

Open Government Status:

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**NUCLEAR SAFETY ADVISORY COMMITTEE**

**Review Group 6**

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**The Production of Technical Baselines and Underpinning Research and Development Documents (TBURDS)**

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**Introduction**

The NDA mission as set out within the Energy Act is clear – *“to deliver a world class programme of safe, cost-effective, accelerated and environmentally responsible decommissioning of the UK’s civil nuclear legacy in an open and transparent manner and with due regards to the socio-economic impacts on our communities”*. Critical to achieving the NDA main objective and overall mission is to accelerate and deliver clean-up programmes through the application of appropriate and innovative technology. The NDA remit also requires us to –*“secure good practice by contractors”* and to *“promote, and where necessary fund, generic research relevant to nuclear clean up.”*

NDA have defined a strategic approach for the underpinning of operational and decommissioning activities where each nuclear site is required to write within the Life Time Plans (LTP) the proposed technical baseline for those activities. This enables the robustness of the activities to be assessed, the gaps and opportunities and accompanying Research and Developments (R&D) requirements to be highlighted and investment to be targeted at key technical issues. NDA also supports the development of a commercial framework where innovation is encouraged and improvements can be demonstrated against the technical baseline.

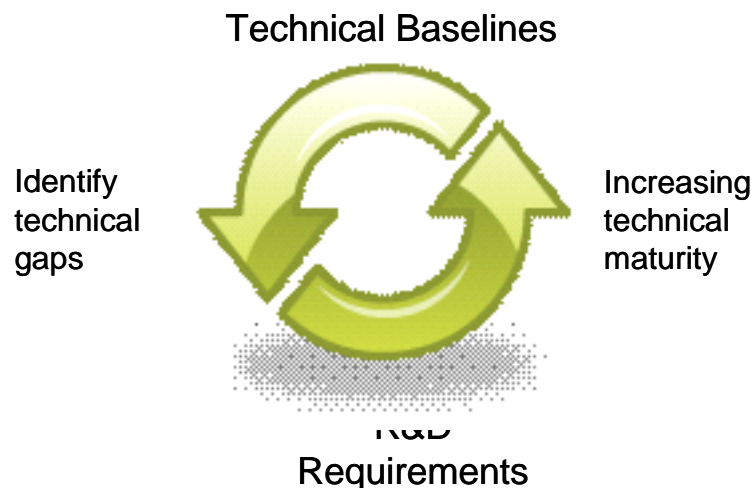
In this paper we will present NDA's overall strategic approach, the annual review process, the benefits already realised and highlight the areas for continued development.

### **TBURD approach**

NDA requires individual sites to develop Lifetime Plans (LTPs) that set out the short, medium and long-term activities required for the decommissioning and clean-up of each site. In order to assess and ensure the robustness of the technical approaches within these activities NDA have set a requirement for the LTP to include at a high level the proposed technical baseline for underpinning these activities and to assign technology readiness levels (TRLs) for the chosen approaches. The technical baselines are then used to identify the technology gaps and thus the Research and Development (R&D) requirements in terms of needs, risks and opportunities.

In terms of adopting good practice we have introduced and implemented the use of TRLs as the method of technology assessment over levels 1 to 9, where 9 is a technology proven in an equivalent application under UK regulatory frameworks. This framework has been extensively used in US government organisations and in the UK also.

The combined documents have become known as the TBURDs (Technical Baseline and Underpinning Research and Development documents) which are updated annually with an assessment of the developments made over the previous year. This provides a comprehensive tool against which improvements and innovations to the baseline can be recorded. The link between Technical Baselines and Research and Development requirements is illustrated schematically below:



*Progress to date*

These documents are now in their third cycle of production and have evolved considerably to the current comprehensive documents. The use of a generic template allows direct comparison of submission on a site basis allowing gaps and opportunities to be clearly identified. As well as the technical baseline and R&D requirements NDA has added a technology successes section to the TBURD. This has the benefit of allowing successes and knowledge to be shared and in future to be rewarded. It is proposed that the sharing of good practice in technology can be documented here and the realised benefit recorded by both donor and recipient organisation. In addition some TBURDS contain links to knowledge management and creation of new intellectual property. Investment in key technical areas is supported by the NDA Direct Research Portfolio and the NDA Skills Strategy to ensure sustainability of key skills.

The development of the framework has been led by NDA but with effective enhancement via a working group approach with the SLCs. This has led to a common format and template for the documents and the requirement for a submission for each NDA site to allow direct comparisons between sites and their key issues to be made. Inconsistencies such as inter-site dependencies and scheduling assumptions regarding facilities availability can be clearly identified.

The R&D needs, risk and opportunities are reviewed and grouped annually and the latest summary of this should be available shortly.

The TBURD production process involves regular input and review from NDA including reviews in November/December. These reviews have focussed this year in particular on technical assurance, connectivity between when technologies are required and the schedule in the LTP and clear link to technical risk. These are discussed in more detail in the next section.

### **The TBURD Review Process to standardise TBURD production.**

The TBURDs are produced by each SLC in line with guidance detailed in PCP-07. NDA wished to ascertain how the production of the TBURDs could be standardised across the sites and consequently how the quality of each could be assessed objectively. Key internal stakeholder determined the following points to be investigated in the reviews regarding the purpose of the TBURD included:

- The purpose of the TBURD, in part, is to embed into the SLC a culture of considering the technical needs, risks and opportunities pertaining to the delivery of the LTP and by doing so the SLC should get early sight of any R&D requirements and plan accordingly.

- The TBURD should demonstrate that the SLC is pro-actively managing the delivery of the LTP and thus achieving year on year efficiency savings against the LTP either through continuous risk reduction or the implementation of innovative technologies, i.e. identification of opportunities.
- The TBURD should show clear connectivity between when the technology is required within the LTP i.e. Technology Insertion Point, and the schedule for developing the technology to Technology Readiness Level (TRL) 9, in other words the critical path for implementation of the required technology has been defined, is captured in the LTP and more importantly is deliverable within the necessary timescales.

A self assessment scorecard was produced, which forms the basis of an annual assessment exercise carried out by NDA for each SLC. The score card is show in Appendix one. The assessments by NDA were carried out at each SLC and consider in depth both the TBuRD and the SLC management processes utilised in the implementation of the TBuRD requirements. This is to ensure sufficient technical governance within critical technical projects. Examples include:

- (a) Assessment of the SLC management structure for implementation of R&D requirements
- (b) Assessment of management procedures for control of technical work, particularly with reference to input into project activities and operational activities
- (c) Assessment of Suitably Qualified and Experienced Personnel in key technical roles
- (d) Knowledge management activities in key technical areas, including succession planning.

The first series of TBuRD reviews were completed in 07/08 and have resulted in a higher degree of confidence in the sites processes for technology management.

### *Benefits realised*

The considerable effort invested by NDA and the SLCs in ensuring the TBURDs and the wider strategic approach provide an effective and consistent tool for underpinning technology has started to realise benefits.

The key benefits that have been realised are:

- Systematic and fundamental process for technically underpinning both site operational and decommissioning activities

- Consistent approach for all 20 NDA UK sites which is independent of SLC
- Short, medium and long term approach that shows technical gaps and indicates where R&D is needed to fill those gaps and opportunities
- Provides a method for sharing site knowledge between sites and stimulated formation of inter-site groups to deal with common issues.
- Method for changes to the strategy to be identified and assessed and improvements to be recorded
- Provide confidence that the cost and schedules for the operation and remediation of individual facilities are valid
- Sharing of technical challenges provides and opportunity for supply chain to innovate and improve the technical baseline and provide platform form which to encourage, validate and reward innovation

The progress described to date has summarised the work to develop the approach and indicate how it has been embedded and applied within three LTP cycles. NDA will further develop the TBURD through international benchmarking to create a process that is world class and clearly linked to delivery and innovation in order to reduce cost and schedule.

In order to ensure our strategic approach to robust underpinning of decommissioning activities has sufficient breadth and depth and is effective NDA has developed other innovative approaches. These include:

- NDA Asset transfer database – this is an electronic system for highlighting across all NDA sites either an asset need or availability for transferral. This has provided real benefits in equipment sharing and reduction in disposal costs
- NDA Intellectual Property and Knowledge Management Policies – these are evolving to ensure technology innovation can be encouraged and rewarded.
- Clear link to skills strategy and support of National Nuclear Laboratory and National Nuclear Skills academy
- Publication of TBURDs – wherever possible the site TBURD has been published in part or full on the SLC website

## **CONCLUSIONS**

The development and implementation of a strategic approach to robustly underpin the technical components of the lifetime plans for operational and decommissioning activities on NDA sites has been extremely successful. As well as showing how mature technology assumptions are and where the key gaps and risks are it has also provided a method for highlighting opportunities to improve on that baseline. The use of a common template across all NDA

LTPs has enabled direct comparison of issues, identification of inter-site dependencies and scheduling hold points and a platform for sharing success and good practice. This deployment of TRLs and TBURDs across all 20 UK NDA sites is unique.

The strategic approach is linked into wider areas in NDA's mission including NDA skills strategy and NDA's Direct Research Portfolio. NDA plan to ensure the strategic approach continues to evolve by the following activities:

- Benchmarking the success of the TBURD and consistency of TRL evaluation
- Development of quantitative as well as qualitative methods of measuring the benefits realised
- Further support the development of technical interest groups where good practice is rewarded, shared, deployed and the benefit realised is measured
- Seek to reward innovation through the technical baselines
- Continue to develop the commercial framework and ensure work

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## **Recommendation**

NuSAC Review Group 6 is invited to note and comment on the paper.

## Appendix 1

### Technical Baseline and Underpinning R&D Document - Score Card

Item	Description of Item	Weight	Grade	Score	Comments
1	Document is coherent and comprehensive and contains a brief site overview, status, key site assumptions, overall perspective on how risk is managed with respect to technical baselines and key timescales in the site strategy. The document highlights technical/innovative successes and explicitly states what the benefits have been in terms of improvements to safety, environmental performance, plant performance, risk reduction and efficiency savings against the LTP. The document highlights areas of good practice either across the site, other NDA sites or from outside the industry, where it has been applied and the benefit it has had on the delivery of the LTP.	4			
2	The appendices have been completed and are consistent with the NDA requirements as outlined in PCP-07. In particular, the document should demonstrate a clear understanding of the link between the risk and the development activities and where applicable a reference must be made to either a project scope (DVs) or a strategy document(s) that provides a more detailed description of the technical baseline and it's underpinning R&D. Furthermore, the risks should be clearly articulated in plain English and be understandable to the reader.	6			
3	There is clear connectivity between when the technology is required within the LTP and the schedule for developing the technology to Technology Readiness Level (TRL) 9. i.e. the critical path for implementing the technology has been articulated in the document.	8			
4	Documents clearly highlights demonstrable progress in reducing risk associated with the delivery of the LTP, this should be achieved through demonstrating increased TRL for the technical baseline for key projects. All Technical baselines entries in the documents, which have been given a TRL of <9 should have a corresponding entry in the R&D needs or risks table. The document maintains connectivity from last year submission by highlighting any significant additions/changes to the R&D plans.	4			
5	The document demonstrates an appropriate application of those R&D activities which support contingency plans, such as alternative technology baselines. The document demonstrates that the SLC are identifying opportunities and subsequently	10			

	investing in R&D that could realise safety environmental improvement cost savings against the LTP.				
	<b>Total Score</b>				

Grades are given in the table below:

Grade	Description
4	Information is comprehensive and complete with very few, insignificant, gaps. Information is consistent and, where applicable, there is excellent connectivity back to the LTP and the additional referenced material. Underpinning data is robust and a professional approach to developing and producing the information is evident. Where applicable “Drill-downs” reveal no significant inconsistencies or anomalies. Overall, the information provided is of a high quality that engenders a strong feeling of confidence in the reader.
3	Information is largely complete. A few gaps exist but these have been identified and are not fundamental. Information is, on the whole, consistent. However, work is required to improve the connectivity back to the LTP and the additional referenced material. Where applicable “Drill-downs” reveal some inconsistencies or anomalies, however, the information provides a solid foundation which with greater maturity and development could achieve 4.
2	Information that is present is generally okay but there are some quality issues and gaps which, whilst they aren’t showstoppers, need addressing. Supporting / underpinning information is present but is of variable quality. Although, there is some evidence of connectivity back to the LTP and the additional referenced material this requires more work to close the gaps. Where applicable, “Drill-downs” reveal significant inconsistencies or anomalies, however, the approach shown in the document for certain components needs to be followed for all the information provided.
1	Information provided is of poor quality and significant gaps exist resulting in unacceptable risk to the baseline LTP. Supporting / underpinning information is poor or non-existent leading to major inconsistencies back to the LTP. Where applicable “Drill downs” reveal major shortcomings leading to a severe lack of confidence in the integrity and quality of the information provided. Unacceptable and shoddy product in need of significant work even to get to a 2.
0	Information does not exist or is of such poor quality as to be meaningless.