

## **NDA Research Board**

**9<sup>th</sup> May 2018 10:00 – 16:00**

**Science Room, Royal Society of Chemistry, Burlington House, London, W1J  
0BA**

### MINUTES – Issue 1

#### **Attendees**

- 1) Chair of NDA Research Board, Independent
- 2) Research Manager, NDA – Technical Secretary
- 3) Head of Technology, NDA
- 4) Director Strategy and Technology, NDA
- 5) Radioactive Substances Principal Policy Officer, Scottish Environment Protection Agency (SEPA)
- 6) Professional Lead, Chemistry and Chemical Engineering and Research Delivery Lead, Office for Nuclear Regulation (ONR)
- 7) Co-Chair, Nuclear Waste and Decommissioning Research Forum (NWDRF), Sellafield Ltd (SL)
- 8) Director Science, Engineering & Technology, Atomic Weapons Establishment (AWE)
- 9) Waste and Decommissioning R&D Programme Manager, EDF Energy Generation
- 10) Environment and Business Manager, Radioactive Substances and Installations Regulation Environment Agency (EA)
- 11) Principal Investigator (PI) - Nuclear Champion, Research Council Energy Programme (RCEP), Chief Scientific Advisor, MoD (Nuclear) and Foreign and Commonwealth Office
- 12) Warhead Director, Ministry of Defence (MoD)
- 13) Committee on Radioactive Waste Management (CoRWM) Member – Observer
- 14) Director, Nuclear Innovation and Research Office (NIRO) – Observer
- 15) Head of Integrated Waste Management, NDA – Invited
- 16) Thermal Treatment Lead, SL – Invited
- 17) HAW Strategy Development Manager, NDA – Invited
- 18) Thermal Treatment Technical Lead, NNL – Invited

#### **Main Purposes of the Meeting**

The main purposes of the meeting were to:

- Thermal treatment of radioactive wastes:
  - Review NDA's R&D programme.
  - To hear from other organisations on their related R&D.
- To receive an update on AWE's Robotics R&D.
- To receive an update and discuss NDA's progress on Horizon Scanning.
- To agree the RB's Annual Report for FY 2017-18.

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## **[1] Welcome & Apologies**

- 1.1 Chair welcomed the Members and Observers to the 15<sup>th</sup> meeting of the NDA Research Board (NDARB) and referred attendees to the full agenda for the meeting.
- 1.2 A number of apologies had been received prior to this meeting:
  - Head of Nuclear Energy, Transport, Decommissioning & Waste Management, Directorate for Energy, European Commission
  - Government Chief Scientific Advisor
  - Chief Scientific Advisor, Department for Business, Energy and Industrial Strategy (BEIS)
  - Chief Scientific Advisor, Scottish Government
  - Programme Manager, Nuclear Energy Directorate – Clean up Division, CEA
  - Director of Engineering & Technology – Rolls-Royce, Civil Nuclear
- 1.3 Members of the Board introduced themselves. The Chair welcomed new members from EA and NWDRF (Co-Chair SL).
- 1.4 The Chair invited any relevant declarations of interest – none were received.

## **[2] Agenda**

- 2.1 The agenda was agreed. Items 10, 11 and 14 were subsequently re-ordered during the course of the meeting.
- 2.2 Any Other Business (AOB) items – Topic for the next Board
- 2.3 The date and location for the next NDA Research Board meeting was agreed: 14<sup>th</sup> November 2018 in Cumbria.
- 2.4 The date for the proposed Board member visit to NNL Central Laboratory Facilities was confirmed as 13<sup>th</sup> November 2018.

## **[3] Review of 14<sup>th</sup> Meeting**

- 3.1 Minutes of 14<sup>th</sup> Meeting

The minutes were approved with minor edits suggested.

- 3.2 Outstanding actions from previous meetings:

The Technical Secretary reviewed the actions list which was distributed prior to the meeting. The following action is outstanding.

**14/03:** NDA to update the Research Board on progress regarding their Robotics and Artificial Intelligence Strategy within two years – by November 2019.

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This action will be completed with the topic included on the agenda for November 2019 meeting.

3.3 The following new action was requested

**Action 15/01:** Technical Secretary, NDA, to circulate the Environment Agencies: Nuclear Research & Development Interests report and ONR's prioritised list of R&D topics to new Board members – by 15th June 2018.

### [4] Discussion and Agreement of NDA Research Board's revised Terms of Reference (ToR)

4.1 Two versions of the ToR were circulated to the Board in advance of the meeting. The first (Document number 15\_4) included the changes requested under NDA Research Board action 14/09 "NDA to update the Research Board's Terms of Reference to: (i) Clarify the role the Board plays in governance of NDA's R&D strategy (ii) Update the Board membership in light of recent changes to RWM Technical Advisory Panel and (iii) Remove the RWM representation on the Board with RWM now to be invited attendees". The second (Document 15\_5) also included changes to background information provided in the ToR to bring the document up to date.

4.2 The Board discussed both documents and confirmed that document 15\_5 was their preferred version.

4.3 Members queried the wording surrounding the Board's role in the provision of R&D governance and prioritisation of the R&D needs and requested further revisions to the ToR. The Board also noted the ToR should be reviewed by the Board periodically.

**Action 15/02:** Technical Secretary, NDA, to update the NDA Research Board Terms of Reference (ToR) to (i) clarify the Board's governance role, (ii) clarify the Board's role in the prioritisation of R&D needs and (iii) include a statement to note that the ToR will be reviewed periodically and circulate to the Board for comment and approval – by 31<sup>st</sup> July 2018.

### [5] Discussion and Agreement of NDA Research Board's Annual Report for FY 2017 – 2018

5.1 The Chair introduced the item and requested feedback on the draft annual report for FY 2017 – 2018, which had been circulated in advance.

5.2 Specific edits in Section 3.3 on EDF's Decommissioning related R&D and related comments in the Executive Summary were requested from Waste and Decommissioning R&D Programme Manager, EDF.

5.3 The Board held a discussion on the Concluding Summary section of the annual report. It was noted it would be beneficial for NDA if the Board could make comments on the NDA's R&D performance in the section, for example, is NDA's carrying out R&D in appropriate subject areas in an appropriate manner.

5.4 The Board agreed that the Executive and Concluding Summary should have a stronger emphasis on the Board's contribution and impact, especially for the Robotics and Artificial Intelligence and Horizon Scanning discussion topics. The Board was pleased that NDA

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had brought these topics for discussion at an early stage and was able to utilise information from other organisations when forming their opinions. This enabled the Board to increase their impact and strengthen NDA's resolve and approach in both areas.

**Action 15/03:** Chair to revise the Executive Summary and Conclusions of the NDA Research Board Annual Report for 2017 – 2018 to take into consideration the suggested edits made by the Board during Meeting 15 – by 26<sup>th</sup> July 2018.

### **[6] Update on AWE Robotics R&D**

6.1 The Director Science, Engineering & Technology, AWE gave a presentation to the Board on AWE Progress on Robotics, Automation & Artificial Intelligence (RAAI). The presentation covered AWE's RAAI strategy and its context and areas of collaboration with NDA (e.g. nuclear liabilities management, advanced manufacturing and approaches to safety management). A specific decommissioning challenge is the current reliance on the use of operators in air-fed suits and using hand-held tools. AWE's decommissioning RAAI opportunities include removing humans from the hazard, robotic inspection and survey and waste strategy innovation. Security issues surrounding the use of RAAI were also discussed.

6.2 AWE's RAAI progress was summarised and includes:

- Establishing strategic and integrating governance of RAAI;
- Off and on-site technology demonstrators in development;
- Growth in the number of partnerships e.g. collaboration on decommissioning with NDA, NNL, Sellafield, RACE.

Most progress has been achieved in advanced assembly (intelligent tooling and inventory management).

6.3 The synergies between the AWE and NDA robotics R&D strategy and programmes were recognised and the Board welcomed the interactions between the organisations including between SL and AWE. Both NDA and AWE are engaging and collaborating with the same organisations which should minimise the risk of duplication of effort.

6.4 Discussions were also held on how to increase the introduction and use of RAAI into the workplace, risks and blockers to RAAI technology adoption and how AWE had used roadmaps to inform their RAAI R&D programme.

6.5 Regulator support for innovation to improve safety and achieve faster decommissioning was noted. It is the regulators role to challenge the safety claims made by robotics systems manufacturers and ensure the behaviour of the systems are understood. There is an appetite for the introduction of robotics technologies as shown by robotics technology demonstrations at Sellafield Ltd.

**Action 15/04:** Director of Science, Engineering & Technology, AWE, to share AWE's Nuclear Liabilities Management strategy with Board members via the Technical Secretary – by 28<sup>th</sup> June 2018.

### **[7] Update on NDA's progress on Horizon Scanning**

7.1 Head of Technology, NDA, gave an overview of the background to the Horizon Scanning topic and an update of NDA and the Estates progress to date.

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- 7.2 In the six months since NDA presented their approach to Horizon Scanning to the Board progress has been made, at SL in particular:
- 7.2.1 Sellafield Ltd (SL) have established a structure for horizon scanning via a new role (Head of Research and Technology) with a small team (2 to 3 people) leading in this area. The team will carry out intelligent scans and disseminate the information via monthly estate wide updates. The team will access a wider range of technology scanning services. A request will be issued via LINC (SME challenge portal) with a challenge based around tools, systems and approaches for horizon scanning to harness the skills of SMEs dedicated to horizon scanning.
  - 7.2.2 The SL Science Integrated Research Team focuses on data science, materials science, particulates, process chemistry and environmental science, and will carry out horizon scanning in these areas.
  - 7.2.3 SL is also investigating new approaches to innovation through a SBRI (Small Business Research Initiative) call with Innovate UK on protecting the nuclear operator. The aim of this call is to bring new organisations to the industry.
  - 7.2.4 Tiger Teams have started work on diverse topics such as remote handling of nuclear material and innovations to alleviate travel congestion. A “Dragon’s Den” type approach has brought in new ideas from staff e.g. an App for travel. Both of these approaches (Tiger teams and “Dragon’s Den”) should help act as levers for change in innovation culture.
- 7.3 NDA is confident the developments in progress at SL can be capitalised upon once a NDA Horizon Scanning Lead is in place. Structural change will be prioritised at SL and NDA; the effectiveness reviewed and then rolled out to the rest of the estate.
- 7.4 NDA agreed to provide regular progress updates to the Board on this topic with the next one scheduled in 18 Months.
- 7.5 A future Board discussion topic on the cultural barriers to technology adoption was suggested.

**Action 15/05:** Technical Secretary, NDA, to draft a discussion topic proposal to cover the cultural barriers to technology adoption and the innovation culture deficit in the nuclear industry – by 4<sup>th</sup> October 2018.

### [8] Update on NIRO and NIRAB

- 8.1 Director NIRO gave a presentation to the Board on NIRAB activities and the BEIS Nuclear Innovation Programme.
- 8.2 The new NIRAB Chair has been appointed and the Board now has 37 members drawn for industry, academia, national labs, consultancies and SME’s, with independent and non-nuclear members. Observers include NDA, Research Councils, Innovate UK, regulators and Government Chief Scientific Advisors. The first Board meeting was held on 10<sup>th</sup> April 2018. More information can be found at <http://www.nirab.org.uk/our-members/>

NIRAB’s objective is to provide Government with independent advice on:

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- The potential for innovation to reduce the cost of the nuclear life cycle
- Opportunities for greater collaboration with industry and international partners
- The impact and delivery of Government's nuclear innovation programme

A key question posed by BEIS is "How should Government prioritise its investment in nuclear research and innovation to meet near and long term objectives?"

- 8.5 NIRAB has prepared a new draft Terms of Reference which includes:
- Monitoring the delivery and impact of the BEIS Nuclear Innovation Programme and recommending any necessary amendments;
  - Providing advice where innovation could drive down costs across the whole nuclear cycle;
  - Identification of opportunities for greater collaboration with industry and international partners
  - Support the development of recommendations for new research and innovation programmes required to underpin policies;
  - Overseeing regular review of the nuclear research and innovation landscape;
  - Fostering greater cooperation and coordination across the whole of the UK's nuclear research and innovation capability, portfolio and capacity.
- 8.3 The BEIS Nuclear Innovation Programme has invested an initial tranche of funding at around £20 Million. In December 2017 a second tranche of innovation funding (up to £8 million) was released focusing on modern safety and security methodologies and advanced fuel studies. The first phase of the Advanced Modular Reactor programme has launched including £7 million to increase regulatory capability and £4 million for feasibility studies.
- 8.4 NIRAB has also created 5 sub-groups to deliver its objectives in the following areas/roles:
- Group 1 – Articulating what success looks like in R&D and innovation in the UK nuclear section
  - Group 2 – Facilities needs
  - Group 3 – Nuclear Innovation programme
  - Group 4 – International Strategy
  - Group 5 – Innovation to enable cost reduction
- 8.5 The NDA Research Board and NIRAB will continue to have good links via Observer attendance at board meetings.

### **[9] Introduction to review of the NDA's Thermal Treatment R&D**

- 9.1 The Chair introduced the topic to the Board and noted that the introduction of thermal treatment technology has the potential to significantly reduce costs of waste treatment. He thanked the NDA for the document, "Delivery of Thermal Treatment R&D through and Integrated Project Team" (NDARB032). The Chair confirmed the intention was to use the Board's standard questions when reviewing this topic.
- Is the approach soundly based
  - Are the mechanisms for adequate?
  - Is the R&D adequately communicated to stakeholders?
  - Is the programme robust to future change?
  - Are there areas where members would investigate further?

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- 9.2 Head of Technology, NDA, outlined the NDA R&D strategy and drivers for background information and to provide context whereby where possible R&D is delivered by SLCs/subsidiaries and their supply chain in support of their direct needs but where necessary NDA can sponsor more estate wide strategic opportunities. Alternative waste treatments such as thermal treatment have the potential for estate wide application therefore NDA is taking a proactive role in this area. Previously NDA Research Board has reviewed topics where there is significant opportunity. NDA have also benefited from early input from the Board and from their review and advice on ongoing work programmes. For this topic NDA would appreciate the Board's early input and their review and advice on the content and approach to the ongoing R&D work.
- 9.3 Head of Integrated Waste Management, NDA, noted that this topic is particularly important due to the move from reprocessing to retrievals, which will generate large volumes of waste. Encapsulation in cement is currently the dominant waste treatment technology but it is not necessarily the correct treatment for all waste types. A toolkit of treatment technologies will be required for a broad range of waste types. Hence, thermal treatment R&D is needs driven. NDA made a commitment in Strategy III to drive thermal treatment technology forward and develop the technology.

### **[10] Delivery of Thermal Treatment R&D through an Integrated Project Team (IPT).**

- 10.1 HAW Strategy Development Manager, NDA, Thermal Treatment Lead, SL, and Thermal Treatment Technical Lead, NNL, gave a joint presentation to the Board covering (i) the strategic context to thermal treatment R&D and the IPT approach, (ii) the IPT's progress to date, (iii) an overview of the trials carried out to date and IPT findings and (iv) IPT future work.
- 10.2 It was noted that there will be a diverse range of waste arisings with currently limited treatment routes. There will also be a long time period for waste arisings and disposal (in the order of hundreds of years).
- 10.3 NDA Strategy supports development of a range of waste treatment technologies as encapsulation is unlikely to be optimal for all waste types. Previous thermal treatment initiatives have been fragmented with a number of organisations pursuing options. The NDA HAW (Higher Activity Waste) Strategy supports collaborative implementation of thermal treatment and notes that work is required to secure long-term and sustainable funding for a thermal treatment R&D project. Therefore an IPT was launched to establish, inter alia, a demonstration facility on the Sellafield site to raise TRL (technology readiness level).
- 10.4 The IPT's role is to develop technical underpinning and the information to enable decision making, support technical arguments for thermal technologies and the business case for implementation. The IPT is not selecting preferred technologies. The IPT's aim is to develop thermal treatment technologies to the point where they can be considered a technically credible option for the treatment of ILW (Intermediate level waste) across the NDA estate and the UK nuclear industry.
- 10.5 The IPT is an NDA strategic commitment, managed by SL, on behalf of NDA and considers NDA Estate and UK-wide wastes, with a focus on specific SL wastes. NDA are leading the IPT and maintaining strategic alignment. SL is the delivery lead and will

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maintain project alignment. NNL are the team technical specialists and provide facilities and capability.

- 10.6 The IPT work programme includes:
- A strategic level DQO (Data Quality Objectives) process to identify and prioritise target waste streams (independently led);
  - Direct technology supply chain engagement against specific requirements;
  - Stakeholder and Regulator engagement throughout the study;
  - Direct engagement of other NDA estate and non-NDA estate waste owners;
  - Active demonstration programme delivered in NNL's Central Laboratory under site licence conditions;
  - Development of a case to change to thermal treatment based on strategic, technical, economic and environmental criteria
  - Supporting key future treatment decisions at Sellafield Ltd; and
  - Identifying missions to treat and dispose off-site wastes on an opportunity cost basis.
- 10.7 The IPT has established that based on a set of current assumptions and our best understanding there is:
- No economic case for stand-alone thermal treatment of Sellafield sludge;
  - Comparable economic case for thermal treatment (compared to current treatment routes) of Sellafield ion exchange resin wastes;
  - Comparable economic case for combined thermal treatment of both Sellafield sludge and ion exchange wastes; and
  - Significant (>£1Bn) economic case for the thermal treatment of PCM (plutonium contaminated material).
- 10.8 The benefits of the IPT approach are that the IPT has been able to accelerate R&D on several work fronts at once. It has maintained good governance, strategic alignment and awareness via engagement with SL Technology Review Board, the NDA's Direct Research Portfolio Governance processes and the NDA Sanction Committee. The use of a generic programme with high-level objectives has resulted in an agile process that is not tied to one specific project and therefore robust to change.
- 10.9 Thermal demonstration trials (inactive and active) have been carried out on surrogate wastes at NNL Central Laboratory and have made progress towards immobilising real waste. The trials have provided information on how thermal treatment operates under site licence conditions, thus increasing TRL and operational experience. This has facilitated the promotion of the tangible benefits of thermal treatment within SL. The demonstration has utilised a batch technology (the Geomelt technology which was already installed at NNL) and has enabled the study of a wide range of waste types.
- 10.10 The trials have been funded by NDA's Direct Research Portfolio (to encourage innovation along with potential multi-site application), with support from SL. A series of six pairs of melts (inactive and active) have been carried on a range of potential UK waste streams. Specific details of individual trials were presented to the Board. Analysis of the product glasses and off gas system is now underway. The results have shown waste volumes are significantly reduced. Information on the trials has been shared with NWDRF, Waste Packaging and Storage Working Group, the IPT stakeholder group and via a published article.

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### [11] Discussion regarding NDA's Thermal Treatment R&D

- 11.1 The Board discussed specific technical points regarding the thermal treatment process including mixing, incorporation of metal waste, volatilisation, off-gas constraints and radionuclide migration and modelling of the treatment process. It should be noted that off-gas performance is technology and process specific, although, learning from the non-nuclear hazardous waste sector and aluminium melting work at Capenhurst could be useful.
- 11.2 The potential to move from batch to continuous feeding of waste and potential increase in plant throughput was discussed. It was noted that thermal treatment may reduce waste handling requirements (e.g. for treatment of skips containing waste) which may off set low throughput for batch thermal treatment plants but that modelling work is required to provide confirmation. Grout encapsulation of waste also requires time for the curing process and encapsulation process has not been optimised for all waste streams.
- 11.3 The Board queried the feasibility of the decision dates for thermal treatment, i.e., will the technology be implementable in the required timeframe, as a number of waste treatment decision points for SL and other operators are approaching. It was noted that SL will benefit most from the introduction of thermal treatment and the treatment of other wastes should be seen as an opportunity. EDF reactors in the UK will enter care and maintenance in around 2035 so it is possible that there may be a case for the introduction of an omnivorous thermal treatment plant in line with that date.
- 11.4 NDA stated that the timeline for waste arisings is lengthy and that some plants are still operational and have not yet moved into retrievals or decommissioning. Some wastes will also be stored for 20/30 years. If there is confidence that a thermal treatment plant is reaching a suitable level of technical maturity then waste can be appropriately packaged for thermal treatment.
- 11.5 The Board also queried the drivers for the potential cost savings for thermal treatment. The volume reduction factor for PCM wastes is the major driver for cost savings; this includes the cost of interim storage, transport and disposal costs. It was noted that benefits other than volume reduction factor should be explored to support the development of the thermal treatment business case .e.g. co-processing of waste streams and the passivity of waste form and the subsequent implications for storage and monitoring and organics destruction.
- 11.6 The Board also discussed if thermal treatment could support the development of alternative waste disposal routes. It is possible that a more passive waste may open up new disposal routes, although work needs to be carried out on determining how improved product quality affects environmental assessments.
- 11.7 The next steps in the work programme will be engagement with the supply chain on the treatment of ion exchange materials and sludges and further work on the treatment for PVC.

### [12] Update on CEA Thermal Treatment R&D

- 12.1 Thermal Treatment Technical Lead, NNL, shared the presentation "Radioactive Waste Management: CEA R&D on the Thermal Treatment Technology" supplied by Programme Manager, Nuclear Energy Directorate – Clean up Division, CEA.

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12.2 It was agreed that Board members and observers should send any questions on the CEA presentation to the Technical Secretary, NDA, by email for collation and forwarding to CEA. Programme Manager, Nuclear Energy Directorate – Clean up Division, CEA, had kindly agreed to provide a written response to Board questions on the presentation.

**Action 15/06:** Technical Secretary, NDA, to circulate to the Board CEA's presentation on their Thermal Treatment R&D – by 14<sup>th</sup> June 2018.

**Action 15/07:** Board members to send their questions on the CEA Thermal Treatment R&D presentation to the Technical Secretary, NDA, for collation and forwarding to Programme Manager, Nuclear Energy Directorate – Clean up Division, CEA – by 29<sup>th</sup> June 2018.

**Action 15/08:** Programme Manager, Nuclear Energy Directorate – Clean up Division, CEA, to provide a written response to Board member questions on the CEA Thermal Treatment R&D presentation and circulate to the Board, via the Technical Secretary – by 26<sup>th</sup> July 2018.

### **[13] Summary of discussion regarding NDA's Thermal Treatment R&D and agreement of Board way forward**

13.1 Board members agreed that thermal treatment technology does offer benefit for the treatment of ILW but that more work is required, in particular, around process improvements, accelerating progress on thermal treatment and the broader benefits that the technology can bring. NDA has carried out initial strategic analyses that demonstrate that thermal treatment could substantially reduce the baseline cost in some areas if it can be implemented successfully. Equally there are other areas where no such benefit can be identified.

13.2 In summary, Board members noted that the NDA Thermal Treatment IPT has carried out a series of active and non-active trials using a single technology (Geomelt). Although these trials are not yet completed they have shown that it is possible to operate a thermal treatment system on a nuclear licensed site on a batch basis and that this technology can deliver significant volume reductions in a variety of raw wastes. The sampling and analysis of the waste products is still underway and more work is needed to characterise residues associated with the off-gas treatment; the IPT is working to complete these tests. The Board was of the opinion that the IPT plans for such work appear sensible. The IPT has already begun the process of going to the market to evaluating other thermal treatment processes.

13.3 The NDA requested the Board's advice and comment on the 2<sup>nd</sup> phase the work, specifically, make versus buy considerations, requirements for further R&D work including exploration of the potential benefits offered by thermal treatment technology and the programme required to do this, application to sites other than SL and meeting the required decision points.

13.4 It was noted that the development programme includes key issues such as understanding off-gas behaviour, gaining regulatory confidence and demonstrating the processes work successfully on a nuclear licenced site. Flowsheeting, the development of thermal treatment skills base and gaining industry wide support require further work. The NDA requested that these points should be reflected in the Board's response.

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- 13.5 The Board agreed that the preparation of a Position Paper on NDA's Thermal Treatment R&D was an appropriate way forward.
- 13.6 Based on the information received prior to the meeting and the presentations and discussions at the meeting the Board's early considerations were that the Board are supportive of the approach and note the interactions with other international programmes. The IPT enables a collaborative approach to progress not just technological issues but operational and cultural issues in demonstrating on a licensed site. Whilst there is a programme to better understand technical issues (e.g. off-gas) there are ongoing opportunities to ensure the maximum benefit from such a programme, across NDA's estate or beyond that should be pursued. At this stage the programme and resource reflect the scale of the opportunity although there are clearly some key decision dates that will be important in determining its size.

**Action 15/09:** Board members to identify the key conclusions that should be made in the Board's Position Paper on NDA's Thermal Treatment R&D and send to the Technical Secretary by email - by 26<sup>th</sup> June 2018.

**Action 15/10:** Chair to hold additional discussions with NDA (if required) and draft a Board position paper on NDA's Thermal Treatment R&D that takes into consideration the conclusions suggested by Board members – by 11<sup>th</sup> October 2018.

### **[14] Observations on Meeting 15**

- 14.1 The CoRWM observer noted that the meeting had been interesting. The summary of actions was clear and efficient. There was a good discussion on the Board ToR and its role. The discussions around the Annual Report should ensure that it meets NDA requirements. The RAAI update from AWE covered organisation needs and security considerations. There was also a useful discussion on the role of the supply chain. The NDA's Horizon Scanning update shows that the area is still embryonic but that progress is being made. NIRO and NIRABs needs and objectives were clearly presented.
- 14.2 The discussion on the use of thermal treatment as an alternative to cement encapsulation was encouraging. A good range of wastes have been trialled and the CoRWM observer was pleased with progress.
- 14.3 CoRWM are currently awaiting the announcement of a new Chair and the interim Chair is still in place. CoRWM are also in the process of developing a work programme for submission to ministers. GDF will be a priority topic in the work programme.

### **[15] Review of Actions**

- 15.1 The Chair and Technical Secretary carried out a review of actions.

### **[16] Any Other Business**

- 16.1 Technical Secretary, NDA, gave an overview of the "Proposal for NDA Research Board Discussion Topic on the Role of Key R&D Organisations Involved in Supporting UK Decommissioning and Waste Management (Doc 15\_7)". The Board gave agreement for NDA to develop the proposal in advance of the November 2018 meeting.

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16.2 Head of Integrated Waste Management, NDA, gave an update on the GDF siting process.

16.3 Board members requested copies of the presentations from this meeting.

**Action 15/11:** Technical Secretary, NDA, to circulate all of the presentations made to the Board at Meeting 15 to Board members by email – by 14<sup>th</sup> June 2018.

**CLOSE**

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### APPENDIX 1 – New Actions

- Action 15/01:** Technical Secretary, NDA, to circulate the Environment Agencies: Nuclear Research & Development Interests report and ONR's prioritised list of R&D topics to new Board members – by 15<sup>th</sup> June 2018.
- Action 15/02:** Technical Secretary, NDA, to update the NDA Research Board Terms of Reference (ToR) to (i) clarify the Board's governance role, (ii) clarify the Board's role in the prioritisation of R&D needs and (iii) include a statement to note that the ToR will be reviewed periodically and circulate to the Board for comment and approval – by 31<sup>st</sup> July 2018.
- Action 15/03:** Chair to revise the Executive Summary and Conclusions of the NDA Research Board Annual Report for 2017 – 2018 to take into consideration the suggested edits made by the Board during Meeting 15 – by 26<sup>th</sup> July 2018.
- Action 15/04:** Director of Science, Engineering & Technology, AWE, to share AWE's Nuclear Liabilities Management strategy with Board members via the Technical Secretary – by 28<sup>th</sup> June 2018.
- Action 15/05:** Technical Secretary, NDA, to draft a discussion topic proposal to cover the cultural barriers to technology adoption and the innovation culture deficit in the nuclear industry – by 4<sup>th</sup> October 2018.
- Action 15/06:** Technical Secretary, NDA, to circulate to the Board CEA's presentation on their Thermal Treatment R&D – by 14<sup>th</sup> June 2018.
- Action 15/07:** Board members to send their questions on the CEA Thermal Treatment R&D presentation to the Technical Secretary, NDA, for collation and forwarding to Programme Manager, Nuclear Energy Directorate – Clean up Division, CEA – by 29<sup>th</sup> June 2018.
- Action 15/08:** Programme Manager, Nuclear Energy Directorate – Clean up Division, CEA, to provide a written response to Board member questions on the CEA Thermal Treatment R&D presentation and circulate to the Board, via the Technical Secretary – by 26<sup>th</sup> July 2018.
- Action 15/09:** Board members to identify the key conclusions that should be made in the Board's Position Paper on NDA's Thermal Treatment R&D and send to the Technical Secretary by email - by 26<sup>th</sup> June 2018.
- Action 15/10:** Chair to hold additional discussions with NDA (if required) and draft a Board position paper on NDA's Thermal Treatment R&D that takes into consideration the conclusions suggested by Board members – by 11<sup>th</sup> October 2018.
- Action 15/11:** Technical Secretary, NDA, to circulate all of the presentations made to the Board at Meeting 15 to Board members by email – by 14<sup>th</sup> June 2018.