deliverables for 2012-13 are sections in the CoRWM 2012-13 Annual Report. It is anticipated that informal advice will be given during the year on key developments.

9.4 CoRWM will carry out its own public and stakeholder engagement to support its work.

9.5 In formulating its programme for 2012-13, CoRWM assumed that its budget and Secretariat resources would be similar to those in 2011-12.

## 10 CORWM'S VIEWS ON THE STATUS OF UK PLANS AND ARRANGEMENTS FOR MANAGING HIGHER ACTIVITY WASTES

### ***Approach to the Assessment of the Status of Plans and Arrangements***

10.1 This section of the report contains CoRWM's comments on the current (June 2012) status of UK plans and arrangements for the management, including the disposal, of HAW. It also covers the management of those spent fuels and nuclear materials that may need to be dealt with as waste.

10.2 In its previous two annual reports (CoRWM docs. 2807, 2922), the Committee commented on various aspects of HAW management plans and arrangements without reference to particular milestones or timeframes. The approach this year is to comment in the context of the strategic position that the UK needs to reach by summer 2015.

10.3 CoRWM is taking this approach for two reasons. The first of these is that, by 23 August 2015, the UK must report to the European Commission on its national programme for the responsible and safe management of spent fuel and radioactive waste. This is a requirement of EU Directive 2011/70/Euratom, which the UK must transpose into laws, regulations and administrative provisions by 23 August 2013 (EU, 2011). The second reason is that NDA has to review and, if necessary revise, its Strategy (NDA, 2011w) during 2015, so that its new Strategy can be agreed and published by the start of April 2016.

10.4 The EU Directive (EU, 2011) specifies the contents of national programmes for the management of spent fuel and radioactive waste. It requires the programmes to include, *inter alia*:

- policy objectives for the management of spent fuel and radioactive waste
- significant milestones and clear timeframes for achieving those objectives
- concepts or plans and technical solutions for the management of spent fuel and radioactive waste, from generation to disposal
- research, development and demonstration activities needed to implement solutions for the management of spent fuel and radioactive waste
- key performance indicators for monitoring progress in implementation of the national programme
- an assessment of the costs of the national programme, including a cost profile over time.

10.5 The Directive also requires Member States to have arrangements to obtain, maintain and further develop the expertise and skills required to carry out the national programme. A further requirement is that Member States must give the public the opportunities necessary to participate effectively in decision-making processes for management of spent fuel and radioactive waste.

10.6 CoRWM considers that the best way for the UK to demonstrate compliance with the Directive would be to have in place clear strategies for the management of all its spent fuels and radioactive wastes, together with programmes of work to implement those strategies. NDA's strategies for the management of the spent fuels and radioactive

wastes for which it is responsible will need to form the principal parts of these UK strategies.

### **Treatment, Packaging and Storage of HAW**

10.7 At present, neither NDA nor the rest of the UK nuclear industry has an agreed HAW management strategy. This is in contrast to the situation for LLW, for which there is a UK nuclear industry strategy (NDA, 2010c) that was developed under NDA auspices and that is used by NDA as its LLW strategy (NDA, 2011w). There is also a national implementation plan and programme for LLW management<sup>11</sup>.

10.8 NDA's integrated waste management strategy development programme (NDA, 2012f) does not contain a clear commitment to producing either a standalone NDA HAW strategy or an NDA integrated waste management strategy that contains an HAW strategy. As far as CoRWM is aware, there is no work in progress to produce a UK nuclear industry HAW strategy or a UK nuclear industry integrated waste management strategy that contains a HAW strategy.

10.9 CoRWM considers that this situation is unsatisfactory. In the Committee's view it is important to develop, preferably by August 2015, both a UK nuclear industry HAW strategy and a UK nuclear industry integrated waste management strategy. The former will need to include geological disposal (para 10.15), Scottish HAW (para 10.30) and new build ILW. The latter will need to bring together the HAW strategy, the LLW strategy, the relevant parts of the UK strategy for radioactive discharges (DECC *et al.*, 2009) and nuclear industry arrangements for managing its non-radioactive wastes and effluents.

10.10 Developing and implementing such HAW and integrated waste management strategies will enable the nuclear industry, and the UK as a whole, to make better use of resources, as well as providing a straightforward means of demonstrating compliance with the radioactive waste management requirements of the EU Directive. As the major waste owner, NDA should play a key role in developing the UK nuclear industry HAW and integrated waste management strategies. It will need to decide whether it should also develop NDA HAW and integrated waste management strategies or whether the UK strategies will be sufficient for its purposes.

10.11 CoRWM notes that NDA appears to have no plans for strategic work on HAW packaging (NDA, 2012f). The Committee considers that this is an important omission. The lack of a strategic approach to HAW packaging has led to the development of many types of packages for ILW, some of which are very similar. This has not been a good use of resources. It is essential that the UK HAW strategy includes packaging, as well as treatment, storage and disposal.

10.12 There will need to be plans for implementing the UK nuclear industry HAW and integrated waste management strategies and key performance indicators for monitoring progress (EU, 2011). In NDA's case, this implies going beyond its planned strategic

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<sup>11</sup> The national plan and programme are on the LLWR Ltd website ([www.llwrsite.com](http://www.llwrsite.com)). They are updated at appropriate intervals. It is also expected that the UK nuclear industry LLW strategy will be reviewed and a revised version issued in 2013-14 (NDA, 2012f).

guidance on HAW (NDA, 2012f), for example by including HAW management matters in the Site Strategic Specifications for its SLCs.

### ***Geological Disposal***

10.13 At the time of writing (June 2012), three decisions are awaited that could have a significant effect on the UK programme to implement geological disposal:

- the decision by Local Authorities in West Cumbria on whether or not to participate further in the GDF siting process
- the decision by Shepway District Council on whether to submit an Expression of Interest in entering without commitment discussions with Government about hosting a GDF
- the decision by DECC Ministers on whether, and if so how, the geological disposal programme should be accelerated.

10.14 Until the outcomes of these decisions are known, it is difficult to set targets for what is to be achieved by summer 2015. However, it is possible to identify some key pieces of work to be carried out over the next three years.

10.15 One of these pieces of work is to achieve better integration of the geological disposal programme, the rest of the NDA HAW management programme, other organisation's HAW management plans, and the plans of NDA and other organisations for managing those legacy and new build spent fuels and nuclear materials that may have to be dealt with as waste. CoRWM considers that it is essential that geological disposal is an integral part of the UK nuclear industry HAW, spent fuels and nuclear materials strategies, rather than simply a final step for which RWMD specifies the requirements.

10.16 The Committee notes that there are activities in progress that should help to achieve this improved integration. These include the work of the GDF Users Group, RWMD's upstream optioneering project and improvements to RWMD's disposability assessment process. A change to a scenario-based approach to the inventory of wastes for geological disposal (CoRWM doc. 2994), in which full account is taken of the possible quantities of legacy and new build spent fuels for disposal, as well as of HAW, would be a further step forward.

10.17 Another key piece of work concerns the implementation of the framework (DECC, 2012a) for Stage 4 of the GDF siting process (Figure 1). It is about identifying potential candidate sites for the sub-surface parts of a GDF.

10.18 In most of the UK there is little firm data available on rocks at the depths being considered for a GDF (more than 200m). Most of the geological information for these depths is based on modelling and expert judgement. It is therefore subject to considerable uncertainty and this needs to be taken into account when the framework for Stage 4 is implemented in any area.

10.19 It is preferable that the methodology for dealing with uncertainties is established before the start of Stage 4. This could involve, for example, elicitation of several different models of the geological conditions in the area, all based on the available data, from a

group of geologists, each of whom could bring their own perspective. Consideration also needs to be given to the circumstances in which geophysical investigations should be carried out in Stage 4 in order to reduce uncertainties. The situation to be avoided is one in which substantial work is carried out on potential sites for the surface facility of a GDF, only to find at a late stage that there are no good potential sites for the sub-surface facility within reasonable distances of the surface facility sites.

10.20 While the UK is in the early phase of its geological disposal programme, it is prudent to build up expertise for the major rock types that may be present at potential GDF sites. Although some consideration is given to sedimentary rocks and evaporites in the gDSSC and other RWMD work, it is evident to CoRWM that most of RWMD's knowledge relates to hard rocks. CoRWM takes the view that it would be sensible for RWMD to increase its knowledge of mudrocks, which have been shown by work in countries such as France and Switzerland to be potentially very suitable for a GDF. The Committee suggests that RWMD bears this in mind when recruiting geoscientists and when considering participation in international R&D programmes (NDA, 2012g).

## **R&D**

10.21 CoRWM considers that the key issues for R&D on the management of HAW, spent fuels and nuclear materials over the next three years are:

- inclusion of sufficient R&D on the long-term management of legacy, new build (Generation III) and advanced reactor (Generation IV) and fuel cycle HAW, spent fuels and nuclear materials in the R&D roadmap that is being developed by the *ad hoc* Nuclear R&D Advisory Board, including R&D on geological disposal
- establishing suitable longer term arrangements for the strategic co-ordination of UK nuclear R&D, including R&D on the long-term management of HAW, spent fuels and nuclear materials
- planning for the expansion of the UK's R&D on geological disposal, on the basis that there will need to be a larger RWMD-funded R&D programme and a complementary programme of independent research.

10.22 Addressing these issues would, in CoRWM's view, assist the UK to demonstrate that it meets the EU Directive requirements on R&D (EU, 2011). Much of the work required would be a continuation of that already in progress in response to the HoLSTC report (HoLSTC, 2011b) and CoRWM's 2009 recommendations on R&D (CoRWM doc. 2543).

10.23 NDA's R&D strategy (NDA, 2011x) sets out its approach to ensuring that sufficient R&D is carried out to deliver its mission. This approach is that, where possible, R&D is undertaken by SLCs and their supply chain, with NDA directly sponsoring a small strategic R&D programme. In the context of R&D, RWMD acts as an SLC and commissions its own R&D on geological disposal and related topics.

10.24 A consequence of this approach is that there is no over-arching description of the R&D programmes of NDA, its SLCs and RWMD that shows how the R&D in progress and planned matches NDA's overall strategy or its topic strategies. CoRWM suggests that this situation be rectified. It would then be straightforward to extract material for the UK report to the European Commission on its R&D on the management of spent fuel and

radioactive waste (EU, 2011) and supplement it with a description of R&D funded by organisations other than NDA and its SLCs. Such a description would also aid the NDA Research Board to assess the adequacy of NDA's R&D.

### ***Management of Spent Fuels and Nuclear Materials***

#### *Legacy Spent Fuels and Nuclear Materials*

10.25 The overall strategy for the management of spent fuels and nuclear materials from the UK's past and current nuclear programme has been established and details of strategy and implementation have been worked out for the next few years. There has, however, been relatively little work on longer term strategic topics such as geological disposal of unprocessed spent AGR fuel, spent MOX fuel and plutonium residues, or the treatment and packaging for disposal of exotic fuels and fuels retrieved from the Sellafield Legacy Ponds and Silos.

10.26 It would be unrealistic to expect the work required to be completed by summer 2015. However, it should be possible to demonstrate that longer term plans for managing the relevant spent fuels and nuclear materials are under development and that the necessary R&D is in progress.

10.27 CoRWM also notes that compliance with the EU Directive requires a description of the UK strategy for managing all its civil spent fuels. This will need to include EDF Energy's strategy for the long-term management of spent fuel from Sizewell B and a demonstration of how this is co-ordinated with NDA's strategies for other spent fuels.

#### *New Build Spent Fuels*

10.28 The management of spent fuels from planned new nuclear power stations will presumably be included in the UK's report to the European Commission on its national programme (EU, 2011). This should be straightforward as spent fuel management plans will be set out in new build operators' Funded Decommissioning Programmes.

10.29 A more difficult task may be to show how strategies for managing legacy and new build spent fuels are co-ordinated. It is CoRWM's understanding that NDA's development of management strategies for its legacy spent fuels and nuclear materials is being carried out entirely separately from the work of potential new build operators on management of their spent fuels. The only forum where both legacy and new build spent fuels are discussed appears to be the GDF Users Group, which covers only a sub-set of the issues involved.

### ***Long-Term Management of Scotland's HAW***

10.30 It is anticipated that Scottish Government's implementation strategy for its HAW policy will be in place before summer 2015. Account will need to be taken of this strategy in developing the UK nuclear industry HAW strategy and integrated waste management strategy (para 10.9).

10.31 CoRWM notes that the EU Directive (EU, 2011) requires Member States to have programmes for management of radioactive wastes from generation through to disposal. The preamble to the Directive states that “*the storage of radioactive waste, including long-term storage, is an interim solution, but not an alternative to disposal*” and that Member States “should include planning and implementation of disposal options in their national policies”. The question therefore arises of what is to be said in the UK report to the European Commission about the long-term management of Scottish HAW that is not destined for near-surface disposal.

### ***Future Transport of HAW, Spent Fuels and Nuclear Materials***

10.32 NDA’s current transport strategy (NDA, 2010d, 2011y) covers present-day transport operations and those over the next few years. It is recognised that a more comprehensive strategy will need to be developed for the transport of legacy HAW, spent fuels and nuclear materials to a GDF (or GDFs). A UK transport strategy may also need to include movement of new build spent fuels to central or regional encapsulation and storage facilities.

10.33 It would be premature to carry out any detailed work on such transport strategies now. However, it is important to identify the transport infrastructure that will be required and to make plans for maintaining or replacing existing infrastructure and obtaining the necessary new facilities and equipment. In NDA’s case this requires co-ordination with site restoration strategy and programmes.

### ***Skills***

10.34 In recent years, Cogent and NSAN, in co-operation with NDA and the rest of the nuclear industry, have carried out a great deal of work on identifying nuclear skills needs and putting in place mechanisms to ensure that those needs are met. CoRWM understands that, at present, Cogent, NNL and the University of Central Lancashire are carrying out a comprehensive assessment of higher education courses relevant to the nuclear sector to determine whether they are sufficient to meet the needs of the research community, regulators and the nuclear industry. This is in response to one of the HoLSTC recommendations (HoLSTC, 2011b).

10.35 While welcoming this work, CoRWM notes that it has not yet included skills for implementing geological disposal. To date, skills provision for geological disposal has been seen as the responsibility of RWMD, in conjunction with its supply chain, rather than a strategic issue for the UK as a whole. CoRWM considers that, not least for compliance with the EU Directive (EU, 2011), this situation needs to change. Skills for implementing geological disposal should become part of the UK nuclear skills agenda. In the case of the geosciences there could be links to skills provision for other aspects of energy and climate change (e.g. carbon capture and storage).

### ***Use of International Knowledge, Expertise and Experience***

10.36 In CoRWM’s view, NDA as a whole has had considerable success in making use of international knowledge, expertise and experience, both in technical topics and in other

aspects of its work such as managing programmes and people. This has not happened by simply buying in technologies, R&D or short-term consultancy. It has occurred mainly through the long-term participation of overseas companies in the Parent Body Organisations (PBOs) that own SLCs. The approach is to build up expertise in the SLCs, as well as making best use of worldwide knowledge, experience and suppliers.

10.37 CoRWM considers that such an approach should also be applied to the implementation of geological disposal. It would be unwise to assume that RWMD can turn to other countries for knowledge and expertise as and when it needs it. There is a need to plan now for the later stages of the geological disposal programme, bearing in mind the lead times involved in building the UK's own expertise. The Committee is pleased that RWMD is already giving some thought to this issue but suggests that it makes more use of the experience of NDA and its SLCs and does not rely solely on WMOs in other countries.

### ***Public Participation in Decision Making***

10.38 There are a number of mechanisms in the UK that address the EU Directive requirements for public participation in making decisions about the management of spent fuel and radioactive waste (EU, 2011). These include the stakeholder engagement that NDA carries out on various aspects of its work<sup>12</sup> and Government consultations on various topics (*e.g.* DECC, 2011c,f). The framework for implementing geological disposal (Defra *et al.*, 2008) sets out how people living near potential GDF sites will be involved in decision making.

10.39 In its position paper on PSE (CoRWM doc. 2850), CoRWM noted the possibility that, in the current economic climate, resources on PSE would be reduced. The Committee is pleased that this has not happened and that, in some instances, resources on PSE have increased (*e.g.* at ONR). CoRWM considers that it is important that this situation continues, so that by summer 2015 the UK can report to the European Commission that it has very effective means for public participation in decision making on the management of spent fuel and radioactive waste.

### ***Government Resources***

10.40 The management of spent fuel and radioactive waste requires Government resources in the form of staff with the appropriate expertise who are able to devote time to it. CoRWM has observed that, during 2011-12, staff resources at DECC and Scottish Government to implement their respective HAW management policies have been stretched. The Committee takes the view that it is essential that Government has the appropriate staff resources to fulfil the functions necessary to comply with the EU Directive (EU, 2011).

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<sup>12</sup> The latest NDA stakeholder engagement plans are at [www.nda.gov.uk/stakeholders/engagement-plan.cfm](http://www.nda.gov.uk/stakeholders/engagement-plan.cfm).

### **Conclusions**

10.41 In the time since CoRWM was reconstituted in 2007, the UK has made substantial progress in developing and implementing plans and arrangements for the management of HAW, spent fuels and nuclear materials. The Committee considers that taking the actions outlined above would ensure that this progress is maintained and enable the UK to demonstrate readily that its national programme for the management of spent fuel and radioactive waste complies in full with the EU Directive when the time comes to do so in summer 2015.

## **11 REFERENCES**

### ***CoRWM Documents***

- 700 CoRWM Recommendations to Government 2006.
- 1703 Moving Forward – CoRWM’s Proposals for Implementation. July 2006.
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## ANNEX A CoRWM TERMS OF REFERENCE

### **Introduction**

A1. Following the announcements by UK Government and the devolved administrations (Government), on 25 October 2006, a new Committee on Radioactive Waste Management (CoRWM) was appointed under these revised terms of reference designed to meet the future needs of the Government's Managing Radioactive Waste Safely (MRWS) programme. The Committee is jointly appointed by UK Government and relevant devolved administration Ministers. Details of its roles, responsibilities and membership are outlined below.

### **CoRWM's Role and Responsibilities**

A2. The role of the reconstituted Committee on Radioactive Waste Management is to provide independent scrutiny and advice to UK Government and devolved administration Ministers on the long-term management of radioactive waste, including storage and disposal. CoRWM's primary task is to provide independent scrutiny on the Government's and Nuclear Decommissioning Authority's (NDA's) proposals, plans and programmes to deliver geological disposal, together with robust interim storage, as the long-term management option for the UK's higher activity wastes.

A3. Sponsoring Ministers (from the Department of Energy and Climate Change (DECC) and the devolved administrations) will agree a three-year rolling programme and budget for CoRWM's work on an annual basis. Any in-year changes will be the subject of agreement by sponsoring Ministers.

A4. CoRWM will provide appropriate and timely evidence-based advice on Government and NDA plans for the delivery of geological disposal under the Managing Radioactive Waste Safety programme. The work programme may include review of activities including waste packaging options, geological disposal delivery programmes and plans, site selection processes and criteria, and the approach to public and stakeholder engagement. Testing the evidence base of the plans for the delivery of geological disposal will be a key component of the work. As well as ongoing dialogue with Government, the implementing body, local authorities and stakeholders, CoRWM will provide an annual report of its work to Government.

A5. CoRWM shall undertake its work in an open and consultative manner. It will engage with stakeholders and it will publish advice (and the underpinning evidence) in a way that is meaningful to the non-expert. It will comply, as will sponsoring departments, with the Government Chief Scientific Advisor's Guidelines on the Use of Scientific and Engineering Advice in Policy Making<sup>13</sup> as well as other relevant Government advice and guidelines. Government will respond to all substantive advice. Published advice and reports will be made available in respective Parliaments/Assemblies, as will any Government response. CoRWM's Chair will attend Parliamentary/Assembly evidence sessions as and when required.

A6. With the agreement of CoRWM's sponsoring Ministers, other parts of Government, the NDA and the regulatory bodies may request independent advice from CoRWM. Relevant Parliamentary/Assembly Committees may also propose work to sponsoring Ministers, for consideration in the work programme. CoRWM's priority role is set out in

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<sup>13</sup> [www.bis.gov.uk/assets/bispartners/goscience/docs/g/10-669-gcsa-guidelines-scientific-engineering-advice-policy-making.pdf](http://www.bis.gov.uk/assets/bispartners/goscience/docs/g/10-669-gcsa-guidelines-scientific-engineering-advice-policy-making.pdf)

paragraph A2 although sponsoring Ministers may also ask the Committee to provide advice on other radioactive waste management issues as necessary.

- A7. In delivering its annual work programme, and where there is a common interest, the Committee will liaise with regulators and any bodies established to advise Government and the regulators.
- A8. CoRWM shall consist of a Chair and up to fourteen members, one of whom will be appointed by Ministers as Deputy Chair on the recommendation of the Chair. Members will not be mandated representatives of organisation or sectoral interests and the skills and expertise which will need to be available to the Committee will vary depending on the programme of work. For example, the relevant skills may include: radioactive waste management, nuclear science, radiation protection, environmental law, environment issues, social science (including public and stakeholder engagement), geology/geochemistry/ hydrogeology, finance/economics, civil engineering/underground construction technology, geological disposal facility performance/safety issues, materials science, environmental impact assessment, local government, planning, regulatory processes and ethics. Sponsoring Ministers may review the membership of the Committee, and the skills and expertise required.
- A9. Appointments will be made following the Office of the Commissioner for Public Appointments (OCPA) code of practice. Appointments will usually be for two to four years and sponsoring Ministers retain the right to terminate appointments at any time in light of individual members' performance, changes in CoRWM's work requirements, or completion of the work required of CoRWM.
- A10. The Committee, as agreed in the annual plans, may co-opt additional expertise to form or support temporary sub-groups set up to examine specific and defined problems.

### ***Programme of Work***

- A11. To support its work, CoRWM will need to familiarise itself with Government policy in this area, including ongoing meetings with relevant government departments and the NDA. The outline framework within which CoRWM is then expected to work is:
- (i) *recognising the policy framework within which it will operate including the roles and responsibilities of Government and the NDA in relation to CoRWM's own advisory role;*
  - (ii) *scrutinising Government and NDA proposals, plans and programmes to implement geological disposal and other radioactive waste management issues on which Government might seek advice as agreed in CoRWM's work plan;*
  - (iii) *formulation of advice and reporting to Government based on the best available evidence and informed by the views of stakeholders and the public;*
- A12. Each year, CoRWM will prepare its proposed work programme for the next three years, in conjunction with Government, the NDA and regulators, taking account of work by other advisory bodies (see paragraph A7 above). The programme will include details of specific areas of work, reports which it intends to produce, the proposed use of sub-groups and any other activities or events, including proposals for public and stakeholder

engagement. CoRWM will submit its proposed three-year work programme to its sponsoring Ministers for discussion and agreement.

A13. In familiarising themselves with the relevant background and issues, Members will make themselves aware, and take account, of previous engagement and reports in the Managing Radioactive Waste Safely programme, the UK Radioactive Waste Inventory and the nature of current and expected future UK holdings of nuclear materials. CoRWM will take account of existing technical assessments and research into radioactive waste management in the UK and elsewhere. In particular, it is recognised that CoRWM will need to engage with NDA given that the Committee's advice will directly impinge on the long-term responsibilities of NDA. CoRWM will also take account of other relevant policy developments.

A14. The Chair will submit a report to Ministers by 30 June each year on the delivery of the agreed work programme. This will be made available in the UK and Scottish Parliament, the National Assembly for Wales and the Northern Ireland Assembly.

### ***Access to Other Sources of Expertise***

A15. Members of CoRWM itself will not have all the skills and expertise necessary to advise Government. The Committee will need to decide how best to secure access to other appropriate sources of expert input during the course of its work. Within this, it will have option of setting up expert sub-groups containing both Members of CoRWM itself and other appropriate co-opted persons. A member of CoRWM will chair any sub-group of this nature and ensure its effective operation, as well as provide a clear line of responsibility and accountability to the main Committee, and hence to Ministers. This approach will enable the Committee to draw on a broad range of expertise in the UK and elsewhere.

A16. The number of such sub-groups will be kept to the minimum necessary. Their role will be that of providing advice for the main Committee to consider and assess as it sees fit, and managing any activity which CoRWM delegates to them. It will be for the main Committee to assess and decide upon the advice it receives from such sub-groups. CoRWM may also utilise other appropriate means of securing expert input, such as sponsored meetings and seminars. The Chair will ensure that sub-group work and all other activities are closely integrated.

### ***Public and Stakeholder Engagement***

A17. CoRWM must continue to inspire public confidence in the way in which it works. In order to secure such confidence in its advice it will work in an open and transparent manner. Hence, its work should be characterised by:

- a published reporting and transparency policy;
- relevant public and stakeholder engagement as required;
- clear communications including the use of plain English, publishing its advice (and the underpinning evidence) in a way that is meaningful to the non-expert;
- making information accessible;
- encouraging people to ask questions or make their views known and listening to their concerns;
- providing opportunities for people to challenge information, for example by making clear the sources of information and points of view on which the Committee's advice is based;
- holding a number of its meetings in public.

### ***Responsibilities of the Committee and its Members***

A18. CoRWM will have a corporate responsibility to deliver its advice to sponsoring Ministers in accordance with agreed work plans. It will be for Ministers, with appropriate reference to their respective Parliaments and Assembly, to take decisions on the advice it receives and to give directions to the NDA as necessary on any subsequent changes required in the delivery of geological disposal of the UK's higher activity radioactive waste.

A19. All members will need to be effective team workers, with good analytical skills and good judgement besides a strong interest in the process of decision-making on difficult issues. A number of them will need experience of project management, advising on scientific and technical issues directly relating to radioactive waste management, public and stakeholder engagement, excellent drafting and communication skills, or business experience and knowledge of economics.

A20. The Chair, in addition, will be capable of successfully and objectively leading committee-based projects, grasping complex technical issues, and managing a diverse group effectively and delivering substantial results, presenting progress and outcomes in public. He or she will be a person with appropriate stature and credibility.

### ***Role of the Chair***

A21. The Chair will be responsible for supervising the CoRWM work programme and ensuring that the Committee's objectives are achieved. The Chair will be responsible for advising Ministers promptly if he or she anticipates that the Committee will not complete its agreed work programme indicating what remedial action might be taken. He or she will be the main point of contact with the public and the media, in presenting progress and answering questions. The Chair will meet Ministers on appointment, and then at least annually along with other members as appropriate. Notes of these meetings will be published. The Chair will ensure CoRWM submits its annual written report to Ministers, by 30 June of each year. The Chair may be required to present the position of CoRWM to Parliament or Assembly committees and representatives as appropriate. The report will set out, among other things, CoRWM's progress with the agreed work programme, advice deriving from it and costs incurred. Ministers will also appoint a Deputy Chair who can assist the Chair as the latter sees fit.

### ***Role of Members***

A22. Members will work, under the Chair's supervision, to the programme agreed with sponsoring Ministers, so as to ensure its satisfactory delivery. Members will have a collective responsibility to ensure achievement of CoRWM's objectives and delivery of its work programme. Individual Members may be appointed by the Chair to undertake specific, active roles, for example chairing sub-groups or in representing CoRWM in meetings with the public, organisations who are contributing to the work, or the media. All members will abide by CoRWM's Code of Practice and will be subject to individual performance appraisal as laid down by the Cabinet Office guide (see next paragraph).

### ***Standards***

A23. CoRWM is set up by, and answerable to Ministers and is funded by the taxpayer. It must therefore comply with the Cabinet Office guide "Public Bodies: a Guide for Departments" (<http://www.civilservice.gov.uk/about/resources/public-bodies.aspx>).

A24. These and other relevant procedural requirements are set out in CoRWM's Code of Practice which Members will agree to, prior to appointment.

***Resources***

A25. Sponsoring Ministers will provide CoRWM with a secretariat and budget to enable it to carry out its agreed programme of work. The Chair and Members will have a collective responsibility for delivering the work programme within the agreed budget, although the Chair may request sponsoring Ministers for adjustment to this budget should this be considered necessary.

***Payments***

A26. The Chair and Members will be paid for their work for CoRWM at agreed daily rates. They will also be fully reimbursed for all reasonable travel and subsistence costs incurred during the course of their work.

## **ANNEX B CoRWM MEMBERS**

**Robert Pickard (Chair)** – is Emeritus Professor of Neurobiology at the University of Cardiff, Visiting Professor at the Royal Agricultural College, Cirencester, and Fellow of the Society of Biology and the Royal Society of Medicine. Formerly, he was Chairman of the Consumers' Association, *Which?*, and Director-General of the British Nutrition Foundation. For the Department of Health and the Royal Society for the Promotion of Health, Professor Pickard was also Chairman of the national NGO Forum, which facilitated the interface between government policymakers and 104 NGOs working for health improvements. He is an international authority on the biology of honeybees and pioneered the development of solid-state, neural microbiosensors in the UK.

**William Lee (Deputy Chair)** – is Director of the Centre for Advanced Structural Ceramics and Co-Director of the Centre for Nuclear Engineering at Imperial College London. He has a Physical Metallurgy BSc from Aston, a DPhil in Radiation Damage Studies from Oxford and has held academic positions in the USA (Case Western Reserve University, Cleveland and Ohio State University) and in the UK, notably at Sheffield University where he was Director of BNFL's University Research Alliance on Waste Immobilisation. He is a Fellow of the American Ceramic Society, the City and Guilds Institute and the Institute of Materials, Minerals and Mining. He acts as technical expert for the International Atomic Energy Agency.

**David Broughton** – is a Chartered Engineer and a Fellow of the Institution of Mechanical Engineers. He has 26 years experience in professional engineering and management of complex nuclear projects. Now retired, he worked at UKAEA Dounreay, Caithness from 1981 until 2007, where he was responsible for Dounreay's major radioactive waste management projects. These included new low level waste disposal facilities, new intermediate level waste encapsulation and storage facilities, the future retrieval of waste from the Dounreay shaft and the shaft isolation project. He is experienced in both engaging stakeholders in projects that have many options and technical issues to consider, and guiding projects through the regulatory and planning processes.

**Margaret Burns** – is Chair of NHS Health Scotland. She was a member of the Health and Safety Commission for nine years, representing the public interest and the devolved administrations. As a Commissioner she chaired HSC's Rail Industry Advisory Committee and the Partnership for Health and Safety in Scotland and had particular responsibility for the offshore oil industry and the nuclear industry. In 2003 she was awarded the CBE for services to health and safety. She has extensive experience of working with consumer organisations, such as the Scottish Consumer Council and Consumers' Association. She is a trustee of the Institute of Occupational Medicine.

**Brian D Clark** – is Professor of Environmental Management and Planning at Aberdeen University. He was a Board Member of the Scottish Environment Protection Agency (SEPA) and Chairman of the North Region Board and the Planning & Finance Committee of SEPA from 2000 to 2008. He has served on CoRWM since 2003. With forty years experience, he is a specialist in environmental impact assessment (EIA), strategic environmental assessment (SEA) and urban and rural planning. He was honoured in 1987 by being made a founder member of UNEP's Global 500 Award. He is a governor of the James Hutton Institute, a

member of the Scottish Government Local Boundary Commission and a founder member of the Institute of Environmental Assessment (IEA), now the Institute of Environmental Management and Assessment (IEMA).

**Mark Dutton** – has a doctorate in high energy physics and a 38 year career based at the National Nuclear Corporation. Specialising in design and safety case issues associated with radiological protection, nuclear safety and radioactive waste management, he continues to work as a nuclear consultant. He has served on CoRWM since 2003. He is a Fellow of the Institution of Nuclear Engineers, co-author of two Safety Guides published by the International Atomic Energy Agency and has reviewed the safety of reactors in Iran and Pakistan on behalf of the Agency. He is a member of the Defence Nuclear Safety Committee of the Ministry of Defence.

**Fergus Gibb** – is Emeritus Professor of Petrology & Geochemistry in the Department of Materials Science and Engineering, University of Sheffield. He has over 40 years' teaching and research experience in mineralogy, petrology, geochemistry and other areas of geoscience. A specialist on igneous intrusions, he is a former Vice-President of the Mineralogical Society and an Elected Fellow of the Mineralogical Society of America. A long-standing research interest in the geological disposal of nuclear wastes has led to over 25 papers on the subject and national and international recognition as an authority on deep borehole disposal. On the strength of the potential strategic importance of this research work, Professor Gibb's post at the University of Sheffield was part-funded for a period by the Nuclear Decommissioning Authority but the conduct of the work was, and remains, independent of the NDA and the nuclear industry.

**Simon Harley** – is Professor of Lower Crustal Processes in the School of Geosciences at the University of Edinburgh. An international expert on the evolution of continental crust, his research integrates geological mapping with experimental and microanalytical studies of the stabilities of minerals and their behaviour at high temperatures and pressures. He has conducted geological mapping projects in diverse and complex basement areas in Australia, India, Norway, Greenland, Scotland and Antarctica. Professor Harley is a Fellow of the Royal Society of Edinburgh and in 2002 was awarded the Imperial Polar Medal in recognition of his contributions to Antarctic Earth Science.

**Marion Hill** – is an independent consultant with over 35 years' experience in standards for and assessments of the radiological impact of the nuclear industry on the public and the environment. She specialises in policies, strategies and standards for the management of radioactive wastes and radioactively contaminated land. Her early career was at the National Radiological Protection Board (now part of the Health Protection Agency), from where she moved into consultancy. Her experience includes national and international work on policy and regulatory topics, and environmental impact assessments for nuclear installations in the UK and overseas. She was a member of the Health and Safety Commission's Nuclear Safety Advisory Committee (NuSAC) from 2006 to 2008, when it was suspended.

**Francis Livens** – has held a radiochemistry position at the University of Manchester since 1991. He worked for over 25 years in environmental radioactivity and actinide chemistry, starting his career with the Natural Environment Research Council, where he was involved in the response to the Chernobyl accident. At the University of Manchester, he has worked in

many aspects of nuclear fuel cycle research, including effluent treatment, waste immobilisation and actinide chemistry. He was the founding director of the Centre for Radiochemistry Research, established in Manchester in 1999 and is now Research Director of the Dalton Nuclear Institute and Director of the EPSRC-funded, Manchester/Sheffield Nuclear Fission Doctoral Training Centre. He has acted as an advisor to the nuclear industry both in the UK and overseas.

**Rebecca Lunn** – is a Professor in Civil Engineering at the University of Strathclyde. She has over 20 years of research experience in hydrogeology, with a particular focus on deep flow systems, hydromechanics and the spatial and temporal evolution of rock permeability. In 2011, she was awarded the Geological Society Aberconway Medal for research of particular relevance within industry. Her research experience is multi-disciplinary and she currently collaborates closely with structural geologists, seismologists, mathematicians,, microbiologists, psychologists and statisticians. She leads the multi-partner EPSRC research consortium, 'Biogeochemical Applications in Nuclear Decommissioning and Disposal' (BANDD). Current research interests include: development of computer models to simulate changes in rock permeability over time surrounding geological faults, with a view to improving flow predictions for deep radioactive waste disposal and carbon dioxide sequestration; understanding the relationship between subsurface groundwater flow and earthquakes; and exploring public understanding of uncertain science, such as flood prediction, to inform the regulators' approach to public information and decision making.

**Leslie Netherton** – has over 30 years local government experience, where he specialised in health and safety, food safety, environmental protection and emergency planning. As Head of Service with Plymouth City Council from 1998-2007 he had responsibility for civil protection, waste management, cemeteries, building control, consumer protection, sustainability and environmental health. As lead Authority officer for the nuclear submarine refitting facility at Devonport Royal Dockyard, he was involved with major planning applications, discharge consent consultations, offsite emergency planning and extensive stakeholder engagement. He is Chair of the Ministry of Defence Advisory Group for its Submarine Dismantling Project and sits on the project Steering Group. He currently runs an environmental health consultancy company and has been an active member of the Chartered Institute of Environmental Health.

**Stephen Newson** – a Chartered Engineer and Fellow of the Institute of Materials, Minerals and Mining and is currently Principal Mining Consultant for Parsons Brinckerhoff, an engineering and project management consultancy. He has over 38 years of mining experience including operational management, research and development and the design and construction of large underground excavations. He spent 16 years with British Coal, latterly responsible for the specification and approval of underground tunnel and coalface support systems on a national basis. During this time his was also a UK representative on the European Experts' Committee on tunnelling systems. He has worked for major companies, such as Shell and BHP Billiton, on new mine construction and expansion projects in Australia and Africa. He has also, as a consultant, previously worked on underground design and planning projects for UK Nirex and the NDA.

**John Rennilson** – is a Chartered Town Planner and a Chartered Surveyor with over 37 years' experience in local government. He served as County Planning Officer of North

Yorkshire County Council (1984-1996) and as Director of Planning & Development for Highland Council (1996-2008). His career has involved balancing development needs and environmental issues at a strategic, as well as at a local, level. He has had considerable experience of the energy industry, including development of the Selby Coalfield, coal-fired electricity generation at Drax and Eggborough, and decommissioning Dounreay, as well as renewable electricity generation and transmission issues across the Highlands.

**Lynda Warren** – is Emeritus Professor of Environmental Law at Aberystwyth University and visiting Professor at Birmingham City University. She was a member of the Royal Commission on Environmental Pollution until its closure in March 2011. She has postgraduate degrees in marine biology and law and has pursued an academic career first in biology and latterly in environmental law. She has over 100 academic publications, including a number on radioactive waste management law and policy. Lynda has over 15 years experience of radioactive waste management policy. She has been a member of CoRWM since 2003 and, before that, was a member of the Radioactive Waste Management Advisory Committee (RWMAC), chairing its working group on Dounreay. She was a member of the Board of the British Geological Survey until it was disbanded in April 2011 and is an associate of IDM, a consultancy engaged in environmental policy advisory work, mainly in the nuclear sector.

## ANNEX C CoRWM EXPENDITURE 2011-12

C1 Table C1 shows CoRWM's budget out-turn for the year, broken down by main spending areas. The budget was set at £500k and the Committee returned £36k to DECC in August 2011 for re-allocation.

**Table C1 CoRWM's Budget Out-Turn**

<i>Budget Item</i>	<i>Budget (£k)</i>	<i>Out-turn (£k)</i>
Member fees and expenses	350	351*
Plenary meetings	45	30
Website	15	19.5
Technical support	0	0
Printing and publication	2	0
Public and stakeholder engagement	1	0.2
Visits	10	2.1
DECC advertisement and recruitment costs for new Chair and Members**	30	33
<b>Total</b>	<b>453</b>	<b>435.8</b>

\*This figure includes Employer National Insurance Contributions charged to CoRWM's cost centre.

\*\*Charged to CoRWM's cost centre

C2 CoRWM is not required to report the fees individual Members were paid, but it publishes this information in the interests of transparency. It is given in Table C2.

C3 The standard fees shown in Table C2 are those paid at the rates specified in Members terms of appointment. These state that the Chair can claim £450 a day for 1.5 days a week, the Deputy Chair can claim £380 for 1 day a week and Members can claim £300 a day for 1 day a week (all for 52 weeks in a year).

C4 The additional fees shown in Table C2 are those that sponsoring departments agreed to pay for work that was additional to that in the CoRWM Work Programme (CoRWM doc. 2919) and that was required during the year.

**Table C2 Fees Paid to CoRWM Members**

<i>Name</i>	<i>Standard Fees (£k)</i>	<i>Additional Fees (£k)</i>
Robert Pickard (Chair)	35.1	0
William Lee (Deputy Chair)	18.2	0
David Broughton	15.6	0
Margaret Burns	9.0	0
Brian D Clark	14.4	0

<i>Name</i>	<i>Standard Fees (£k)</i>	<i>Additional Fees (£k)</i>
Mark Dutton	15.6	1.8
Fergus Gibb	15.6	4.5
Simon Harley	15.0	4.8
Marion Hill	15.6	13.5
Francis Livens	14.4	1.5
Rebecca Lunn	15.6	0
Leslie Netherton	15.6	0
John Rennilson	15.3	0
Stephen Newson*	4.8	0
Lynda Warren	15.0	1.8
<b><i>Totals</i></b>	<b><i>234.8</i></b>	<b><i>27.9</i></b>

\*Appointed in October 2011.

**ANNEX D GLOSSARY AND ACRONYM LIST**

*Glossary*

<b>Advanced Gas-Cooled Reactor (AGR)</b>	A UK designed, gas-cooled reactor with a graphite moderator. <i>[It uses enriched uranium oxide fuel with steel cladding and graphite sleeves. The primary coolant is carbon dioxide.]</i>
<b>Becquerel (Bq)</b>	The standard international unit of measurement of radioactivity, equivalent to one disintegration per second.
<b>Benefits Package</b>	See “Community Benefits Package”.
<b>Biosphere</b>	That part of the environment where most organisms live. <i>[Includes soils, surface waters and their sediments, and the atmosphere. In the context of “geological disposal”, often also used to include organisms (humans, other animals, plants etc.).]</i>
<b>Committed waste</b>	Radioactive waste that will arise in future from the operation or decommissioning of existing nuclear facilities. <i>[As distinct from existing waste, which already exists, and “new build wastes”, which will only arise if new facilities are built.]</i>
<b>Community Benefits Package</b>	A set of measures to enhance the social and economic well-being of a community that hosts a geological disposal facility, to recognise that the community is performing an essential service to the country.
<b>Community Siting Partnership</b>	A partnership of organisations with interests in the community that has expressed an interest in hosting a geological disposal facility. <i>[The partnership is expected to involve the host community, the “Decision Making Body” (or Bodies) and “Wider Local Interests”. It will work with the Nuclear Decommissioning Authority and other relevant organisations to ensure local concerns are addressed during the geological disposal facility siting process and will advise the Decision Making Body (or Bodies).]</i>
<b>Conditioning</b>	Any process used to prepare waste for long-term storage and/or disposal. <i>[Usually by converting it into a suitable solid form e.g. incorporation in glass (vitrification), encapsulation in cement.]</i>
<b>Decision Making Body</b>	The Local Authority that will make the decisions for a host community in the geological disposal facility siting process.
<b>Decision to Participate</b>	A decision by a community to participate in the geological disposal facility siting process, without commitment to eventually host a facility.

<b>Decommissioning</b>	<p>The process of taking a nuclear facility out of service after operations have ceased. It includes full or partial dismantling of buildings and their contents and may include actions such as the decontamination of buildings that are not to be dismantled and the remedial treatment or restoration of land under and around a facility.</p> <p><i>[Regulators define decommissioning as “administrative and technical actions taken to reduce hazards progressively and thereby allow the removal of some or all regulatory controls” from a nuclear facility or area of land.]</i></p>
<b>Deep borehole disposal (DBD)</b>	<p>Disposal of waste in boreholes more than 1000m deep.</p>
<b>Desk-based studies</b>	<p>Review, summary, collation or evaluation of existing knowledge, information, facts and research outcomes.</p> <p><i>[In the context of the UK geological disposal siting process, assessing the suitability of sites using existing knowledge about the geology, surface environment, communities etc.]</i></p>
<b>Development</b>	<p>Progressive, systematic use of knowledge and understanding gained from research directed towards the production or improvement of materials, devices, systems or methods.</p> <p><i>[Includes the design and development of processes.]</i></p>
<b>Disposal</b>	<p>Emplacement of waste in an appropriate facility without the intention of retrieving it.</p> <p><i>[Retrieval may be possible but if intended the appropriate term is “storage”.]</i></p>
<b>Disposable</b>	<p>A waste package is disposable if it can be safely removed from a store, transported to a disposal facility and emplaced in that facility, and if it will play its planned role in ensuring the post-closure safety of that facility.</p>
<b>Encapsulation</b>	<p>A process in which radioactive waste is physically enclosed in a material with the aim of preventing radionuclides from escaping.</p> <p><i>[For intermediate level waste encapsulation is a type of “conditioning”; the most commonly used encapsulants are types of cement and others include polymers. For spent fuel encapsulation is likely to entail placing the fuel in an inner canister that is then placed in an outer, disposal canister. The canisters could be made of different metals and might be filled with metal.]</i></p>
<b>Engagement Package</b>	<p>Funding and other support to a community that has made an “Expression of Interest” to assist it to consider the issues involved in geological disposal, including the setting up and running of a “Community Siting Partnership”.</p>
<b>Enriched uranium</b>	<p>Uranium in which the mass content of the isotope uranium-235 is above the level in natural uranium ores (0.72% by mass).</p>

<b>Environmental Permit</b>	A permit issued by the Environment Agency under the Environmental Permitting Regulations. <i>[When the Environmental Permitting Regulations 2010 came into force, Environmental Permits replaced registrations and authorisations under the Radioactive Substances Act 1993 in England and Wales.]</i>
<b>Environmental Safety Case</b>	The collection of arguments, provided by the developer or operator of a disposal facility, that seeks to demonstrate that the required standard of environmental safety is achieved.
<b>Exotic fuel</b>	Term used by NDA for any type of nuclear fuel that is not from a commercial nuclear power reactor. <i>[Mainly fuels from research reactors; can be taken to include fuel from nuclear powered submarines.]</i>
<b>Expression of Interest</b>	A notification to Government by a community that it is interested in entering discussions about involvement in the geological disposal facility siting process, without commitment.
<b>Far-field</b>	The “geosphere” beyond the “near-field”. <i>[i.e. the rocks and subsoil undisturbed by the presence of the disposal facility.]</i>
<b>Generation III nuclear reactors</b>	Reactors that are about to be deployed. <i>[In the UK Generation III reactors are “pressurised water reactors” with advanced safety systems.]</i>
<b>Generation IV reactors</b>	Reactors that not yet available to be deployed commercially. <i>[Generation IV reactors are typically at the prototype or design stage, e.g. fast reactors.]</i>
<b>Generic Design Assessment (GDA)</b>	The generic assessment undertaken by the Office for Nuclear Regulation of the Health and Safety Executive and the Environment Agency of the suitability of new reactor designs for use in the UK.
<b>Geological disposal</b>	Generally, emplacement in the Earth’s crust with no intent to retrieve. Used specifically in the MRWS programme to mean “disposal” of radioactive waste in an underground facility, where the geology (rock structure) provides a barrier against escape of radioactivity and where the depth, taken in the particular geological context, substantially protects the waste from disturbances arising at the surface.
<b>Geological disposal concept</b>	Any variant of geological disposal, including the use of a “mined repository”, “deep boreholes” and more than one “geological disposal facility”.
<b>Geological disposal facility (GDF)</b>	Any facility used for geological disposal. <i>[Includes mined repositories, natural caverns, disused man-made caverns or mines, and deep boreholes.]</i>
<b>Geological disposal facility design</b>	The detailed drawings and specifications that will allow construction of a “geological disposal facility”. <i>[Includes nuclear, civil, mechanical, electrical, materials, chemical, geotechnical and geological engineering aspects.]</i>

<b>Geological repository</b>	See “mined repository”.
<b>Geosphere</b>	Solid portion of the earth consisting of the crust and part of the upper mantle.
<b>Hex tails</b>	Uranium hexafluoride residue from the production of enriched uranium. <i>[Hex tails are depleted in uranium-235 to levels well below the 0.72 wt% of natural uranium, usually about 0.2 wt%. Uranium hexafluoride is a stable solid at room temperature and pressure but sublimates to a vapour at 56.5 °C.]</i>
<b>Higher activity waste (HAW)</b>	Radioactive waste with activity above the thresholds for low level waste (LLW), <i>i.e.</i> above 4 GBq/tonne alpha activity or above 12 GBq/tonne beta gamma activity. <i>[It is usually also taken to include LLW unsuitable for near-surface disposal.]</i>
<b>High level waste (HLW)</b>	Radioactive waste in which the temperature may rise significantly as a result of its radioactive content, so that this factor has to be taken into account in the design of waste storage or disposal facilities. <i>[In practice the term is only used in the UK for the nitric acid solutions arising from reprocessing spent fuels and for the vitrified form of the solutes in these solutions.]</i>
<b>Host community</b>	A community in which a geological disposal facility will be built. <i>[It is a community in a small geographically well-defined area, such as town or village, and includes the population of that area and the owners of the land.]</i>
<b>Immobilisation</b>	A conditioning process in which radioactive waste is chemically incorporated into a material with the aim of preventing radionuclides from moving. <i>[“Vitrification” and incorporation in ceramics are types of immobilisation processes.]</i>
<b>Integrated waste management</b>	Management of all radioactive and non-radioactive wastes arising on nuclear sites (including those in solid, liquid and gaseous form) in an integrated way. <i>[Nuclear sites are required by regulators to have integrated waste strategies.]</i>
<b>Interim storage</b>	Storage of radioactive waste prior to implementing a final management step, such as “geological disposal”.
<b>Intermediate level waste (ILW)</b>	Radioactive waste exceeding the upper activity boundaries for “low level waste” ( <i>i.e.</i> over 4 GBq/tonne alpha activity or 12 GBq/tonne beta gamma activity) but for which its heat output need not be taken into account in the design of storage or disposal facilities.

<b>Land quality management</b>	<p>Managing the aspects of the condition of ground (soil, underlying rocks, water and buried structures) that could have an impact on people or the environment.</p> <p><i>[Includes all actions taken to assess, characterise, control, monitor, reduce or remove radioactive and non-radioactive contamination in, on or under the land.]</i></p>
<b>Legacy facility</b>	<p>A nuclear facility constructed several decades ago where waste has been generated or stored.</p>
<b>Legacy Ponds and Silos (LP&amp;S)</b>	<p>Four facilities at Sellafield: the First Generation Magnox Storage Pond, the Pile Fuel Storage Pond, the Magnox Swarf Silo and the Pile Fuel Cladding Silo.</p> <p><i>[The retrieval of wastes and fuels from these facilities is the highest priority of the Nuclear Decommissioning Authority because the facilities present intolerable risks to people and the environment.]</i></p>
<b>Legacy waste</b>	<p>Radioactive waste that arose several decades ago.</p> <p><i>[A subset of existing waste; sometimes called historic waste or historical waste. The term was originally reserved for wastes kept in, or that have arisen in, legacy facilities. It is now also used to mean all existing and committed wastes (to distinguish them from “new build wastes”).]</i></p>
<b>Letter of Compliance (LoC)</b>	<p>A letter issued by the Nuclear Decommissioning Authority's Radioactive Waste Management Directorate (RWMD) stating that a proposed “waste package” complies with RWMD's packaging standards and is thus suitable for “interim storage” and “geological disposal”.</p> <p><i>[The regulators' view is that packages assessed under the LoC process as suitable for “geological disposal” will also be suitable for “long-term storage”.]</i></p>
<b>Long-term storage</b>	<p>Storage for more than about 100 years.</p>
<b>Low level waste (LLW)</b>	<p>“Radioactive waste” with activity levels that do not exceed 4 GBq/tonne alpha activity or 12 GBq/tonne beta gamma activity.</p>
<b>Low Level Waste Repository (LLWR)</b>	<p>The UK national disposal facility for low level waste.</p> <p><i>[Located near the village of Drigg in Cumbria.]</i></p>
<b>Magnox reactor</b>	<p>A UK designed gas-cooled reactor with a graphite moderator.</p> <p><i>[It uses uranium metal fuel with a magnesium alloy cladding.]</i></p>
<b>Mined repository</b>	<p>A facility specifically excavated and constructed for the “geological disposal” of radioactive waste.</p> <p><i>[“Mined and engineered repository” is a more correct description. Most designs consist of shafts or adits leading to tunnels and vaults.]</i></p>
<b>Near-field</b>	<p>The part of a disposal facility near or in contact with the “waste packages”, including filling or sealing materials, and those parts of the host rock whose characteristics have been or could be altered as a result of the presence of the disposal facility and its contents.</p>

<b>Near-surface disposal</b>	Disposal at or close to the surface of the Earth. <i>[Includes underground disposal in the Earth's crust at depths less than a few tens of metres, and emplacement in engineered structures at or just below ground level. Formerly called "shallow land burial" or emplacement in a "near surface repository".]</i>
<b>New build wastes</b>	Wastes from new nuclear power stations.
<b>Nuclear materials</b>	Separated plutonium and "uranic materials". <i>[Not to be confused with 'nuclear matter', which is defined in the Nuclear Installations Act 1965 and related Regulations and which includes both fissile material and material made radioactive by the production or use of fissile material. Thorium that has not been declared to be waste is also considered to be a nuclear material.]</i>
<b>Optimisation</b>	A process of showing that risks have been reduced to a level beyond which, on a balance of factors, no further reduction would be worthwhile. <i>[The optimisation principle encompasses various principles and concepts used in health and safety regulation, environmental protection and radiological protection (e.g. "as low as reasonably practicable" (ALARP), "best available techniques" (BAT), "as low as reasonably achievable" (ALARA). In the context of radioactive waste management it always implies a need to identify, assess and compare options for achieving an objective or carrying out an operation.]</i>
<b>Overpack</b>	An additional container for a waste package. <i>[Usually to make it more suitable for storage, handling, transport or disposal.]</i>
<b>Package</b>	See "Waste package".
<b>Packaging</b>	Placing waste into a container for long-term storage and/or disposal. <i>[In most cases this includes conditioning but sometimes waste is simply placed in containers, with or without compaction to reduce its volume.]</i>
<b>Pond</b>	A water-filled structure in which nuclear fuel is stored. <i>[Usually made of concrete, the water provides cooling and shielding.]</i>
<b>Pressurised water reactor (PWR)</b>	A nuclear reactor in which water is used as the coolant and moderator. <i>[The fuel is enriched uranium oxide with "zircaloy" cladding. PWRs operate above atmospheric pressure to prevent the water boiling. ]</i>
<b>Public</b>	People who have no particular interest in, and are not affected by, radioactive waste management. <i>[CoRWM distinguishes between "stakeholders" and the public.]</i>

<b>Radioactive waste</b>	Radioactive waste is defined in the Environmental Permitting (England and Wales) (Amendment) Regulations 2011 (SI 2011/2043), the Radioactive Substances Act 1993 Amendment (Scotland) Regulations 2011 (SSI 2011/207) and the Radioactive Substances Act 1993 (Amendment) Regulations (Northern Ireland) 2011 (NISR2011/290). The definition has numerical levels for artificial radionuclides and a separate definition for wastes from industries using naturally occurring radioactive materials (NORM wastes). <i>[Note that spent fuels, plutonium and uranium are not radioactive wastes unless it has been decided that there is no further use for them and they are declared to be wastes.]</i>
<b>Radioactive waste management</b>	All the activities involved in managing radioactive wastes. <i>[Includes minimising arisings, all types of treatment (e.g. decontamination, sorting, segregation), "conditioning", "packaging" and "disposal".]</i>
<b>Raw waste</b>	Waste that has not been conditioned.
<b>Recycling</b>	Any operation in which wastes are processed to make new products or materials.
<b>Repository</b>	A facility where waste is emplaced for disposal. <i>[Often used as shorthand for "mined repository", but also used in other contexts, e.g. the UK's Low Level Waste Repository (LLWR).]</i>
<b>Reprocessing</b>	Separation of uranium and plutonium from "spent fuel". <i>[A specialised form of recycling. Reprocessing usually involves dissolving spent fuel in nitric acid. The uranium and plutonium are then stored pending decisions on their re-use or disposal and the remaining high activity liquid waste is vitrified.]</i>
<b>Requesting Parties</b>	The organisations that have requested that their reactor designs be considered in the Generic Design Assessment of new reactors by the Health and Safety Executive and the Environment Agency. <i>[The current Requesting Parties are Westinghouse and EDF-AREVA.]</i>
<b>Research</b>	An investigation directed to the discovery of some fact or principle by a course of study or scientific enquiry.
<b>Retrievability</b>	The ability in principle to recover waste or entire waste packages once they have been emplaced in a repository. <i>[Retrieval is the concrete action of removal of the waste. Retrievability implies making provisions in order to allow retrieval should it be required.]</i>
<b>Reversibility</b>	The ability to withdraw wastes from an open disposal facility by reversing the emplacement process.
<b>Safety assessment</b>	An assessment of whether a nuclear facility or operation is or, if particular actions are taken, will be safe.
<b>Safety case</b>	The complete set of arguments that demonstrates that a nuclear facility or operation is or, if particular actions are taken, will be safe.

<b>Silo</b>	A structure used for storage or disposal of radioactive waste. <i>[The term is applied in the UK mainly to concrete structures (buildings) used for temporary storage of wastes, but it can also apply to vertical shafts in rock used for underground storage or disposal.]</i>
<b>Spent fuel</b>	Fuel that has been used in a nuclear reactor and for which there is no further use as fuel in that reactor. <i>[MOD uses the term “irradiated fuel” to mean fuels that have been produced and irradiated for the purpose of nuclear submarine propulsion, including prototype and research fuel assemblies. In the US spent fuel is increasingly referred to as “used fuel” because it may be worthwhile to extract materials from the fuel and recycle them (e.g. via “reprocessing”).]</i>
<b>Stakeholder</b>	A person or organisation who has an interest in or is affected by radioactive waste management. <i>[In the context of CoRWM’s work, stakeholders include waste producers, regulators, non-governmental organisations, local authorities and communities near existing nuclear sites and potential disposal sites.]</i>
<b>Storage</b>	Placing wastes or other materials in a facility with the intention of retrieving them at a later date.
<b>Strategic Environmental Assessment (SEA)</b>	The type of environmental assessment legally required by the Environmental Assessment of Plans and Programmes Regulations 2004 and the Environmental Assessment (Scotland) Act 2005 in the preparation of certain plans, programmes and strategies. <i>[The authority responsible for the plan, programme or strategy must prepare an environmental report on its likely significant effects, consult the public on the report and the plan or programme proposals, take the findings into account, and provide information on the plan or programme as finally adopted.]</i>
<b>Surface-based investigations</b>	Investigations of a potential geological disposal site that are carried out from the surface, rather than underground. <i>[For example, seismic investigations and boreholes.]</i>
<b>Topic Strategy</b>	A strategy developed by the Nuclear Decommissioning Authority for a particular topic within its remit. <i>[For example, topic strategies have been or are being developed for higher activity wastes and for various types of spent fuels.]</i>
<b>Treatment</b>	Any process used to make radioactive wastes suitable for the next step in their management. <i>[Treatment processes include sorting, decontamination, volume reduction and all types of “conditioning”.]</i>
<b>Underground research facility (URF)</b>	A site or host rock specific underground facility for characterisation and R&D related to “geological disposal”.
<b>Upstream optioneering</b>	A Nuclear Decommissioning Authority project that looks upstream of geological disposal to enable optimisation of the management of higher activity wastes throughout their lifecycle.

<b>Uranic materials</b>	Materials consisting largely or entirely of uranium and the products of its radioactive decay.
<b>Vitrification</b>	The process of converting wastes into a glass or glass-like form.
<b>Voluntarism</b>	An approach to siting geological disposal facilities that involves communities voluntarily expressing an interest in holding discussions with Government, then deciding whether to participate any further.
<b>Waste hierarchy</b>	The hierarchy of principles used in waste management. These consist of: (1) non-creation of wastes where practicable; (2) minimisation of arisings; (3) recycling and re-use; (4) disposal.
<b>Waste package</b>	A container and all its contents. <i>[Includes the waste, any encapsulating material, any capping grout, etc.]</i>
<b>Zeolite</b>	An ion exchange material.

### **Acronym List**

<b>AGR</b>	advanced gas cooled reactor (A type of reactor with a graphite core, and uranium oxide fuel in steel cladding with a graphite sleeve.)
<b>ALARP</b>	as low as reasonably practicable (a basic principle of UK health and safety regulation)
<b>APM</b>	adaptive phased management (of nuclear fuel, Canada)
<b>AWAF</b>	Active Waste Accumulation Facility (at Rosyth Royal Dockyard)
<b>AWE</b>	Atomic Weapons Establishment (at Aldermaston). (AWE plc is the company that runs Aldermaston and Burghfield under contract to the Ministry of Defence.)
<b>BAT</b>	best available techniques (A basic environmental protection principle in the European Union and other countries. Now used by the Environment Agency in radioactive substances regulation instead of “best practicable environmental option” (BPEO) and “best practicable means” (BPM).)
<b>BIS</b>	Department for Business, Innovation and Skills
<b>BRC</b>	Blue Ribbon Commission (in the USA, a commission set up by the direction of the President)
<b>CNS</b>	civil nuclear safety (acronym used for a team at ONR)
<b>CoRWM</b>	Committee on Radioactive Waste Management
<b>CSA</b>	Chief Scientific Advisor (to Government or a government department)
<b>DCIC</b>	ductile cast iron container
<b>DECC</b>	Department of Energy and Climate Change
<b>DFR</b>	Dounreay Fast Reactor
<b>DRP</b>	Direct Research Portfolio (the directly funded NDA research programme)

<b>DSSC</b>	disposal system safety case (for geological disposal, produced by RWMD)
<b>EA</b>	Environment Agency, England and Wales
<b>EDF</b>	Electricité de France (trades in the UK as EDF Energy)
<b>EPSRC</b>	Engineering and Physical Sciences Research Council
<b>ESRC</b>	Economic and Social Research Council
<b>EU</b>	European Union
<b>FDP</b>	Funded Decommissioning Programme (for a new nuclear power station)
<b>FED</b>	fuel element debris (a type of ILW)
<b>GDA</b>	Generic Design Assessment (of new nuclear reactors, carried out by the regulators)
<b>GDF</b>	geological disposal facility
<b>GDIB</b>	Geological Disposal Implementation Board (set up by DECC and chaired by a DECC Minister)
<b>GDIP</b>	Geological Disposal Implementation Plan (an RWMD plan)
<b>GDSG</b>	Geological Disposal Steering Group (a UK Government group that reports to GDIB)
<b>gDSSC</b>	generic Disposal System Safety Case (produced by RWMD)
<b>HAW</b>	higher activity waste
<b>HEU</b>	highly enriched uranium
<b>HLW</b>	high level waste
<b>HoLSTC</b>	House of Lords Select Committee on Science and Technology
<b>HPA</b>	Health Protection Agency
<b>HSE</b>	Health and Safety Executive
<b>IAEA</b>	International Atomic Energy Agency (a United Nations agency)
<b>ILW</b>	intermediate level waste
<b>IPPAS</b>	International Physical Protection Advisory Service (of IAEA)
<b>IPT</b>	Integrated Project Team (an NDA team for addressing a particular HAW management issue)
<b>LLW</b>	low level waste
<b>LoC</b>	Letter of Compliance (previously Letter of Comfort)
<b>LP&amp;S</b>	Legacy Ponds and Silos (at Sellafield)
<b>m<sup>3</sup></b>	cubic metre
<b>MOD</b>	Ministry of Defence
<b>MOP</b>	Magnox Operating Plan (the current plan is the eighth, MOP8, MOP9 is due to be published in summer 2012)
<b>MOX</b>	mixed oxide fuel (contains uranium and plutonium oxides)

<b>MRWS</b>	Managing Radioactive Waste Safely (the UK programme for the management of higher activity wastes)
<b>NDA</b>	Nuclear Decommissioning Authority
<b>NDARB</b>	Nuclear Decommissioning Authority Research Board
<b>NDPB</b>	non-departmental public body
<b>NEA</b>	Nuclear Energy Agency (part of the Organisation for Economic Cooperation and Development)
<b>NERC</b>	Natural Environment Research Council
<b>NIA</b>	Nuclear Industry Association
<b>NNL</b>	National Nuclear Laboratory
<b>NSAN</b>	National Skills Academy for Nuclear
<b>NuLeAF</b>	Nuclear Legacy Advisory Forum
<b>NWAA</b>	Nuclear Waste Advisory Associates
<b>NWMO</b>	Nuclear Waste Management Organisation (Canada)
<b>NWRF</b>	Nuclear Waste Research Forum (a group convened by NDA)
<b>NWTRB</b>	Nuclear Waste Technical Review Board (in the USA)
<b>OECD</b>	Organisation for Economic Cooperation and Development
<b>OGC</b>	Office of Government Commerce (now part of the Efficiency and Reform Group within the Cabinet Office)
<b>ONR</b>	Office for Nuclear Regulation (An agency within HSE that regulates safety, security and safeguards at nuclear facilities and transport of radioactive materials. ONR will in due course become an autonomous organisation, legally separated from but still supported by HSE.)
<b>OSPAR</b>	Oslo and Paris Convention on the Protection of the Marine Environment of the North East Atlantic
<b>PBO</b>	Parent Body Organisation (the owner of an NDA SLC)
<b>PCM</b>	plutonium contaminated material
<b>PSE</b>	public and stakeholder engagement
<b>PSE3</b>	the third round of PSE carried out by the West Cumbria MRWS Partnership
<b>RAP</b>	RWMD's Research Advisory Panel
<b>RATE</b>	Radioactivity and the Environment (a NERC research programme)
<b>RCEP</b>	Research Councils Energy Programme
<b>R&amp;D</b>	research and development
<b>RDMB</b>	Repository Development Management Board (the Board of NDA-RWMD)
<b>RMTT</b>	Radioactive Materials Transport Team (part of DfT until July 2011, now part of ONR)
<b>RSRL</b>	Research Sites Restoration Limited

<b>RWMD</b>	Radioactive Waste Management Directorate (of NDA)
<b>RWPG</b>	Radioactive Waste Policy Group (a UK Government group)
<b>SDIG</b>	Strategy Development and Implementation Group (for NDA, chaired by DECC)
<b>SDP</b>	Submarine Dismantling Project (an MOD project), or Silo Direct Encapsulation Plant (at Sellafield) or Shaft Decommissioning Project (at Dounreay)
<b>SEA</b>	strategic environmental assessment
<b>SEPA</b>	Scottish Environment Protection Agency
<b>SKB</b>	Svensk Kärnbränslehantering AB (Swedish nuclear fuel and waste management company)
<b>SLC</b>	site licence company (a company that runs an NDA site, under contract to the NDA, and holds the nuclear site licence)
<b>SSG</b>	Site Stakeholder Group (at NDA sites)
<b>TBuRD</b>	Technical Baseline and underpinning R&D Document (produced by each SLC for its sites)
<b>THORP</b>	Thermal Oxide Reprocessing Plant (at Sellafield)
<b>TOG</b>	Theme Overview Group (an NDA group; there are TOGs for most of the themes in the NDA Strategy)
<b>WMO</b>	waste management organisation
<b>WMSG</b>	Waste Management Steering Group (a UK Government group)

## **FURTHER INFORMATION**

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