Office for Nuclear Regulation

ONR Assessment Report

Generic Design Assessment of the BWRX-300 –

Step 2 assessment of Nuclear Liabilities Regulation

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Executive summary

In December 2024, the Office for Nuclear Regulation (ONR), together with the Environment Agency and Natural Resources Wales, began Step 2 of the Generic Design Assessment (GDA) of the BWRX-300 design on behalf of GE Vernova Hitachi Nuclear Energy International LLC, United Kingdom (UK) Branch, the Requesting Party (RP).

This report presents the outcomes of my Nuclear Liabilities Regulation (NLR) assessment of the BWRX-300 design as part of Step 2 of the ONR GDA. This assessment is based upon the information presented in the RP's safety, security, safeguards and environment cases (SSSE), the associated revision 3 of the Design Reference Report and supporting documentation.

ONR's GDA process calls for an assessment of the RP's submissions, which increases in detail as the project progresses. The focus of my assessment in this step was to support ONR's decision on the fundamental adequacy of the BWRX-300 design and safety case, and the suitability of the methodologies, approaches, codes, standards and philosophies which form the building blocks for the design and generic safety, security and safeguards cases.

I targeted my assessment, in accordance with my assessment plan, at the areas that were fundamental to the acceptability of the design and methods for deployment in Great Britain (GB), benchmarking my regulatory judgements against the expectations of the expectations of ONR's Safety Assessment Principles (SAPs), Technical Assessment Guides (TAGs) and other guidance which ONR regards as relevant good practice, such as International Atomic Energy Agency (IAEA) safety, security and safeguards standards. Where appropriate, I have also considered how I could use relevant learning and regulatory conclusions from the UK ABWR GDA to inform my assessment of the BWRX-300.

I targeted the following aspects in my assessment of the BWRX-300 SSSE:

- Structure, System and Components (SSCs) related to the management of radioactive waste within the Radioactive Waste Building, or elsewhere on the site, comprising the solid, liquid and gaseous radioactive waste systems and the radioactive drain system;
- The Reactor Coolant System within the Reactor Building and Spent Fuel Pool Cooling System within the Reactor Building and Radwaste Building;
- The Spent Fuel Pool system located within the Containment Structure, the Fuel Handling Area within the Reactor Building, and the Interim Spent Fuel Storage Installation (ISFSI); and,
- SSCs related to and which facilitate safe decommissioning of the plant.

Based upon my assessment, I have concluded the following:

- the SSSE case related to the NLR topic area is logical and hierarchical aligning with UK and international Relevant Good Practice (RGP);
- the overall quality of the SSSE content in topic areas relevant to NLR are of a generally good standard that align to both UK and International guidance;
- the overall Claims Argument Evidence (CAE) constructs lack detail. A future SSSE should consider improving the traceability between the safety analysis and NLR-related requirements such as waste minimisation;
- the SSSE does not adequately demonstrate the SSC associated with the management and disposal of spent ion-exchange resins aligns to UK and International guidance. This perceived shortfall is identified in the Regulatory Observation (RO) RO-BWRX-300-002. However, for the purposes of my Step 2 assessment, I am satisfied that the RP understands the shortfall and has produced an adequate resolution plan. A future SSSE would need to demonstrate completion and incorporation of these actions;
- the radioactive waste management strategy is immature and lacks key details such as appropriate container selection and waste arising volume estimates;
- the SSSE does not adequately demonstrate that it has incorporated design for decommissioning within the SSSE or design. This perceived shortfall is identified in RO-BWRX-300-003. However, for the purposes of my Step 2 assessment, I am satisfied that the RP understands the shortfall and has produced an adequate resolution plan. A future SSSE would need to demonstrate completion and incorporation of these actions; and,
- the Spent Fuel Management strategy aligns to UK RGP and Nuclear Waste Services (NWS) has assessed the expected spent fuel and Higher-Activity Waste (HAW) and provided their expert view, communicating a good level of confidence that the RP can make corresponding disposability cases.

Overall, based on my assessment to date, I have not identified any fundamental safety shortfalls that could prevent ONR permissioning the construction of a power station based on the generic BWRX-300 design; noting that any decision to permission a BWRX-300 will require further assessment (in either a future Step 3 GDA or during site specific activities) of suitable and sufficient supporting evidence that can substantiate the claims and proposals made in the GDA Step 2 submissions.

List of abbreviations

ALARP	As Low As Reasonably Practicable
CAE	Claim, Argument and Evidence
CM&I	Condition Monitoring and Inspection
CNSC	Canadian Nuclear Safety Commission
DAC	Design Acceptance Confirmation
DRR	Design Reference Report
ESBWR	Economic Simplified Boiling Water Reactor
GB	Great Britain
GDA	Generic Design Assessment
GDF	Geological Disposal Facility
GVHA	GE Vernova Hitachi Nuclear Energy Americas LLC
HAW	Higher-Activity Waste
IAEA	International Atomic Energy Agency
IICC	Irradiated In-Core Components
ILW	Intermediate-Level Waste
LC	Licence Condition
NLR	Nuclear Liabilities Regulation
NPP	Nuclear Power Plant
NRC	Nuclear Regulatory Commission
NRW	Natural Resources Wales
NWS	Nuclear Waste Services
OGS	Off-Gas System
ONR	Office for Nuclear Regulation
OPEX	Operational Experience
PCSR	Pre-construction Safety Report
PER	Preliminary Environmental Report
PSAR	Preliminary Safety Analysis Report
PSR	Preliminary Safety Report
RGP	Relevant Good Practice
RO	Regulatory Observation
RP	Requesting Party
RQ	Regulatory Query
SSSE	Safety, Security, Safeguards and Environment Cases
SMR	Small Modular Reactor
SSCs	Structures, Systems and Components
SAP	Safety Assessment Principle(s)
TAG	Technical Assessment Guide(s) (ONR)
TSC	Technical Support Contractor
UK	United Kingdom
US	United States of America
WENRA	Western European Nuclear Regulators' Association

Contents

1. Introduction

1. This report presents the outcome of my Nuclear Liabilities Regulation (NLR) assessment of the BWRX-300 design as part of Step 2 of the Office for Nuclear Regulation (ONR) Generic Design Assessment (GDA). My assessment is based upon the information presented the safety, security, safeguards and environment cases (SSSE) head document [1], specifically chapters 1, 3, 11, 12, 20, 21, 26, and 27 (refs. [2], [3], [4], [5], [6], [7], [8] and [9]) the associated revision of the Design Reference Report (DRR)(ref. [10]) and supporting documentation.

2. Assessment was undertaken in accordance with the requirements of ONR's Management System and follows ONR's guidance on the mechanics of assessment, NS-TAST-GD-096 (ref. [11]) and ONR's risk informed, targeted engagements (RITE) guidance (ref. [12]. The ONR Safety Assessment Principles (SAPs) (ref. [13]) together with supporting Technical Assessment Guides (TAGs) (ref. [14]), have been used as the basis for this assessment.

3. This is a Major report as per ONR's guidance on production of reports (NS-TAST-GD-108) (ref.[15]).

1.1. Background

4. The ONR's GDA process (ref. [16]) calls for an assessment of the Requesting Party's (RP) submissions with the assessments increasing in detail as the project progresses. This GDA will be finishing at Step 2 of the GDA process. For the purposes of the GDA, GE Vernova Hitachi Nuclear Energy International LLC, United Kingdom (UK) Branch, is the RP. GE Vernova Hitachi Nuclear Energy Americas LLC (GVHA) is a provider of advanced reactors and nuclear services and is the designer of the BWRX-300. GVHA is headquartered in Wilmington, North Carolina, United States of America (US).

5. In Step 1, and for the majority of Step 2, the RP was known as GE-Hitachi (GEH) Nuclear Energy International LLC, UK Branch, and GVHA as GE-Hitachi Nuclear Energy Americas LLC. The entities formally changed names in October 2025 and July 2025 respectively. The majority of the submissions provided by the RP during GDA were produced prior to the name change, and thus the reference titles in this report reflect this.

6. In the UK, the RP has been supported by its supply chain partner, Amentum, who has assisted the RP in the development of the UK-specific chapters of the Safety, Security, Safeguards and Environment cases (SSSE), and other technical documents for the GDA.

7. In January 2024 ONR, together with the Environment Agency and Natural Resources Wales began Step 1 of this two-Step GDA for the generic BWRX-300 design. Step 1 is the preparatory part of the design assessment process

and is mainly associated with initiation of the project and preparation for technical assessment in Step 2. Step 1 completed in December 2024. Step 2 is the first substantive technical assessment step, and began in December 2024 and will complete in December 2025.

8. The RP has stated that, at this time, it has no plans to undertake Step 3 of GDA and obtain a Design Acceptance Confirmation (DAC). It anticipates that any further assessment by the UK regulators of the BWRX-300 design will be on site-specific basis and with a future licensee.

9. The focus of ONR's assessment in Step 2 was:

- The fundamental adequacy of the design and safety, security and safeguards cases; and
- The suitability of the methodologies, approaches, codes, standards and philosophies which form the building blocks for the design and cases.

10. The objective is to undertake an assessment of the design against regulatory expectations to identify any fundamental safety, security or safeguards shortfalls that could prevent ONR permissioning the construction of a power station based on the design.

11. Prior to the start of Step 2 I prepared a detailed Assessment Plan for NLR (ref. [17]). This has formed the basis of my assessment and was also shared with the RP to maximise openness and transparency.

12. This report is one of a series of assessments which support ONR's overall judgements at the end of Step 2 which are recorded in the Step 2 Summary Report (ref. [18]) and published on the regulators' website.

1.2. Scope

13. The assessment documented in this report is based upon the SSSE for the BWRX-300 (refs. [1], [2], [3], [4], [5], [6], [7], [8], [9], [19] [20], [21], [22], [23], [24], [25], [26], [27] [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42] [43], [44], [45], [46], [47]).

14. The RP's GDA scope has been agreed between the regulators and the RP during Step 1. This is documented in an overall Scope of Generic Design Assessment report (ref. [48]). This is further supported by its DRR (ref. [10]) and the MDSL (ref. [49]). The GDA scope report documents the submissions which were provided in each topic area during Step 2 and provides a brief overview of the physical and functional scope of the Nuclear Power Plant (NPP) that is proposed for consideration in the GDA. The Design Reference Report (DRR) provides a list of the systems, structures and components (SSCs) which are included in the scope of the GDA, and their relevant GDA reference design documents.

15. The RP has stated it does not have any current plans to undertake GDA beyond Step 2. This has defined the boundaries of the GDA and therefore of my own assessment.

16. The GDA scope includes the Power Block (comprising the Reactor Building, Turbine Building, Control Building, Radwaste Building, Service Building, Reactor Auxiliary Structures) and Protected Areas (PA) as well as the balance of plant. It includes all modes of operation. The regulatory conclusions from GDA apply to everything that is within the GDA scope. However, ONR does not assess everything within it or all matters to the same level of detail. This applies equally to my own assessment, and I have followed ONR's guidance on the mechanics of assessment, NS-TAST-GD-096 [11] and ONR's guidance on Risk Informed, Targeted Engagements [12].

17. As appropriate for Step 2 of the GDA, the RP has not submitted information for all aspects within the GDA Scope during Step 2. The following aspects of the SSSE are therefore out of scope of this assessment:

<u>Radioactive Waste Management</u>

- Management of waste from contaminated ground discovered in preparing the site for construction.

<u>Spent Fuel Management</u>

- On-site transfer of fuel and irradiated in-core components.
- Any fault studies associated with the operation of the proposed storage facilities.

18. The RP has however provided conceptual descriptions in the relevant Preliminary Safety Report (PSR) and Preliminary Environmental Report (PER) chapter for the following:

<u>Radioactive Waste Management</u>

- A description of the radiological protection principles adopted in the design.
- An overview of key radiation protection design features of the main groups of plant systems.
- Provision of tables with radionuclide inventories for key plant areas as the basis for future dose assessments.
- Outline of general types of calculations (plant areas / source terms / dose points) to be carried out for the future site licensing phase.
- The key elements of a penetration design philosophy.

- A high-level overview of the elements of a contamination control strategy.
- A description of the radiation protection programme likely to be adopted by a future licensee.

Decommissioning

- A set of principles for facilitation of safe decommissioning, including how they have been derived from RGP and Operating Experience (OPEX).
- A description of how those principles have been applied and how the design process promotes further challenge to ensure decommissioning risks are reduced as low as reasonably practicable (ALARP).
- A high-level summary of why there is confidence that the BWRX-300 can be safely decommissioned, based on OPEX of successful decommissioning of BWRs worldwide and the availability of suitable techniques to support such decommissioning.
- Selection and justification of decommissioning strategy (assumed to be prompt, in line with UK expectations, but not precluding deferred).
- Anticipated timeline for key decommissioning activities (high-level illustration only).
- A summary of the radioactive wastes anticipated to be generated during decommissioning and an assurance that these can be managed and disposed of as required.

Spent Fuel Management

- A conceptual description of the preferred spent fuel management strategy (on-site dry storage) including an assessment of potential spent fuel quantities, its management, storage, and potential for disposal.
- Management of irradiated in-core components (assumed to be high level waste on removal from core).

2. Assessment standards and interfaces

19. The primary goal of the GDA Step 2 assessment is to reach an independent and informed judgment on the adequacy of the RP's SSSE for the reactor technology being assessed.

20. ONR has a range of internal guidance to enable inspectors to undertake a proportionate and consistent assessment of such cases. This section identifies the standards which have been considered in this assessment. This section also identifies the key interfaces with other technical topic areas.

2.1. Standards

21. The ONR Safety Assessment Principles (SAPs) (ref. [13]) constitute the regulatory principles against which the RP's case is judged. Consequently, the SAPs are the basis for ONR's assessment and have therefore been used for the Step 2 assessment of the BWRX-300.

22. The International Atomic Energy Agency (IAEA) safety standards (ref. [50]) and nuclear security series (ref. [51]) are a cornerstone of the global nuclear safety and security regime. They provide a framework of fundamental principles, requirements and guidance. They are applicable, as relevant, throughout the entire lifetime of facilities and activities.

23. Furthermore, ONR is a member of the Western European Nuclear Regulators Association (WENRA). WENRA has developed Reference Levels (ref. [52]), which represent good practices for existing nuclear power plants, and Safety Objectives for new reactors (ref. [53]).

24. The relevant SAPs, IAEA standards and WENRA reference levels are embodied and expanded on in the TAGs (ref. [14]). The TAGs provide the principal means for assessing the NLR aspects in practice.

25. The key guidance is identified below and referenced where appropriate within Section 4 of this report. Relevant good practice, where applicable, has also been cited within the body of this report.

2.1.1. Safety Assessment Principles (SAPs)

26. The key SAPs applied within my assessment are Radioactive Waste Management (RW) and Decommissioning (DC).

27. A full list of all SAPs used in this assessment with corresponding rationale is provided in Appendix 1.

2.1.2. Technical Assessment Guides (TAGs)

28. The following TAGs have been used as part of this assessment:

- NS-TAST-GD-096 - Guidance on Mechanics of Assessment
- NS-TAST-GD-005 - Regulating duties to reduce risks ALARP
- NS-TAST-GD-051 - The purpose, scope and content of safety cases
- NS-TAST-GD-023 - Control of processes involving nuclear matter
- NS-TAST-GD-024 - Management of Radioactive Material and Radioactive Waste
- NS-TAST-GD-026 - Decommissioning
- NS-TAST-GD-029 - Ownership and Control of Nuclear Matter
- NS-TAST-GD-033 - Management of Records
- NS-TAST-GD-051 - Purpose, Scope and Content of Safety Cases
- NS-TAST-GD-081 - Safety Aspects Specific to Storage of Spent Nuclear Fuel

2.1.3. National and international standards and guidance

29. The following international standards and guidance have been used as part of this assessment:

- IAEA SSR-2/1 – Safety of Nuclear Power Plants: Design
- IAEA SSG-47 - Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities
- IAEA SSG-61 - Format and Content of the Safety Analysis Report for Nuclear Power Plants
- IAEA-TECDOC-1657 - Design Lessons Drawn from the Decommissioning of Nuclear Facilities
- WENRA Safety Reference Levels for Existing Reactor 2020
- WENRA Safety of New NPP designs
- WENRA Decommissioning Safety Reference Levels
- The management of higher activity radioactive waste on nuclear licensed sites - Joint guidance from the Office for Nuclear Regulation, the Environment Agency, the Scottish Environment Protection Agency and Natural Resources Wales to nuclear licensees

2.2. Integration with other assessment scope

30. To deliver the assessment scope described above I have worked closely with a number of other topics (including the Environment Agency and Natural Resources Wales (NRW) assessors) to inform my assessment. Similarly, other assessors sought input from my assessment. These interactions are key to the success of GDA to prevent or mitigate any gaps, duplications or inconsistencies in ONR's assessment.

31. The key interactions with other topic areas were:

- Chemistry – source terms and impact on downstream waste streams
- Fuel and Core – credible failure modes for spent fuel
- Civil Engineering – Construction, Design and Management (CDM) requirements associated with decommissioning
- Environment Agency – radioactive waste minimisation and disposability

2.3. Use of technical support contractors

During Step 2 I have not engaged Technical Support Contractors (TSCs) to support my assessment of the Topic aspects of the BWRX-300 GDA.

3. Requesting Party's submission

32. The RP submitted the SSSE at the start of Step 2 in four volumes that integrate environmental protection, safety, security, and safeguards. This was accompanied by a head document (ref. [1]), which presents the integrated GDA environmental, safety, security, and safeguards case for the BWRX-300 design.

33. All four volumes were subsequently consolidated to incorporate any commitments and clarifications identified in regulatory engagements, regulatory queries and regulatory observations, and were resubmitted in July 2025. This consolidated revision is the basis of the regulatory judgements reached in Step 2.

34. This section presents a summary of the RP's safety case for NLR. It also identifies the documents submitted by the RP which have formed the basis of my Step 2 assessment of the BWRX-300 design.

3.1. Summary of the BWRX-300 Design

35. The BWRX-300 is a single unit, direct-cycle, natural circulation, boiling water reactor with a power of ~870 MW (thermal) and a generating capacity of ~ 300 MW (electrical) and is designed to have an operational life of 60 years. The RP claims the design is at an advanced concept stage of development and is being further developed during the GDA in parallel with the RP's SSSE.

36. The BWRX-300 is the tenth generation of the boiling water reactor (BWR) designed by GVHA and its predecessor organisations. The BWRX-300 design builds upon technology and methodologies used in its earlier designs, including the Advanced Boiling Water Reactor (ABWR), Simplified Boiling Water Reactor (SBWR) and the Economic Simplified Boiling Water Reactor (ESBWR). The ABWR has been licensed, constructed and is currently in operation in Japan, and a UK version of the design was assessed in a previous GDA with a view to potential deployment at the Wylfa Newydd site. Neither the SBWR or ESBWR have been built or operated.

37. The BWRX-300 reactor core houses 240 fuel assemblies and 57 control rods inside a steel reactor pressure vessel (RPV). It uses fuel assemblies (GNF2) that are already currently widely used globally (ref. [6]).

38. The reactor is equipped with several supporting systems for normal operations and a range of safety measures are present in the design to provide cooling, control criticality and contain radioactivity under fault conditions. The BWRX-300 utilises natural circulation and passive cooling rather than active components, reflecting the RP's design philosophy.

3.2. BWRX-300 Case Approach and Structure

39. The RP has submitted information on its strategy and intentions regarding the development of the SSSE (ref. [54], [55], [56]). This was submitted to ONR during Step 1.

40. The RP has submitted a SSSE for the BWRX-300 that claims to demonstrate that the standard BWRX-300 can be constructed, operated, and decommissioned on a generic site in Great Britain (GB) such that a future licensee will be able to fulfil its legal duties for activities to be safe, secure and will protect people and the environment. The SSSE comprises a Preliminary Safety Report (PSR) which also includes information on its approach to safeguards and security, a security assessment, a Preliminary Environment Report (PER), and their supporting documents.

41. The format and structure of the PSR largely aligns with the IAEA guidance for safety cases, SSG-61 (ref. [57]), supplemented to include UK specific chapters such as Structural Integrity and Chemistry. The RP has also provided a chapter on As Low as Reasonably Practicable (ALARP), which is applicable to all safety chapters. The RP has stated that the design and analysis referenced in the PSR is consistent with the March 2024 Preliminary Safety Analysis Report (PSAR) submitted to the US Nuclear Regulatory Commission (NRC).".

3.3. Summary of the RP's case for Nuclear Liabilities Regulation

42. The aspects covered by the BWRX-300 safety case in the area of NLR can be broadly grouped under three headings which are summarised as follows:

- That risks associated with the design and operation of the radioactive waste management systems for the BWRX-300 are capable of being reduced ALARP as the design progresses into detailed design;
- That the design of the BWRX-300 has considered factors to ensure that the Nuclear Power Plant (NPP) can be decommissioned safely and that the risks associated with decommissioning are minimised, so far as is reasonably practicable; and
- That the management of spent fuel and irradiated in-core components (IICC) has been considered; a viable future plan for the long-term storage and disposal of the SF could be devised; and no fundamental impediments to its management have been identified.

3.4. Basis of assessment: RP's documentation

43. The principal documents that have formed the basis of my NLR assessment of the SSSE are:

- PSR Chapter 11 Management of Radioactive Waste which presents the arrangements for management of the radioactive wastes (excluding Spent Nuclear Fuel) arising from commissioning, operation, and subsequent decommissioning of the BWRX-300 Small Modular Reactor in compliance with United Kingdom (UK) requirements (ref. [4]);
- PSR Chapter 21 – Decommissioning and End of Life which provides an overview of the BWXR-300 Small Modular Reactor's (SMR's) approach to decommissioning and end-of-life (ref. [7]); and
- PSR Chapter 26 - Interim Storage of Spent Fuel which presents information on the Spent Fuel (SF) management arrangements for the BWRX-300 to demonstrate that they can be developed to comply with relevant UK policy, legislation, regulations, and regulatory guidance. (ref [8]).

3.5. Design Maturity

44. My assessment is based on revision 3 of the DRR (ref. [10]). The design reference report presents the baseline design for GDA Step 2, outlining the physical system descriptions and requirements that form the design at that point in time.

45. The reactor building and the turbine building, along with the majority of the significant structures, systems and components (SSCs) are housed with the 'power block'. The power block also includes the radwaste building, the control building and a plant services building. For security, this also includes the PA boundary and the PA access building.

46. The GDA Scope Report (ref. [48]) describes the RP's design process that extends from baseline (BL) 0 (where functional requirements are defined) up to BL 3 (where the design is ready for construction).

47. In the March 2024 design reference, SSCs in the power block are stated to be at BL1. BL1 is defined as:

    - System interfaces established
    - (included) in an integrated 3D model
    - Instrumentation and control aspects have been modelled
    - Deterministic and probabilistic analysis has been undertaken
    - System descriptions developed for the primary systems

48. The balance of plant remains at BL0 for which only plant requirements have been established, and SSC design remains at a high concept level.

4. ONR assessment

4.1. Assessment strategy

49. My assessment plan is ref. [17].

50. The objective of my GDA Step 2 assessment was to reach an independent regulatory judgement on the fundamental aspects of the BWRX-300 design, relevant to NLR as described in sections 1 and 3 of this report. My assessment strategy is set out in this section and defines how I have chosen my assessments targeted matters. My assessment is consistent with the delivery strategy for the BWRX-300 GDA ref. [58].

51. GVHA is currently engaging with regulators internationally, including the Nuclear Regulatory Commission in the US (US NRC) and the Canadian Nuclear Safety Commission in Canada (CNSC). It is proposing a standard BWRX-300 design for global deployment with minimal design variations from country to country. NLR topic areas all relate to ensuring compatibility with the UK-specific waste management infrastructure, regulations, government policy, site licencing and delicensing. There is therefore no expectation for collaboration with international regulators.

52. Whilst there is no operating BWR plant in the UK, ONR has previously performed a four-step GDA on the Hitachi-GE UK ABWR (ref. [59]). I have taken learning from this previous activity, targeting my assessment on those aspects of the BWRX-300 which are novel or specific to this design. I have not looked to reassess inherent aspects of BWR technology which were considered in significant detail for the UK ABWR and judged to be acceptable.

53. I have considered the ABWR Step 4 GDA report as part of my planning for this GDA. I acknowledge that there were significant developments made in the NLR areas within the ABWR GDA. A particular area of focus for the ABWR GDA was in the consideration of interim spent fuel storage. GE Hitachi have however specifically stated that they will diverge from the ABWR design in this area and develop a separate bespoke system.

54. My assessment consisted of two complimentary approaches. The first was to target specific aspects of the submission that I consider fundamental to a two-step GDA. The second was to perform a high-level assessment of all key NLR-topic submissions and sample areas where I consider where there is the potential for the design to be unable to reduce risks ALARP.

4.2. Assessment Scope

55. My assessment scope and the areas I have chosen to target for my assessment are set out in this section. This section also outlines the

submissions that I have sampled, the standards and criteria that I will judge against and how I have interacted with the RP and other assessment topics.

56. My assessment scope is consistent with the GDA scope agreed between the regulators and the RP during Step 1 and detailed in Section 1.2 of this report. I have targeted my assessment within this scope.

57. In line with the objectives for Step 2, I have undertaken a broad review of the highest level, fundamental claims and supporting arguments related to NLR. To support this, I have sampled a targeted set of the claims or arguments as set out below. Where applicable, I have also sampled the evidence available to support any claims and arguments.

58. In order to fulfil the aims for the Step 2 assessment of the BWRX-300, I have assessed the following items, which I consider important:

- <u>Radioactive waste management</u>

  Disposability of radioactive waste
  - That the design will not generate any novel radioactive waste streams compared to existing light water reactors that may prove to be problematic with regards to disposability;

  Minimisation of radioactive waste volume and accumulation
  - SSCs and processes associated with the control and containment of radioactive material and radioactive waste are designed to minimise the generation and accumulation of radioactive waste;

  Radioactive waste storage
  - There is sufficient capacity and capability to process and store, in accordance with relevant good practice, all radioactive waste anticipated to be generated on the site for which there is no existing UK disposal route available and the assumed route is the Geological Disposal Facility (GDF); where such capacity and capability cannot be demonstrated, that the RP understands the status of UK RGP and that suitable options exist that could be taken forward during future site licensing;

- <u>Decommissioning</u>

  Design for decommissioning
  - The design will adequately facilitate safe decommissioning of the plant at the end of its operational life;

  Management arrangements
  - The RP has suitable arrangements to ensure adequate consideration of decommissioning during the design including, but not limited to, consideration of materials selection to minimise and

control activation products, design features to facilitate decommissioning and dismantling, and modularisation of the design;

End-state

- The target end-state complies with UK policy;

- Spent fuel management

UK RGP alignment

- The strategy for managing all spent fuel, including failed fuel, provides for its safe and secure storage in alignment with UK government policy, taking due account of relevant good practice; and,

Fuel disposability

- The RP has sought appropriate advice from NWS on disposability of spent fuel to inform its on-site management.

4.3. Assessment

4.3.1. Targeted matters

59. The following section summarises my findings associated with targeted Radioactive Waste Management matters.

4.3.1.1. Radioactive Waste Management

Disposability of radioactive waste

60. Licence Condition (LC) 32 requires that radioactive waste accumulation is minimised and the Technical Inspection Guide (TIG) [60] states that the generation of radioactive waste with no feasible disposal route should be avoided. It is therefore important that the RP can provide evidence that the radioactive waste expected to be generated by the design will be disposable. The established disposal routes for Low-Level Waste (LLW) are managed and operated by NWS. NWS also manages the acceptance criteria for the GDF which is the currently assumed UK disposal route for HAW including spent fuel and Intermediate-Level Waste (ILW). The RP has therefore provided information to NWS who have assessed the disposability of radioactive waste associated with BWRX-300. The results of this assessment are presented in their corresponding “Expert View” captured in ref. [61].

61. NWS concluded that that there is enough analogy between ABWR and BWRX-300 to give confidence that a disposability case could be made. It did however also note that significantly more information will be required to fully establish this position, highlighting uncertainty with respect to the choice of ion-exchange resins to be used for liquid effluent treatment and the current lack of a treatment and processing strategy. I am content that the absence of this information is commensurate with the level of maturity expected for a 2-

step GDA and that there are no fundamental shortfalls within this area that would prevent the RP from further developing the generic BWRX-300 design.

62. The disposability of the fuel is discussed in Section 4.3.1.3.

Radioactive waste volume minimisation

63. The ONR's RW.2 (Generation of radioactive waste) SAP states that radioactive waste should be minimised in terms of quantity and activity and RW.3 (Accumulation of radioactive waste) states that the total quantity of radioactive waste accumulated on a site should be minimised. Equivalent statements are also presented in IAEA guidance (ref. [62]). In order to explore the alignment of the BWRX-300 design against this guidance, I targeted the following topics:

Waste category dilution

- The majority of ILW generated by the operation of a nuclear reactor is the spent ion-exchange resin used to decontaminate the coolant in the reactor and ponds. These resins have the potential to have differing waste categories and so I have assessed the SSCs and operational philosophy associated with the management of these resins;

Secondary containment

- Secondary containment minimises possible contamination and the generation of secondary radioactive waste by containing leaks when the primary containment fails. For this topic, I've focussed on the general design philosophy to be used when designing SSCs; and,

Water table protection

- In contrast to the previous topic which focussed on general features, I've targeted the specific SSCs to be employed to prevent a leak to groundwater. I consider this particularly relevant to the BWRX-300 design due to the intention to construct the majority of the reactor building below grade.

Waste category dilution

64. The Management of Radioactive Waste chapter of the SSSE (ref. [4]) includes simplified diagrams of the solid waste management system (Figure 11-2). This diagram illustrates how the four different spent ion-exchange resins used by the design are routed to a single bulking tank. The body of the document describes how these resins will then be collected in this tank to allow it to decay before being transferred to the Solid Waste Storage Subsystem to be prepared for disposal. It then describes that these resins are assumed to be ILW based on the current source terms.

65. During my engagement with the RP I established that the RP is currently unable to accurately define the waste categories of the ion-exchange resins

and acknowledged that they could be dissimilar. This position was later confirmed in response (ref. [63]) to a Regulatory Query (RQ) (ref. [64]) which also stated that there was a high degree of confidence that ion-exchange resin from the Isolation Condenser Pools Cooling and Cleanup System (ICC) demineraliser will have a lower category but stated that this could be managed by a future operator operationally by campaigning batches of similar category waste. The RP stated that it would however be the future facility operator's responsibility to ensure alignment with local and international guidance.

66. In my judgement, this decision results in constraints on the design which incentivise a future operator to dilute waste by making it operationally difficult to avoid doing so. I consider this to be a potential shortfall against SAP RW.2 (Generation of radioactive waste) and RW.4 (Characterisation and segregation), and not in alignment with International guidance (ref. [62].) The Environment Agency and I have therefore raised a joint regulatory observation (RO) (ref. [65]) to resolve this shortfall.

67. The RP has produced a resolution plan in response to this RO (ref. [66]) which identifies how the design will be validated and justified once the category and volumes of the spent ion-exchange resins are known ahead of the production of a site-specific pre-construction safety report (PCSR). I am satisfied that this resolution plan defines a process that will adequately addresses this shortfall for the purposes of my Step 2 assessment.

Secondary containment

68. I targeted whether the RP has considered secondary containment in the design but was unable to locate any corresponding information within the SSSE. Secondary containment is necessary to mitigate the risk of leak associated with storing and processing radioactive material and is identified in both UK (ref. [67]) and international guidance (ref. [68], [52]). The RP provided reference (ref. [69]) which defines the design requirements intended to reduce both occupational and public dose to As Low As Reasonably Achievable (ALARA). This document includes the following relevant requirements:

- "[5.2.2.1.c] Walls or curbs shall be provided around tanks to collect leaks. Room collection capacity shall be sufficient to contain the maximum amount of liquid for which the tank is designed."
- "[5.2.6.1.a] The enclosures that house equipment with large volumes of radioactive liquids (e.g., tanks, heat exchangers, filters) that are adjacent to areas with lower radiation zones shall be leak-tight to prevent the spread of contamination. Additionally, suitable containment measures shall be adopted to prevent dispersion in the event of liquid overflow (e.g. curbs, sloping floor drains)."

69. The RP also stated that these requirements will be captured by the requirements management tool to ensure inclusion in this design. I consider this sufficient evidence that the design will satisfy the requirements identified by the aforementioned guidance for a two-step GDA.

Water table protection

70. I targeted the elements of the design specially intended to protect the water table from an accidental release of activity. This is particularly relevant to the BWRX-300 design due to a significant proportion of the reactor building being below ground. LC34 requires that radioactive material and radioactive waste is at all times controlled or contained to prevent a leak or unintended release to the environment. This is also identified in both IAEA (ref. [50]) and WENRA (ref. [52]) guidance.

71. The RP provided reference (ref. [69]) which states that leakage of radioactive liquids to ground water, and the leakage of ground water into buildings, shall be minimised by avoiding the use of below-grade conduit and piping penetrations through walls that form exterior boundaries. Penetrations through outer walls of a building containing radioactive systems shall be sealed to prevent leaks to the environment, and the integrity of such seals shall be periodically verified.

72. It is also proposed that suitable containment measures shall be adopted to prevent dispersion in the event of liquid overflow and the RP separately stated that sump tanks will be located at the base of the Reactor Building as additional mitigation. I consider this evidence sufficient to satisfy my interpretation of the expectations of a two-step GDA.

Radioactive waste management strategy

73. In order assess the adequacy of the radioactive waste management strategy I targeted the following topics:

Waste containers

74. I targeted the waste storage containers associated with the waste management strategy. LC34 requires the licensee to ensure that radioactive waste on the site is at all times adequately controlled or contained. In addition, ONR’s SAP RW.5 (Storage of radioactive waste and passive safety) states that waste containers are to be compatible with the long-term management strategy for the waste and that the design of waste packages should aim to ensure that future management steps can be carried out and that they are compatible with handling, retrieval, transport and storage requirements. Equivalent statements are also included in international guidance such as the IAEA’s SSG-40 (Predisposal Management of Radioactive Waste from Nuclear Power Plants and Research Reactors) (ref. [62]) and WENRA’s Waste and Spent Fuel Storage Safety Reference Levels (ref. [70]).

75. Although the RP did identify the anticipated waste streams, it did not identify the corresponding waste containers. Whilst this does not, in my opinion, clearly demonstrate alignment to RW.5, I judge, based on the response (ref. [71]) to RQ-01975 (ref. [72]), that this has been adequately considered by the RP in its development of the BWRX-300. Whilst this should be captured in a future version of the safety case, it is my judgement that this omission from the safety case assessed in this GDA is not a challenge to the suitability of the BWRX-300 for deployment in GB.

Stored waste condition monitoring

76. I targeted SSCs necessary to enable a Condition Monitoring and Inspection (CM&I) regime. ONR's SAP RW.5 (Storage of radioactive waste and passive safety) states that a radioactive waste store's safety case should identify the operational limits and conditions (operating rules) needed for safe storage and that it should also be designed and operated to enable timely intervention in the event of faults and provisions should be made for dealing with any radioactive waste or its packaging that shows signs of unacceptable degradation. I was however unable to locate any information in relation to CM&I within the SSSE. Whilst I consider this a shortfall against RW.5, I am content from the RPs response (ref. [73]) to RQ-01977 (ref. [74]) that it has adequate awareness of the issue. Whilst this should be captured in a future version of the safety case, it is my judgement that this omission from the safety case assessed in this GDA is not a challenge to the suitability of the BWRX-300 for deployment in GB.

4.3.1.2. Decommissioning

Design for decommissioning

77. I have targeted whether the BWRX-300 design will incorporate features to facilitate decommissioning. ONR's SAP DC.1 (Design and Operation) specifies that facilities should be designed and operated so that they can be safely decommissioned and that decommissioning and waste retrievals should be taken into account during the planning and design. IAEA SSR2/1 (Safety of Nuclear Power Plants: Design) (ref. [50]) specifies design features to facilitate decommissioning and to reduce future dose uptake by decommissioning workers and identification of reasonably practicable changes to the facility to facilitate or accelerate decommissioning. IAEA SSG-47 (Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities) (ref. [51]) states that, at the design stage of a new facility, the designer or the licensee should ensure that decommissioning considerations are taken into account and lists various features to be considered during design such as modularisation. Equivalent statements are also identified in the WENRA decommissioning safety reference levels (ref. [75]).

78. My review of the SSSE identified several examples of design criteria intended to reduce and manage contamination by material selection and

design features. This was supplemented by the RP providing Reference (ref. [69]) “BWRX-300 As Low As Reasonably Achievable Design Criteria for Standard Design” and Reference (ref. [76]) BWRX-300 Composite Design Specification. I was however unable to determine whether there was a decommissioning disassembly plan that identified the design features necessary to enable it.

79. The RP’s response (ref. [77]) to RQ-01980 (ref. [78]) described how detailed decommissioning plans will not be developed until site specific detailed design is developed. I consider this a shortfall against the previously identified guidance as it describes how decommissioning should be considered in the planning and early design stages to avoid foreclosing specific options and maximise the overall benefits in terms of risk reduction. I therefore raised a corresponding RO (ref. [79]), describing my perceived shortfall, defining the deliverables necessary to close it, and requesting an outline resolution plan within Step-2 describing activities relative to and preceding licence application to deliver the defined deliverables. The RP produced a resolution plan (ref. [80]) which meets my expectations.

Management arrangements

80. In addition to targeting the specific design features necessary to enable the development of the decommissioning and disassembly plan, I also targeted the management arrangement to be used to ensure that the identified features are incorporated into the design. I was unable to locate this information in the SSSE and so incorporated this into RQ-01980 (ref. [81]) (Design for Decommissioning).

81. The RP’s response (ref. [81]) to RQ-01980 (ref. [77]) describes how requirements, once identified, are recorded and tracked through a traceability framework as they incorporated into the design. Single and multi-discipline design reviews are then used throughout the design process then ensure that the requirements are adequately incorporated and verified. I consider this adequate and represents sufficient evidence to satisfy my interpretation of the expectations of a two-step GDA.

End-state

82. I targeted the decommissioning end-state of the site and its alignment to UK expectations. ONR’s SAP DC.2 (Decommissioning strategies) describes how a decommissioning strategy should be consistent with Government policies and strategies and should describe the planned end-state for the site. I was however unable to locate a description of the end state in the SSSE.

83. The RP’s response (ref. [82]) to RQ-01983 (ref. [83]) defined the end state to be a “brownfield” industrial end-state free of industrial and radiological hazards. Contamination levels will be below release levels both above and below ground, and structures will be reduced to ground level minus one metre and back-filled with clean soil, rubble, or concrete to prevent

subsidence. I consider this adequate and represents sufficient evidence to satisfy my interpretation of the expectations of a two-step GDA.

4.3.1.3. Spent Fuel Management

UK RGP alignment

84. I sampled how the overall spent fuel management strategy aligned to UK RGP. ONR SAP ENM.1 (Strategies for managing nuclear matter) states that A strategy (or strategies) should be made and implemented for the management of nuclear matter and ONR's Technical Assessment Guide (TAG) NS-TAST-GD-081 (Safety aspects specific to spent fuel) describes how, although spent nuclear fuel is not considered to be waste, where the baseline assumption is direct disposal to a future geological disposal facility, radioactive waste management principles and practice are relevant to the safe and secure long-term management of spent nuclear fuel. ONR's SAP RW.5 (Storage of radioactive waste and passive safety) describes how the safety case should demonstrate that radioactive waste is managed in accordance with relevant good practice. My review of the SSSE established that the proposed strategy and associated SSC strongly align to current UK RGP and I am satisfied that it complies with my interpretation of the expectations of a two-step GDA.

Fuel Disposability

85. LC32 requires that radioactive waste accumulation is minimised. This includes spent fuel and so it is important that the RP can provide evidence that it will be ultimately disposable. The established disposal route for spent fuel in the UK is the future GDF for which NWS manage the associated acceptance criteria. The previously mentioned NWS Expert View (ref. [61]) therefore also considered spent fuel.

86. As with radioactive waste, NWS concluded that that there is sufficient commonality between BWRX-300 and the previously assessed ABWR to provide confidence that a disposability case could be made. NWS did however identify four risks to the disposability case. The first risk is that a transport safety case cannot be made for a disposal container fully loaded with 12 BWR spent fuel assemblies due to the 65t transport weight limit being exceeded; the second was that the spent fuel may require cooling periods beyond the assumed last date of emplacement in a GDF (2190); the third was that a criticality safety case cannot be made due to the initial enrichment, geometry and use of burnable poisons in BWRX-300 fuel being outside of the envelope of the current knowledge base; and the fourth being that a disposability case cannot be made due to insufficient information being provided. These do not however represent fundamental shortfalls and I therefore consider this evidence adequate to satisfy my interpretation of the expectations of a two-step GDA.

4.3.2. Sampled matters

87. The following are matters that I sampled during my review of the SSSE:

4.3.2.1. Radioactive Waste Management

Zero-effluent discharge statement

88. ONR's SAP (ref. [13]) RW.1 (Strategies for radioactive waste) described how a strategy should be produced and implemented for the management of radioactive waste on a site. IAEA Safety Standard SSR-2/1 (Rev.1) (Safety of Nuclear Power Plants: Design (ref. [50]) also states that systems shall be provided for treating liquid radioactive waste at the nuclear power plant to keep the amounts and concentrations of radioactive releases below the authorized limits on discharges and as low as reasonably achievable. Revision A of Chapter 11 of the SSSE (ref. [84]) stated that BWRX-300 is capable of operating with zero aqueous effluent discharges during normal operations and included no other details about how liquid effluent is managed or the associated SSCs.

89. The RP's response [85] to RQ-02001 (ref. [86]) clarified the intention to change the terminology used in the SSSE from "zero effluent discharge" to "maximum recirculation." The RP also acknowledged that there is the potential for quantities of liquid radioactive waste and provided details of the SSCs associated with bulking, sampling and disposal. I am therefore now content that the information presented is commensurate with the level of maturity expected for a two-step GDA and that there are no fundamental shortfalls within this area that would prevent the RP from further developing the generic BWRX-300 design.

Off-Gas System (OGS) charcoal-bed filters

90. ONR's SAP (ref. [13]) RW.1 (Strategies for radioactive waste) described how a strategy should be produced and implemented for the management of radioactive waste on a site. IAEA Safety Standard SSR-2/1 (Rev.1) (Safety of Nuclear Power Plants: Design (ref. [50]) also states that systems shall be provided for treating solid radioactive waste at the nuclear power plant to keep the amounts and concentrations of radioactive releases below the authorized limits on discharges and as low as reasonably achievable. There are examples of other reactors where the charcoal bed filters needed to be replaced but that the associated SSC was not designed to accommodate this process, resulting in an increase potential for operator dose uptake.

91. I noted that the charcoal beds were not identified as a radioactive waste associated with operation and that there was no information with respect to managing and replacing them in the SSSE. I therefore sampled this topic and raised it with the RP. The RP directed me to Reference ref. [87] which explains that the charcoal bed filter will operate for 60 years and will not require replacement. I challenged this assumption on the basis that the filters may need replacing in the event that a future operator attempts to

extend the life of the reactor. The RP reiterated the current assumption of a 60-year operating life and that there is no intention to replace the filters. I am content that the information presented is commensurate with the level of maturity expected for a two-step GDA and that there are no fundamental shortfalls within this area that would prevent the RP from further developing the generic BWRX-300 design.

Safety function of the off-gas system during fault scenarios

92. ONR's SAP (ref. [13]) EKP.3 (Defence in depth) expects provision of physical barriers to prevent the release of radioactive material to the environment" and ECH.4 (Monitoring, sampling and analysis) states that ventilation systems should confine the radioactive material within the facility and prevent its leakage or escape to the environment in fault conditions. In addition, IAEA SSR-2/1 (ref. [50]) states that the design should manage all design basis accidents so that they have no or only minor radiological consequences both on and off site. The Off-Gas System (OGS) meets my expectations under normal operation however, my review of the SSSE highlighted that there was no safety case claim against the OGS under fault conditions.

93. The RP submitted Reference (ref. [87]) which states that the OGS does not operate during fault scenarios. In my opinion, non-operation of the OGS is a safety functional requirement and therefore should have a corresponding safety case claim. I am however content that the information presented for normal operation is commensurate with the level of maturity expected for a two-step GDA. However, a future safety case would need to provide additional substantiation for the OGS under fault conditions.

4.3.2.2. Decommissioning

Decommissioning sequencing and priorities

94. ONR SAP DC.2 (Decommissioning Strategies) state that a decommissioning strategy should be prepared and maintained for each site and should be integrated with other relevant strategies. My review of the SSSE identified that the high-level plan indicated that the turbine hall would only be decommissioned following decommissioning of the reactor building. During discussions, the RP was unable to substantiate the need for this dependency. DC.3 states that decommissioning should be carried out as soon as reasonably practical and so I consider this delay a shortfall. I do however accept that this plan is indicative and requires significant additional development and substantiation. I am therefore content that the information presented is commensurate with the level of maturity expected for a two-step GDA and that there are no fundamental shortfalls within this area that would prevent the RP from further developing the generic BWRX-300 design.

4.3.2.3. Overall Claims Arguments Evidence structure

95. I have reviewed the Claims Arguments and Evidence (CAE) structures presented in each of the chapters relevant to the NLR topic area to test that

it aligns to ONR's SAP SC4. Ref. [88] states that safety claims through to arguments and evidence within the safety case should be carefully considered and implemented so that the resulting safety case flows and makes sense to those with responsibility for safety. The overall CAE structures presented in the NLR topic area chapters are both logical and clear, although they do rely heavily on repeated references to non-specific RGP, failing to identify specific standards. I consider this a shortfall against SC4 as, in my opinion, it is set at too much of a high level which makes it difficult for the reader to understand the specific claims. Instead, having to infer the details of the claim based on the context of the evidence listed. I do however consider this level of detail is commensurate with the maturity of the current design and GDA step and therefore do not consider this a fundamental shortfall. A future iteration of the SSSE should consider improving the traceability between the safety analysis and NLR-related requirements.

5. Conclusions

96. This report presents the Step 2 NLR assessment for the GDA of the BWRX-300 design. The focus of my assessment in this step was towards the fundamental adequacy of the design and safety case. I have assessed the SSSE chapters and relevant supporting documentation provided by the RP to form my judgements. I targeted my assessment, in accordance with my assessment plan (ref. [17]), at the content of most relevance to NLR against the expectations of ONR's SAPs, TAGs and other guidance which ONR regards as relevant good practice, such as IAEA and WENRA standards.

97. Based upon my assessment, I have concluded the following:

- the SSSE case related to the NLR topic area is logical and hierarchical aligning with RGP;
- the overall quality of the SSSE content in topic areas relevant to NLR are of a generally good standard that aligns to both UK and International guidance;
- the overall CAE constructs lack detail. A future SSSE should consider improving the traceability between the safety analysis and NLR-related requirements such as waste minimisation;
- the SSSE does not adequately demonstrate the SSC associated with the management and disposal of spent ion-exchange resins aligns to UK and International guidance. This perceived shortfall is identified in RO-BWRX-300-002. However, for the purposes of my Step 2 assessment, I am satisfied that the RP understands the shortfall and has produced an adequate resolution plan. A future SSSE would need to demonstrate completion and incorporation of these actions;
- the radioactive waste management strategy is immature and lacks key details such as appropriate container selection;
- the SSSE does not adequately demonstrated that it has incorporated design for decommissioning within the SSSE or design. This perceived shortfall is identified in RO-BWRX-300-003. However, for the purposes of my Step 2 assessment, I am satisfied that the RP understands the shortfall and has produced an adequate resolution plan. A future SSSE would need to demonstrate completion and incorporation of these actions; and,
- the Spent Fuel Management strategy aligns to UK RGP and NWS has assessed the expected spent fuel and HAW and provided their expert view, communicating a good level of confidence that the RP can make corresponding disposability cases.

98. Overall, based on my assessment, I have not identified any fundamental safety shortfalls that could prevent ONR permissioning the construction of a power station based on the generic BWRX-300 design; noting that any decision to permission a BWRX-300 will require further assessment (in either a future Step 3 GDA or during site specific activities) of suitable and sufficient supporting evidence that can substantiate the claims and proposals made in the GDA Step 2 submissions.

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Appendix 1 – Relevant SAPs considered during the assessment

SAP reference	SAP title	Relevance
RW.1	Strategy for radioactive waste management	A strategy should be produced and implemented for the management of radioactive waste on a site.
RW.2	Generation of radioactive waste	The generation of radioactive waste should be prevented or, where this is not reasonably practicable, minimised in terms of quantity and activity.
RW.3	Accumulation of radioactive waste	The total quantity of radioactive waste accumulated on site at any time should be minimised so far as is reasonably practicable.
RW.4	Characterisation and segregation	Radioactive waste should be characterised and segregated to facilitate its subsequent safe and effective management.
RW.5	Storage of radioactive waste and passive safety	Radioactive waste should be stored in accordance with good engineering practice and in a passively safe condition.
DC.1	Design and operation	Facilities should be designed and operated so that they can be safely decommissioned.
DC.2	Decommissioning strategies	A decommissioning strategy should be prepared and maintained for each site and should be integrated with other relevant strategies.
DC.3	Timing of decommissioning	The safety case should justify the continuing safety of the facility for the period prior to its decommissioning. Where adequate levels of safety cannot

		be demonstrated, prompt decommissioning should be carried out and, where necessary, prompt remedial and operational measures should be implemented to reduce the risk.
SC.4	Safety case characteristics	A safety case should be accurate, objective and demonstrably complete for its intended purpose. Safety case content guidance
ENM.1	Strategies for managing nuclear matter	A strategy (or strategies) should be made and implemented for the management of nuclear matter.