

NDA Research Board Annual Report – Issue 1 Stan Gordelier, Independent Chair, March 2015

1. Introduction and Background.

The terms of reference, the modus operandi and the membership of the Research Board (RB) have been subject to review, particularly following the government's response to the House of Lords Science and Technology Committee report on UK nuclear R&D capability¹ and the subsequent establishments of the Nuclear Innovation and Research Advisory Board (NIRAB) and its support body the Nuclear Innovation and Research Office (NIRO). The Board has concluded, following discussions with the chair of NIRAB (see section 2), that there is no need for any significant change for the moment; this will be kept under review.

As a separate matter arising from this review members did however feel that some minor modifications to the terms of reference would be desirable to make clear that the Board is independent of the NDA and any other body. Members were keen to ensure that, while it expects to work cooperatively with the NDA, the independence of its advisory role must be transparent; its programme of work and any recommendations that it makes are not subject to agreement or veto by any other body. Some minor modifications to its terms of reference and modus operandi document have now been agreed and the revised version is available via the NDA's website.

A request for membership was received from the Chief Scientific Advisor for Scotland, to which the Board was happy to agree. In addition the Board was pleased that the NIRO Director has accepted the Board's invitation to attend as an observer.

Two meetings of the independent Research Board have been held during this period, in April and October 2014, see sections 4 and 5 and appendices 1 and 2 for the full agendas. Progress between meetings is maintained via correspondence.

2. Discussions with NIRAB.

In April 2014 the independent chair of the Research Board and the NDA Head of R&D met with the Chair of NIRAB and the NIRO Director to discuss the possible interactions between the two bodies and whether the RB terms of reference and activities needed modification now that NIRAB had become established.

The discussions were very constructive with the following key points resulting:

- NIRAB's early conclusions from its UK R&D gap analysis were that small modular reactor (SMR) development, fuel development and advanced fuel cycles were the most prominent gaps. The work of the NDA and the review mechanisms by the RB and its supporting Nuclear Waste Research Forum (NWRF) and Radioactive Waste Management

¹ "The UK's Nuclear Future", BIS/13/627, HM Government, March 2013

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Ltd's Technical Advisory Panel (TAP) meant that waste management and decommissioning R&D was already well covered. In view of this, the chair of NIRAB saw no need for the present to modify any of the RB's arrangements or activities.

- It was agreed that the two bodies should stay in contact (now facilitated by the NIRO Director attending the RB as an observer and that there are a number of joint members) and would exchange all relevant information and documents that might be helpful to the other party. In particular NIRAB would share its completed gap analysis and seek views on whether NDA's own programme could be adjusted in content or timescale to at least partially cover some of the gaps, whilst recognising that this must not damage NDA's needs nor cut across NDA's vires. Spent fuel management, particularly for more exotic R&D fuels, was the most likely area for such future collaboration.
- There was a recognised need to improve the co-ordination of and the benefits from UK participation in international programmes. Where possible the RB and NIRAB would work together to achieve this.

3. The Board's Continuing Strategic Approach.

As reported in the last Annual Report, the Board has agreed that the strategic approach to its work programme will be to explore relevant UK R&D activities (both NDA's and that of others) via:

- The NDA strategic themes², taking more manageable sub-sets as necessary.
- The objectives, activities and progress of the NWRP topic based working groups³.
- Comparing the outcomes to members' views of needs and priorities and making recommendations as necessary.

The Board's work during the reporting year has continued with this approach and in doing so it has evolved a set of relatively standard questions (adapted as necessary to the topic under discussion) to which it seeks responses when examining the strategic themes. These questions are:

- Q1. On the basis of the evidence available to the Research Board, does the Board consider the process for developing the R&D programme for this topic is soundly based?
- Q2. Does the Board consider the mechanisms for review of the R&D programme are adequate?
- Q3. Are there still areas where the Board believes there could be gaps or where it would like further work to test for gaps?

² The NDA Strategic Themes are: Site Restoration, Spent Fuels, Nuclear Materials, Integrated Waste Management, Business Optimisation and Critical Enablers.

³ These six working groups are: Characterisation; Waste Packaging and Storage; Decommissioning; Land Quality, TBUrd and University Interactions. The latter two groups are more process oriented to facilitate sharing of good practice and to improve coordination.

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Q4. Does the Board consider that the R&D programme is adequately communicated to NDA's stakeholders?

Q5. Is the R&D programme robust to possible change?

In pursuing this approach the Board now requests that the NDA provide documentation in advance of the discussions at its meetings which specifically address these questions.

The Board has also agreed that it should make more transparent its conclusions and recommendations following such explorations. It has agreed that it will do so by publishing a Position Statement of its agreed views, whenever appropriate, on each sub-set of a NDA strategic themes that it has examined. During the course of the year such position statements have been prepared and agreed on the RWMD⁴ (as it was at the time) R&D programme and the NDA Spent Fuel R&D programme. A position statement on the pre-disposal treatment of higher activity wastes (part of the Integrated Waste Management theme) is in preparation.

The current Board intention for the coming year is that the first meeting will return to and complete its examination of the Technology Baseline underpinning Research and Development (TBuRD) process and the outcome R&D priorities and at the second session of the year it will examine the Nuclear Materials theme. If appropriate, Position Statements will be produced for each of these topics.

In line with the principles of its agreed strategic approach, the Board also returned during the year to an examination of the progress of the NWRF and its working groups.

4. April Meeting.

The main purposes of the April meeting were to:

- Confirm members' views of the RWMD R&D programme.
- Understand the UK's Spent Fuels R&D programme and, as appropriate, make recommendations or endorse the approach.

The Board also received an update on the Government Response to the House of Lords Science and Technology Committee inquiry into the UK's Nuclear R&D capabilities from the NIRO Director and went on to discuss the implications for the NDA RB itself, as outlined in sections 1 and 2 above. The full agenda for the April meeting is included in Appendix 1.

4.1. The RWMD R&D Programme.

With respect to the RWMD R&D programme the Board reviewed the draft Position Statement prepared on its behalf by the independent chair following the Board's examination of this topic at its April 2013 meeting. The Board sought further information from the NDA on the repository inventory, the chemo-toxic aspects of the repository safety case and whether the international expenditure on R&D for repository development could be more accurately quantified. It also requested that the recommendations contained in the text of the report be more explicitly

⁴ As of 1st April 2014, RWMD became a wholly owned subsidiary of NDA, Radioactive Waste Management Ltd.

identified. Subject to changes reflecting these points, the Board agreed its Position Statement on the RWMD R&D programme. The key points and key recommendations from the subsequently agreed Position Statement are briefly recorded here. The reader is referred to the full Position Statement published on the NDA website for more detail.

5.1.1. Question 1 (*On the basis of the evidence available to the Research Board, does the Board consider the process for developing the R&D programme for this topic is soundly based?*)

With respect to the Board's standard question 1 it concluded that RWMD had set out a logical approach to establishing and prioritising the UK R&D needs which it was further developing.

Recommendation: The RB encouraged the further development of this approach to establish a fully prioritised programme with timescales set out against the needs at each stage of the overall GDF delivery programme.

5.1.2. Question 2 (*Does the Board consider the mechanisms for review of the R&D programme are adequate?*)

With respect to the Boards' standard question 2, it observed that RWMD's programme was already heavily monitored at considerable depth from three separate and independent directions, the Technical Advisory Panel (with the RB supplementing the TAP with a higher level of supervision), the regulatory bodies (The Office of Nuclear Regulation (ONR) and the Environment Agency (EA)) and the Committee on Radioactive Waste Management (CoRWM). The Board considered the level of monitoring was already at least adequate. There had been a suggestion in a recent government consultation that an additional monitoring body could be created, which the Board did not support.

Recommendation: The creation of yet another body to monitor RWMD's R&D programme is at best unnecessary.

5.1.3. Question 3 (*Are there still areas where the Board believes there could be gaps or where it would like further work to test for gaps?*)

With respect to the Board's standard question 3, the Board noted that deep geological disposal was now being employed in a number of countries for disposal of chemo-toxic wastes for which the requirements for the long term safety case were on a less demanding basis than for radioactive wastes. It considered that there may be merits in a common basis for these assessments (i.e. why should the requirements for radioactive materials be made more demanding than for chemo-toxic wastes?). It further noted that UK regulatory requirements were already that the level of protection for chemo-toxic wastes in the GDF were consistent with that demanded for non-radioactive waste disposal facilities.

The Board also observed that it is typically societal aspects that determine a GDF project's timescale and progress, not the technical programme. Hence, ensuring that technical work and its communication were capturing societal needs fully is essential. The Board recognised that research in this area was a difficult issue with the risk that RWMD could be accused of trying to manipulate public opinion.

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In its overall response to question 3 the Board's view was that, given the extensive monitoring of RWMD's programme, it was unlikely that any significant R&D element was missing. Nevertheless it did have a recommendation.

Recommendation: That the TAP considered exploring two topics further with RWMD:

- The approach to non-radiological toxicity issues (i.e. potential chemo-toxic exposure) in the GDF safety case.
- Societal issues: what R&D could usefully be undertaken and how this is best managed and funded.

5.1.4. Question 4 (*Does the Board consider that the R&D programme is adequately communicated to NDA's stakeholders?*)

With respect to the Board's standard question 4 the Board considered that there was a good story to tell on the sound methodology by which RWMD's R&D programme is put together. However, the Technical Programme document published on the NDA's website was written for specialists in disposal, was extremely lengthy and a difficult read.

Recommendation: Consideration should be given to producing more accessible and visual communications, more accessible to a non-specialist audience.

5.1.5. Question 5 (*Is the R&D programme robust to possible change?*)

At the time this review was conducted the Board's standard question list had not yet included question 5, that of robustness to change. However, in subsequent discussions the Board has confirmed that the processes that RWMD uses, particularly the Issues Register noted as a good practice in the Board's full Position Statement, make the R&D programme robust to change.

4.2. Spent Fuel R&D.

On the second main purpose of the April meeting, exploring the spent fuel theme, the Board received documentation from and held discussion with the NDA Head of Nuclear Fuel Cycle; the R&D Manager for EDF UK; The Head of Research for RWM Ltd; the Principal Investigator, Nuclear Champion, Research Council Energy Programme; and the Director Assistant, Nuclear Energy Directorate of the CEA, France. The Board then discussed its preliminary conclusions with a view to the preparation of its Position Statement for this NDA theme.

5. October Meeting.

The main purposes of the October meeting were to:

- Confirm members' views of the Spent Fuels R&D programme and agree the Research Board's Position Statement.
- Understand the UK's Integrated Waste Management R&D programme with respect to the pre-disposal treatment of higher activity wastes and, as appropriate, make recommendations or endorse the approach.
- Review the progress of the Nuclear Waste Research Forum Working Groups.

The Board also received an update on the progress of NIRAB and NIRO and discussed the annual report of the RWM Technical Advisory Panel. It also discussed a review of the Board's performance to date conducted by the independent chair, the NDA Director for Strategy and Technology and the NDA Head of Technology. The full agenda for the October meeting is given in appendix 2.

5.1. Position Statement - Spent Fuels R&D.

With respect to the first key item on the agenda, the Board reviewed the Position Statement that had been prepared on its behalf by the independent chair. There was a discussion of the possible need for archive material of fuel samples or fuel materials that may be needed to support any wider UK nuclear R&D programme and members agreed that some consideration of this should be included in the text. Members also agreed that some recommendations should be downgraded to observations, but otherwise regarded the draft as an appropriate reflection of their views. The key points and recommendations from the subsequently agreed Position Statement are recorded here below. The reader is referred to the full Position Statement published on the NDA website for more detail.

5.1.1. Question 1 (*On the basis of the evidence available to the Research Board, does the Board consider the process for developing the R&D programme for this topic is soundly based?*)

The NDA classifies the UK spent fuel stocks into three primary groups: oxide (Advanced Gas Cooled Reactor (AGR) and Light Water Reactor (LWR)); Magnox; and Exotics (small non-standard quantities, resulting from numerous prototype and experimental fuels).

Oxide Fuels - AGR

Most of NDA's directly funded R&D on spent fuels of all types in recent years has focused on AGR fuel. This level of R&D activity reflects the fact that a major strategic change, from reprocessing to long-term storage, is planned to occur before the end of this decade. Sellafield Ltd has conducted a study to select the best interim storage method, which the NDA arranged to have independently assessed. This independent assessment concurred with the NDA view that dry storage must be maintained as a fall-back. Shorter term R&D milestones feed into the intention to implement caustic dosing in the THORP Receipt and Storage Pond (TR&S) in 2018, and to have the interim storage and monitoring regime established and underpinned by 2019.

The Technology Roadmap for AGR fuel is well developed and shows the timeline for the future management of spent AGR fuel, key milestones and decision points in the management strategy for the fuel, and how R&D work feeds into these at appropriate times.

Oxide Fuels - LWR

The position with respect to LWR fuel is simpler. At present only EDF's Sizewell B pressurised water reactor is generating spent LWR fuel in the UK. The EDF strategy for spent fuel is on site storage pending subsequent direct disposal in the long term; NDA has no responsibility for any of this fuel. There are relatively small volumes of foreign "conventional" spent LWR fuel, which the NDA is contracted to reprocess.

Magnox Fuels

The key issue for Magnox fuel is that long-term pond storage is very difficult compared to oxide fuel. The cladding and metallic fuel itself are more chemically reactive and the experience is that significant and severe corrosion can occur.

The NDA Strategy is to:

- Reprocess the whole of the Magnox inventory in the Sellafield Magnox reprocessing plant. However, this plant is now very elderly (it began operation in 1964) and there is a risk that it will not remain operable until all the spent fuel has been reprocessed. The current estimated time for completion is 2018-2020.
- Establish the contingency option of dry storage in the event of either sudden irreversible loss of reprocessing capability or more gradual loss of capability. This needs to be implementable on a timescale commensurate with the satisfactory pond storage time of the fuel.
- This contingency only maintains the fuel in a safe condition which minimises deterioration. Once the fuel is in dry storage there is a longer term need to develop the capability for direct disposal.

However, it is believed that some 2% of the fuel inventory cannot be successfully dried. Deterioration of such fuel in the event of forced long term storage could present a difficult and expensive problem.

There is also the issue of the “end game” for the reprocessing plant which, to a more limited extent, also applies to THORP. These plants were designed for bulk reprocessing and will be difficult and expensive to use for “tail end” small quantities.

Exotic Fuels

Due to the diverse nature of the fuels, management routes necessarily have to be dealt with on a case by case basis, albeit with the intention to use existing facilities. The intention is to take advantage of THORP and the Magnox reprocessing facilities whenever possible.

NDA has funded some R&D on Exotics recently, although to a fairly small extent. A moderate increase in R&D on Exotics is expected over the next few years, reflecting the fact that management options for these fuels have to be developed. It is likely in the longer term that a flexible, small scale advanced reprocessing/treatment plant will be needed.

Research Board’s Position:

Oxide Fuels

- The strategy is clear and a credible fall back option is well advanced.
- The AGR Technology Roadmap is well established and the milestones and decision points identified.
- The programme for the under-pinning R&D is established and credible.

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- The intention to monitor the Technology Roadmap at least annually and to monitor the progress of delivery via the AGR Technical Forum is sound.

Recommendation: The intention to move to caustic dosing of the storage pond in 2018 is near term and critical. Although there is good experience of this regime on the Sellafield site it is imperative that the R&D work to underpin this change is completed as soon as possible. The Board also recommends a thorough peer review of the evidence before such a change is implemented.

Recommendation: The NDA has already made efforts to collect the earlier R&D on fuel drying and dry storage conducted by the former electricity utilities in the UK; there should be effort to ensure this earlier work is not lost.

Magnox Fuels

- The strategy is clear and a credible fall back option is under development.
- Whilst the Magnox technical baseline is well developed, a Magnox Technology Roadmap document has not been prepared but there is a clear intention to progress this.
- The risks to the basic strategy (i.e. reprocess all fuel) have been thought through and the R&D to establish the contingent approach appears to be addressing all the right issues, with the above noted exceptions (2% difficult to dry fuel and tail end quantities). The intention to monitor the Technology Roadmap annually is sound.
- The Research Board accept the argument that development of direct disposal capability for Magnox fuel (some research for which is ongoing) is not an urgent matter although it is probably a difficult issue to resolve.

Recommendation: The Magnox Throughput Improvement Programme should be approached with caution; the objective should be for the plant to last until all the fuel has been reprocessed. If this takes a little longer, it is worth a small time extension to avoid stranded fuel.

Recommendation: Consideration should be given to small tail end quantities of Magnox (and perhaps also to AGR) fuel. R&D may be needed to assess the practicalities of using the reprocessing plants for these or for how they can be otherwise addressed.

Recommendation: The Magnox Operating Programme should consider the merits of leaving some Wylfa fuel until last if there is an acute risk that the reprocessing plant will be unable to complete all fuel. Similarly there are advantages to any “tail end” fuel being that from Wylfa.

Exotic Fuels

Recommendation: While the NDA believes that the Exotic fuels are generally stable from a corrosion perspective (most of them having been stored at various locations within the UK for many years) it seems to the Board urgent to confirm both the overall inventory characteristics and that the current storage conditions are appropriate.

Recommendation: If the intention is to use the THORP and the Magnox reprocessing plants whenever possible for these materials, both are closing in significantly less than a decade. It

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must therefore be an urgent matter to identify those Exotic fuels for which there is a possibility to process by these two routes.

Recommendation: As R&D programmes are developed to deal with treatment of the more difficult Exotic fuels it would be appropriate to have close liaison with the Nuclear Innovation and Research Advisory Board (NIRAB). It may be that such R&D (for example pyro-processing) would have similar interests as those of NIRAB for advanced fuel cycles.

5.1.2. Question 2 (*Does the Board consider the mechanisms for review of the R&D programme are adequate?*)

Research Board's Position:

The development of the Technology Roadmaps and supporting R&D tables for all spent fuel types is an important step in facilitating appropriate review of the spent fuels R&D programme. The Board welcomes the NDA's intentions and encourages the completion of these maps.

Observation: In principle, the intention of expanding the AGR Technical Forum to cover R&D of all spent fuels appears attractive; monitoring of storage conditions, for example, is a topic which extends across all spent fuel types. However, before this forum's remit is expanded it seems highly desirable that the terms of reference and membership of the numerous existing groups are reviewed and rationalised, with a view to appropriately minimising the meetings at which spent fuel R&D issues are discussed. Consideration should also be given to avoiding the need for separate NDA and RWM groups.

5.1.3. Question 3 (*Are there still areas where the Board believes there could be gaps or where it would like further work to test for gaps?*)

The Board notes the reawakened UK interest in advanced nuclear systems following the publication of "The Nuclear Industrial Strategy – The UK's Nuclear Future" (BIS/13/627). There may therefore be future R&D value in some samples of the currently stored spent fuel from earlier research programmes, for example fast reactor fuels and Dragon fuel, both of which may have some potential R&D value for Generation IV advanced systems.

Although this is strictly outside of its terms of reference, the Board would like to see NDA engaging with the Nuclear Innovation and Research Advisory Board to see whether there is value in the latter developing an archiving strategy. There is currently a programme for encapsulating spent Dragon fuel (of potential value for Gen IV High Temperature Reactor Systems R&D) which presents the most urgent case in which the archiving opportunity might be lost.

Research Board's Position:

Observation: There may be merit in NIRAB sponsoring an archiving strategy for limited quantities of spent fuel from earlier R&D programmes. NDA should open discussions with NIRAB before the opportunity is lost.

Recommendation: As discussed earlier in this document, the Board would like to see:

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- Appropriate R&D to resolve the issue of the 2% of the Magnox fuel inventory, for which it is believed drying cannot be achieved in order to satisfactorily dry store the fuel. Further investigation, for example, of the US work to dry store the Hanford K basin fuel may be appropriate, much of which was in extremely poor condition.
- Early resolution of the total Exotics inventory characteristics and confirmation of, or work to establish appropriate long term storage.
- Early R&D to identify those Exotics for which use of THORP and the Magnox reprocessing plants may be appropriate, before the opportunity is lost.

Recommendation: In its earlier review of the RWMD R&D programme, the Board were pleased to see RWMD's efforts with respect to the establishment of a Knowledge Base and long term data management. While the timescales for spent fuel management and disposal are not as lengthy, they do extend over many decades. The Board would like to see that the good practices being adopted elsewhere are also being employed for the long-term in the field of spent fuel management.

5.1.4. Question 4 (*Does the Board consider that the R&D programme is adequately communicated to NDA's stakeholders?*)

Research Board's Position:

The Board considers that the communication issues for spent fuel management are not as demanding as those for development of a geological disposal facility, the R&D programme for which it recently reviewed. Nevertheless this is an important area for which stakeholder communication needs to be carefully considered.

Observation: As discussed above in the response to second question, there are numerous meetings at which many of the key stakeholders are present. The Board believes there is a need to consider a rationalisation of these meetings. The opportunity to do so would be facilitated if the AGR Technical Forum is expanded to embrace other spent fuel streams, at which many of the key stakeholders are likely to be in attendance.

Observation: The Board also notes that, over the past three years NDA has also held a 'Spent Fuel Technical Forum' with a wide range of stakeholder attendees. The Board supports this as a good practice which should continue in the future.

5.1.5. Question 5 (*Is the R&D programme robust to possible change?*)

The Board notes and supports the intentions to develop the Technology Roadmaps and supporting R&D tables for all spent fuel streams and to review these on an annual basis. Once these intentions have been fulfilled the associated key milestones and decision dates can be regularly reviewed to ensure the strategies continue to be robust.

The Board is pleased to note that the strategies for AGR and Magnox fuels already address the risks that the main strategic approach proves not to be implementable and are hence robust to change.

Recommendation: As noted above, the strategic approach for Exotic fuels is under-developed at present. In particular, the assumption that current storage arrangements for all such fuels are appropriate seems unproven. While work is intended in this area, currently the programme for Exotic fuels is not robust to change and, as indicated earlier, in the Research Board's view some aspects need more urgent attention.

Recommendation: The NDA is dependent on a singleton in house expert in this area. Given the importance of the topic NDA does not appear to be robust against the potential risk from the loss of this expert. The NDA should review its response to this potential risk.

5.2. Pre-Disposal Waste Treatments.

In considering the second main purpose of the October meeting, higher activity waste pre-disposal treatment R&D, members reviewed the documentation received in advance and held discussions with the NDA Head of Integrated Waste Management and the NDA Head of Technology. Members probed, in particular, how the NDA determines when R&D is required and the insertion points identified. In the following discussion members debated their preliminary responses to the Board's standard questions and other related matters, with a view to the preparation of a Position Statement.

5.3. NWRF Progress.

For the third main purpose of the October meeting, reviewing the progress of the NWRF Working Groups, the members received an update and held a discussion with the NDA Head of Technology covering all six working groups. It also benefitted from a more detailed discussion on the progress of the Waste Packaging and Storage Working Group with the NDA Higher Active Waste Development Manager.

The Board confirmed its view that the NWRF has made a significant contribution in bringing together R&D problem owners in a coordinated way to share R&D needs and opportunities. However, while some groups had made excellent progress, others were continuing to struggle, particularly the Decommissioning Working Group, which had been experiencing similar difficulties when the Board reviewed progress some 18 months earlier. The NDA had now instituted changes to reinvigorate this group. As before, the Board recognised that this was the only meeting in which decommissioning R&D needs were discussed. As such it continued to encourage the work of the group and supported the view that narrowing the focus to a smaller range of targeted issues would enable progress.

More generally, it was clear that NWRF and Working Group members struggled to find the time to devote to such activities. Board members questioned whether there were appropriate incentives for Site Licence Companies to allow time to be spent on NWRF activities.

The Board asked that each Working Group provide a prioritised list of issues on which they will be focussing and the key targets and outcomes that they were hoping to achieve as part of a two year forward plan. While some groups had such explicit intentions, this was not transparent in the work of all groups. It encouraged all Working Groups to think in terms of production of guidance documents or good practice guides as key deliverables from their work, to facilitate

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wide dissemination of the benefits from the outcomes. The Board recognised that not all benefits of the NWRf and its Working Groups were tangible (for example that resulting from improved networking), but nevertheless encouraged the groups to explore what metrics might be appropriate to measure their progress. It also asked for Working Group feedback on any practicable assistance that might like from the RB.

6. Conclusions.

1. The Board's structure, modus operandi and activities have been reviewed following the establishment of NIRAB and NIRO and discussions with the chair of NIRAB. The conclusion has been that there is no need for change. These will, of course, be kept under review in any case, to maintain the health of the Board's activities. Meetings remain well attended at senior level.
2. The Board has found that the strategic approach which it had already set out at the time of the last annual report has remained appropriate. It has developed a standard set of questions to which it seeks answers as it examines the UK R&D activities via consideration of the NDA's strategic themes or appropriate sub-sets of these themes where the scope is large.
3. The Board has agreed that it will make the outcomes of such reviews more transparent by the publication of Position Statements laying out its observations, conclusions and recommendations.
4. The first two Position Statements have now been published covering the important topics of the R&D programme to establish a GDF and the programme to underpin the safe and environmentally appropriate management of the existing stocks of spent nuclear fuel. The Board has also examined R&D associated with the pre-disposal treatment of higher activity wastes and a position statement on this sub-theme is in preparation.
5. The Board continues to express its support for the NWRf and its working groups. However, while good progress is being made by some, others are continuing to struggle.

7. Recommendations.

1. The Research Board should continue to maintain close relations with NIRAB to ensure that, where possible and appropriate, its recommendations encourage NDA's R&D programme to be complementary to that of NIRAB.
2. Having examined RWMD's R&D programme, the Research Board judged it to be largely well founded. It made a number of recommendations, the key ones of which are identified earlier in this report. These and others are contained in the full Board Position Statement.
3. Having examined the UK spent fuel R&D programme, the Research Board judged it to be largely well founded. It made a number of recommendations, the key ones of which are identified in this report. These and others are contained in the full Board Position Statement.

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4. The Board is highly supportive of the work of the NWRF and its working groups but is concerned that progress may be constrained by the amount of time that the Site Licence Companies allow their staff for participation. The NDA should review whether there are sufficient incentives for the SLCs to fully support the NWRF's work.
5. In this Annual Report and in those for earlier periods the Board has made a number of recommendations. While the Board recognises that its recommendations are only advisory it would welcome more explicit feedback on the NDA's responses. The Board believes that this would help it track whether the advice that it is offering is appropriate. The Board and the NDA should institute a more substantial mechanism for monitoring this.

Outputs

The Board has published the agenda and minutes of the meetings held. In addition, papers have been compiled as follows:

Published papers

NDARB011 - Review of Radioactive Waste Management Directorate's (RWMD) R&D Programme
NDARB016 - Review of NDA's Spent Fuels R&D Programme

Working documents

NDARB012 - Summary of Spent Fuels Inventory
NDARB013 - NDA Research and Development Activities on Spent Fuels
NDARB014 - NDA Research and Development Activities on AGR Fuel
NDARB015 - Radioactive Waste Management Ltd. Research on Spent Fuel Disposal
NDARB017 - Progress of NWRF Working Groups
NDARB018 - R&D Programme with Respect to Pre-disposal Treatment of Higher Activity Wastes

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Appendix 1

Agenda for the seventh meeting of the Research Board

Meeting 7 – 23rd April 2014

Main purposes of the meeting

- To confirm members' view of the RWM R&D programme.
- To understand the UK's Spent Fuels R&D programme and, as appropriate, make recommendations or endorse the approach.

Agenda – Issue 1

No.	Agenda Item	Time	Lead
01	Members Only Discussion	10:00	Chair
	Arrival of Observers and Presenters	10:30	
02	Welcome & Apologies <ul style="list-style-type: none"> • Welcome and introductions • Any declarations of interest 	10:35	Chair
03	<ul style="list-style-type: none"> • Agreement of Agenda • Notification of AOB if known at this point • Date, location and time of next meeting 	10:40	Chair
04	Review of 6 th Meeting <ul style="list-style-type: none"> • Review and approval of minutes • Actions 	10:50	Chair
05	Research Board's view on the RWM R&D Programme <ul style="list-style-type: none"> • NDARB011 	11:10	
06	Update on Government Response to House of Lords Science and Technology Committee inquiry in to the UK's nuclear R&D capabilities	11:40	Director, NIRO
07	Discussion on implications for NDA Research Board	11:50	ALL

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	LUNCH	12:00	
	<u>Spent Fuels R&D Programme</u>		
08	<p>Introduction</p> <ul style="list-style-type: none"> • NDARB012: Summary of Spent Fuels Inventory 	12:30	Chair
09	<p>NDA's Spent Fuels R&D Programme:</p> <ul style="list-style-type: none"> • Summary and overview of NDA's response to the question posed by NDA Research Board • NDARB013: NDA Research and Development Activities on Spent Fuels • NDARB014: NDA Research and Development Activities on AGR Fuel 	12:35	Head of Nuclear Fuel Cycle, NDA
10	EDF's Spent Fuels R&D Programme	13:10	R&D Manager, EDF Energy
11	<p>RWM's Spent Fuels Disposal R&D Programme</p> <ul style="list-style-type: none"> • NDARB015: Radioactive Waste Management Ltd. Research on Spent Fuel Disposal 	13:30	Head of Research, RWM
12	Academic Spent Fuels Research in the UK	13:50	PI – Nuclear Champion
13	Spent Fuel Management in France	14:10	Director Assistant, CEA
14	<p>Discussion on Spent Fuels R&D</p> <ul style="list-style-type: none"> • Is the UK R&D programme for management of existing spent fuels covering the correct issues to sufficient depth in the correct timescale with no significant omissions? 	14:30	ALL
15	Observations on Meeting 7	15:30	CoRWM
16	Review of actions	15:40	
17	AOB	15:50	
	CLOSE OF MEETING	16:00	

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Appendix 2

Agenda for the eighth meeting of the Research Board

Meeting 8 – 15th October 2014

Main purposes of the meeting

- To confirm members' view of the Spent Fuels R&D programme and agree the Research Board's Position Statement.
- To understand the UK's Integrated Waste Management (IWM) R&D programme with respect to pre-disposal treatment of Higher Activity Wastes and, as appropriate, make recommendations or endorse the approach.
- To review the progress of the Nuclear Waste Research Forum (NWRF) Working Groups.

Agenda – Issue 2

No.	Agenda Item	Time	Lead
01	Members Only Discussion	10:00	Chair
	Arrival of Observers and Invited Presenters	10:20	
02	Welcome & Apologies <ul style="list-style-type: none"> • Welcome and introductions • Any declarations of interest 	10:25	Chair
03	Agenda <ul style="list-style-type: none"> • Agreement of Agenda • Notification of AOB if known at this point • Date, location and time of next meeting 	10:30	Chair
04	Review of 7 th Meeting <ul style="list-style-type: none"> • Review and approval of minutes • Actions 	10:35	Chair
05	Research Board's view on the Spent Fuels R&D Programme and discussion of draft Research Board Position Statement. [NDARB016]	10:50	ALL
06	Update on NIRAB/NIRO activities <ul style="list-style-type: none"> • Discussion and questions 	11:20	Director, NIRO ALL

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07	Annual Report from Radioactive Waste Management Ltd's Technical Advisory Panel (TAP) [TAP Annual Report for FY 2013-14]	11:35	Chair of TAP, Independent
08	Update on progress of NWRF Working Groups: <ul style="list-style-type: none"> • Are the Working Groups progressing satisfactorily? • Do members have issues they would like the Working Groups to address? [NDARB017]	11:45	Head of Technology, NDA
09	NWRF Waste Packaging and Storage (WP&S) Working Group (WG)	12:00	HAW Strategy Development Manager. NDA
10	Research Board questions and discussion	12:20	ALL
	LUNCH	12:30	
11	Members' views and discussion on IWM R&D programme with respect to treatment of Higher Activity Wastes <ul style="list-style-type: none"> • Q1 – Is the programme soundly based? • Q2 – Are the mechanisms for review adequate? • Q3 – Is the programme adequately communicated to stakeholders? • Q4 – Is the programme robust to future change? • Q5 – Are there areas where members would like to investigate further? [NDARB018]	13:15	ALL
12	NDA Response to members' views and outcome of discussion	14:45	Head of IWM, NDA Head of Technology, NDA
13	Further Research Board questions and discussion	15:00	ALL
14	Summary of IWM R&D with respect to pre-disposal treatment of HAW	15:15	Chair
15	Observations on Meeting 8	15:30	CoRWM
16	Review of actions	15:40	Technical Secretary, NDA
17	AOB	15:50	

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	CLOSE OF MEETING	16:00	
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