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26.1 INTRODUCTION

The Fundamental Purpose of the Generic Design Assessment (GDA) Safety, Security and Environment Case (SSEC) is to demonstrate that the generic Small Modular Reactor (SMR)-300 can be constructed, operated and decommissioned on a generic site in the United Kingdom (UK) to fulfil the future licensee's legal duties to be safe, secure and protect people and the environment, as defined in Holtec SMR GDA PSR Part A Chapter 1 Introduction [1].

The Fundamental Purpose is achieved through the Fundamental Objective of the Preliminary Safety Report (PSR), which is to summarise the safety standards and criteria, safety management and organisation, claims, arguments and intended evidence to demonstrate that the generic SMR-300 design risks to people are likely to be tolerable and As Low as Reasonably Practicable (ALARP) [1].

This chapter of the PSR presents the Claims, Arguments and Evidence (CAE) for the decommissioning approach of the generic SMR-300.

26.1.1 Purpose and Scope

The Overarching SSEC Claims are presented in Holtec SMR GDA PSR Part A Chapter 3 Claims, Arguments and Evidence [2]. This chapter links to the overarching claim through Claim 2.3:

Claim 2.3: The design and safety assessment of the generic Holtec SMR-300 considers the entire reactor lifecycle.

As set out in Part A Chapter 3 [2], Claim 2.3 is further decomposed across several disciplines which support the development of through-life management arrangements.

This Chapter presents the decommissioning approach aspects for the generic SMR-300 and therefore directly supports Claim 2.3.2.

Claim 2.3.2: The generic Holtec SMR-300 can be safely decommissioned.

Discussion on how the Level 3 claim is broken down into Level 4 claims and how those claims are met is provided in sub-chapter 26.3.

The scope of this chapter covers:

- Relevant codes and standards associated with the decommissioning approach (as set out in sub-chapter 26.3).
- The decommissioning strategy (as set out in sub-chapter 26.4).
- Design for decommissioning (as set out in sub-chapter 26.5).
- Disposal routes and storage (as set out in sub-chapter 26.6).
- Faults and hazards relating to decommissioning (as set out in sub-chapter 26.7).
- Nuclear Liability Regulations relating to decommissioning (as set out in sub-chapter 26.8).
- A technical summary of how the claims for this chapter have been achieved, together with a summary of key contributions from this chapter to the overall ALARP argument. (as set out in Sub-chapter 26.9). The GDA commitment is also described.

No specific exclusions have been identified from the decommissioning scope during GDA.

A master list of definitions and abbreviations relevant to all PSR chapters can be found in PSR Part A Chapter 2 General Design Aspects and Site Characteristics [3].

26.1.2 Assumptions

Assumptions which relate to this topic have been formally captured in the Holtec SMR-300 Generic Design Assessment Capturing and Managing Commitments, Assumptions and requirements [4] process. Further details of this process are provided in PSR Part A Chapter 4 Lifecycle Management of Safety and Quality Assurance [5].

There are no assumptions raised in relation to this chapter.

26.1.3 Interfaces with other SSEC Chapters

As with all safety case topic areas, decommissioning both influences and is influenced by other topic areas. Decommissioning is fundamental to the design and therefore interfaces with every topic which comprises the PSR. However, key interfaces are described below.

Holtec SMR GDA PSR Part B Chapter 10 Radiological Protection [6], concerns the radiation protection of workers and the public. During the design phase, design for decommissioning should be considered to reduce the dose to operators during the decommissioning phase of the plant.

Holtec SMR GDA PSR Part B Chapter 13 Radioactive Waste Management (RWM) [7], concerns management of radioactive waste arising from the reactor. This is a co-topic with decommissioning under Nuclear Liabilities Regulation (NLR) in terms of radioactive wastes arising from the decommissioning of the generic SMR-300.

Holtec SMR GDA PSR Part B Chapter 12 Nuclear Site Health and Safety and Conventional Fire Safety, covers several aspects important to safe and effective decommissioning such as fire safety and information management systems.

Holtec SMR PSR GDA Part B Chapter 19 Mechanical Engineering [8]. The mechanical design of the Structures, Systems and Components (SSCs) will have influence on the claims placed on the decommissioning approach.

Holtec SMR GDA PSR Part B Chapter 20 Civil Engineering [9]. The design of the generic SMR-300 from a civil engineering perspective influences the strategy selected for the decommissioning of the SMR-300.

Holtec SMR GDA PSR Part B Chapter 23 Reactor Chemistry [10], considers minimisation of source term and spread of contamination with respect to design for decommissioning.

Holtec SMR GDA PSR Part B Chapter 24 Fuel Transport and Storage [11], specifies the strategy identified for spent fuel management and storage which impacts the decommissioning approach for the generic SMR-300.

Holtec SMR GDA PSR Part B Chapter 25 Construction and Commissioning Approach [12]. The method employed for construction and commissioning of the plant will influence the strategy applied to decommissioning the plant.

There is also a crossover between this topic and the Preliminary Environmental Report (PER). Holtec SMR GDA PER Chapter 1 Radioactive Waste Management Arrangements (RWMA) [13] is applicable as the chapter discusses the strategy and management of radioactive waste arising during the decommissioning phase. Additionally, the use of Best Available Techniques (BAT) must be demonstrated in the strategy and methodology for decommissioning to ensure the prospective operator can comply with Radioactive Substances Regulation (RSR) permit conditions [14].

26.2 OVERVIEW OF DECOMMISSIONING APPROACH

This sub-chapter outlines the codes, standards, policy and guidance applicable to the decommissioning approach. It does not introduce any claims or evidence but is intended to supplement the other CAE sections by providing context to decommissioning requirements. The Requesting Party (RP) recognises that UK nuclear safety regulations are based on a non-prescriptive regime and consequently the technical codes and standards that must be used for a Nuclear Power Plant (NPP) are not directly specified in the regulatory regime.

26.2.1 US Codes, Standards and Methodologies used for the Decommissioning Approach of the SMR-300

The United States (US) Nuclear Regulatory Commission (NRC) follows a more prescriptive regulatory regime. The two main regulations relating to decommissioning are:

- Regulation 10 Code of Federal Regulations (CFR) 20.1406 [15], requires licensees to ensure that design and procedures for operation of new facilities would minimise contamination and facilitate decommissioning.
- Regulation 10 CFR 50.82 [16], relates to licence termination and how the operator has to plan for and cover decommissioning costs.

To provide methods on how to implement regulations effectively, the NRC also publish a series of guidance documents:

- NRC Nuclear Regulatory Report (NUREG) 1757 [17], provides consolidated guidance covering processes, characterisation, surveying, timeliness and financial assurance in decommissioning.
- NRC Regulatory Guide 4.21 [18], provides guidance on acceptable methods that can be used to implement regulation 10 CFR 20.1406.
- NRC NUREG 1575 [19], provides guidance on site surveying and characterisation using the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).

A key source of information for this chapter is the UK SMR-300 GDA Decommissioning Strategy Assessment [20]. This document reviews the design features outlined in the SMR-160 Design Standard for Decommissioning [21] which have been developed with consideration of international lessons learned [22] and Holtec Decommissioning International's (a subsidiary of Holtec International) extensive operational experience (OPEX) in decommissioning NPPs in the US. The Decommissioning Strategy Assessment [20] also evaluates guidance provided in the SMR-160 Design Standard [21] to ensure that decommissioning requirements are considered early in the design process. As the SMR-300 design develops, the RP will continue to incorporate learning from experience (LfE) from its ongoing US decommissioning projects.

The UK GDA Decommissioning Waste Inventory for the Generic SMR-300 Design [23] has identified the types of waste likely to arise during the decommissioning of the generic SMR-300, providing confidence that plant design can avoid the generation of orphan or problematic wastes at decommissioning.

26.2.2 UK Legislation, Policy, Strategy and Regulatory Guidance

UK legislation relevant to decommissioning is presented in Table 1 below.

Table 1: UK Legislation Relevant to Decommissioning Regulation

Title
The Energy Act 2008 [24] (This includes Funded Decommissioning Programme (FDP) requirement)
The Nuclear Installations Act 1965 [25]
Ionising Radiations Regulations 2017 [26]
Environment Act 2021 [27]
The Construction (Design and Management) Regulations 2015 [28]
The Environmental Permitting (England and Wales) Regulations 2016 [29] – Schedule 23 Radioactive substances regulations
Health and Safety at Work Act 1974 [30]

UK policy and regulatory guidance relevant to decommissioning is presented in Table 2 below.

Table 2: UK Policies and Regulatory Guides Relevant to Decommissioning

Title
UK policy framework for managing radioactive substances and nuclear decommissioning [31]
Policy for the Long-Term Management of Solid Low Level Radioactive Waste in the United Kingdom [32]
The Management of Higher Activity Radioactive Waste on Nuclear Licensed Sites [33]

The Office for Nuclear Regulation (ONR) is responsible for regulating UK nuclear sites through nuclear site licence conditions.

As part of the site-specific nuclear licensing application process, the prospective licensee must appropriately establish arrangements to support the demonstration of compliance with nuclear site licence conditions (LC) [34].

LC 35 specifically addresses decommissioning and requires the licensee to implement adequate arrangements for the decommissioning of any plant or process that may affect safety. LC 35 also requires decommissioning to be divided into defined stages, where appropriate; with progression between stages subject to ONR permission. These stages are highlighted by the UK code of practice, determining the timing and pace of decommissioning [35]. A summary of typical stages are:

- **Post-Operational Clean Out (POCO):** where the bulk of the radioactive material, such as spent fuel, operational radioactive waste and waste arising from system draining and decontamination activities are removed from the facility.
- **Dismantling:**
    - **Deferred dismantling:** making preparations through removal of residual radioactive waste and other plant items prior to putting the facility into a defined period of care and maintenance to accrue the benefits of radioactive decay prior to final dismantling; or

  - **Immediate (prompt) dismantling:** initial work is to remove residual radioactive material and waste prior to the demolition of structures; and remediation of land to meet an agreed end-state; and
- **Final site clean-up:** to a point where the site may apply to ONR to become delicensed.

The decommissioning plan, which will be developed at the site-specific stage, will detail the full scope of decommissioning activities and is discussed further by sub-chapter 26.8. This will include POCO, dismantling and demolition and final site clean-up.

Typically, the ONR will agree a set of key decommissioning milestones with the licensee, and these are included in its programme and progress with decommissioning is permissioned and monitored through meeting of these milestones.

Prior to commencing the decommissioning of shutdown nuclear reactors, there is a requirement to assess the potential environmental impact of decommissioning these facilities. Work cannot start until ONR issues its consent under The Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations (EIADR) [36].

While all LCs are applicable to the nuclear site [34], several are of particular relevance to decommissioning. LC 32, accumulation of radioactive material, and LC 33, leakage and escape of radioactive waste should be considered in the design phase to minimise risks associated with decommissioning. When the plant is operating, LC 25 requires the licensee to keep operational procedural controls and operational records as lifetime records. At the end of the plant's life, LC 26, control and supervision of operations, LC 36 organisational capability are important for the end of generation and decommissioning.

The ONR inspects compliance against licence conditions for site-specific nuclear applications. At Step 2 of GDA, the generic SMR-300 design has insufficient maturity for the ONR to make regulatory decisions based on licence conditions. Instead, the ONR has developed a list of Safety Assessment Principles (SAP) [37], to support inspectors in the nuclear permissioning process. Further, corresponding Technical Assessment Guides (TAG) were developed to provide guidance in assessment using the SAPs. The SAPs are laid out in sections corresponding to different disciplines, SAPs relevant specifically to decommissioning can be found within Table 4. The TAG relevant directly to decommissioning is NS-TAST-GD-026 [38]. NS-TAST-GD-017 [39] covering civil engineering is also relevant, as civil engineering must consider all lifecycle phases including decommissioning.

This chapter considers the nuclear safety aspects of decommissioning under ONR regulation as well as environmental safety and impacts, under the Environment Agency (EA) regulation. The EA has decommissioning guidance for assistance in regulation, "RSR guidance for sites undergoing decommissioning" [40]. There is consistency between the ONR and EA regulatory guidance, such as waste prevention and minimisation, where the EA guidance has an increased focus on environmental protection. As previously stated, the ONR utilises SAPs and TAGs for regulation. The EA utilises Radioactive Substances Management Developed Principles (RSMDP) [41]. The RSMDPs and SAPs are compared further in Table 1 of the decommissioning strategy assessment [20], to highlight where ONR and EA requirements overlap.

26.2.3 Preferred Strategy

The preferred decommissioning strategy selected for the SMR-300 is to design a facility that enables prompt decommissioning, allowing decommissioning activities to commence as soon as reasonably practicable following final shutdown and defuelling. This strategy avoids the need for a period of care and maintenance to allow for radioactive decay, thereby reducing long-term operational risks and enabling earlier hazard reduction. However, within this overarching decommissioning strategy, opportunities to defer selected high-dose decommissioning operations within the overall sequence will be assessed at the site-specific stage, to assess where decay benefits could enable the demonstration of ALARP and BAT.

This decommissioning strategy is aligned with UK policy (introduced in section 26.2.2), and international guidance (introduced in section 26.2.4), both of which identify prompt decommissioning as the preferred approach. Further justification for adopting a prompt decommissioning strategy is presented in sub-chapter 26.4.

The SMR-160 Decommissioning Schedule [42] does not consider a UK specific regulatory context but does provide an indication of the phasing and sequencing of decommissioning activities that are expected to be applicable to the generic SMR-300. Although specific timescales will be adapted to meet UK regulatory requirements, the SMR-160 schedule offers a framework of activities that follow key stages:

- **Post-shutdown activities**

  These are not distinct phases; some of these activities may run concurrently should all enabling work be complete.

  - **Defuelling and POCO** – Unloading of RPV and cooling of spent fuel in Spent Fuel Pool (SFP), POCO of process fluids, sludges, system fluids, combustible material, spent resins and ion exchange cartridges. SSCs required to process above tasks will be required to remain operational.
  - **Pool to Pad (PTP) Transfer Campaign** – Enabling activities and operations associated with transfer of spent fuel and nuclear materials from the SFP to the Independent Spent Fuel Storage Installation (ISFSI).

- **Decommissioning Work** (Once fuel free and POCO is complete)

  - **Dismantlement and abatement phase** – Structures including the Reactor Pressure Vessel (RPV) are segmented and systems and building components are dismantled.
  - **Bulk waste removal phase** – Conditionally exempt and low-level decommissioning wastes are packaged and transported off-site for disposal.
  - **Demolition phase** – Phases of demolishing buildings and structures inside and outside the Radiologically Controlled Area (RCA).
  - **Long Term Operation of ISFSI** – Prior to shipping fuel storage stage. For a UK context, this will also include the storage of Intermediate Level Waste (ILW) at Interim Storage Facility (ISF).
  - **Fuel shipping** – Transfer of spent fuel to offsite disposal facility
  - **Final Site Restoration and Licence Termination** – Final delicensing stage, including the clearance of any remaining structures.

26.2.4 International Guidance

The Decommissioning Strategy Assessment [20] provides an overview of the international guidance and OPEX relevant to NPP decommissioning that has been reviewed and considered in the development of this chapter, Table 3 below presents key examples.

Table 3: International guidance and RGP relevant to decommissioning

Body	Title
International Atomic Energy Agency (IAEA)	Decommissioning of Facilities, Generic Safety Report (GSR) Part 6 [43]
IAEA	Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities Safety Guide, SSG-47 [44]
IAEA	Release of Sites from Regulatory Control on Termination of Practices, Safety Guide WS-G-5.1 [45]
IAEA	Safety Assessment for the Decommissioning of Facilities Using Radioactive Material - WS-G-5.2 [46]
IAEA	Design Lessons Drawn from the Decommissioning of Nuclear Facilities [47]
Western European Nuclear Regulators' Association (WENRA)	Decommissioning Safety Reference Levels Report [48]
Nuclear Energy Agency (NEA)	Applying Decommissioning Experience to the Design and Operation of New Nuclear Power Plants [49]
NEA	Decommissioning Considerations for New Nuclear Power Plants [50]
NRC	Decommissioning Lessons Learned [51]

26.2.5 US vs UK Regulatory Gap Analysis

A summary of how the SAPs [37] relevant to decommissioning align to the US NRC regulations is shown in Table 4 below.

Table 4: US vs UK Regulatory Gap Analysis

Decommissioning SAPs (ONR)		US NRC Regulations	Differences Identified
DC.1 Design and operation	This principle relates to consideration of decommissioning during the planning, design construction and operation of a new facility, or modification to an existing facility to facilitate safe decommissioning.	It is a regulatory requirement within the US per 10 CFR 20.1406 [15] that the facility design will facilitate eventual decommissioning. Guidance [50] and lessons learned [51] on incorporating decommissioning within the design of NPPs have been extracted from the US NRC and international bodies such as the IAEA and the NEA.	UK design requirements are more detailed. This is covered in the Decommissioning Strategy Assessment [20], and discussed in sub-chapter 26.5.
DC.2 Decommissioning strategies	This principle relates to preparation and maintenance of a decommissioning strategy that is appropriately integrated with other relevant strategies.	Guidance on development of a decommissioning strategy within the US is provided within NUREG-1757 [17].	Strategy is regulatory regime specific. Sub-chapter 26.4.covers the strategy in a UK context.
DC.3 Timing of decommissioning	This principle relates to timing of decommissioning and justification of the continuing safety of the facility for the period prior to its decommissioning, with identification of any necessary remedial and operational measures to reduce the risk	Guidance on timing of decommissioning is provided within NUREG-1757 [17].	Timing is related to the strategy employed. Context in UK timing is addressed in sub-chapters 26.4 and 26.8.

Decommissioning SAPs (ONR)		US NRC Regulations	Differences Identified
	where this cannot be underpinned.		
DC.4 Planning for decommissioning	This principle relates to preparation of a decommissioning plan that sets out how the facility will be safely decommissioned.	Decommissioning plans are a requirement for certain nuclear sites within the US.	The UK requires a decommissioning plan before construction. This is addressed in sub-chapter 26.8.1.1.
DC.5 Passive safety	This principle relates to facilities being passively safe before entering a care and maintenance phase.	There is no requirement for passive safety in the US.	Passive safety must be demonstrated in the UK. This level of detail exceeds the required in US regulations. Consequently, this information will not be available until a future site-specific stage
DC.6 Records for decommissioning	This principle relates to identification, preparation, update, retention and ownership of documents and records required for decommissioning purposes.	The US NRC prescribes the recordkeeping responsibilities for decommissioning within 10 CFR 20 [15], 30 [52], 40 [53], 70 [54] and 72 [55].	This is related to the organisation applying for site licence and addressed in a UK context at the site-specific stage. It is discussed in sub-chapter 26.5.1.2.
DC.7 Decommissioning organisation	This principle relates to arrangements for establishing and maintaining the decommissioning organisation to ensure safe and effective decommissioning.	Organisation of decommissioning is covered within 10 CFR 30 [52], 40 [53], 70 [54] and 72 [55].	This is related to the organisation applying for site licence so will be addressed in a UK context at the site-specific stage.
DC.8 Management system	This principle relates to periodic review and modification to the management system prior to and during decommissioning.	Management of decommissioning is covered within 10 CFR 30 [52], 40 [53], 70 [54] and 72 [55].	This is related to the organisation applying for site licence and will be addressed in a UK context at the site-specific stage.
DC.9 Decommissioning safety case	This principle relates to preparation of the decommissioning safety case to demonstrate the safety of the decommissioning plan and its associated decommissioning activities, which is to be kept up to date as the work progresses.	Within 10 CFR 20.1403 [15] it is required that as part of the site licence termination there is sufficient analysis on the remaining risks of the site. Within 10 CFR 30.36 [52] it prescribes the activities required for the decommissioning plan as well as justification that the site is safe for licence termination.	UK sites require a safety case to be produced and assessed in compliance with LC14.
ECE.26 Civil Engineering: Design – Provision for decommissioning	Special consideration should be given at the design stage to the incorporation of features to facilitate radioactive waste management and the future decommissioning and dismantling of the facility.	This covers the same arrangements as DC.1. Therefore, it will be addressed in sub-chapter 26.5.	See DC.1

26.3 DECOMMISSIONING APPROACH CLAIMS, ARGUMENTS AND EVIDENCE

This chapter presents the decommissioning approach for the generic SMR-300 and therefore directly supports Claim 2.3.2.

Claim 2.3.2: The generic Holtec SMR-300 can be safely decommissioned.

Claim 2.3.2 has been further decomposed within Part B Chapter 26 to provide confidence that the relevant requirements for decommissioning will be met. The Claim has been broken down into five Level 4 claims, each of which covers relevant topics to support the Level 3 Claim. These Claims provide a logical framework for justifying that the generic SMR-300 can be safely decommissioned and are as follows.

Claim 2.3.2.1 ensures that the generic SMR-300 shall have a thorough and sufficient decommissioning strategy which enables safe and prompt decommissioning when this is desired to take place.

Claim 2.3.2.2 contributes to the design phase of the plant by ensuring that features are incorporated which facilitate decommissioning using proven current technology, thereby reducing the risks during decommissioning.

Claim 2.3.2.3 ensures that there are disposal routes and storage facilities available to accommodate the waste generated through decommissioning.

Claim 2.3.2.4 ensures that all faults and hazards relating to decommissioning are identified and assessed, and risks shown to be capable of being ALARP.

Claim 2.3.2.5 ensures that all NLR expectations for decommissioning are addressed in an appropriate manner for this stage in the design.

Table 5 below shows the breakdown of Claim 2.3.2 and identifies in which chapter of this PSR these claims are demonstrated to be met to a maturity appropriate for PSR v1.

Appendix A provides Claims, Arguments and Evidence mapping for Chapter B26, which includes any lower-level claims, arguments and evidence needed to support the Claims in the Table 5.

Table 5: Claims Covered by Chapter B26

Claim No	Claim	Chapter Section
2.3.2.1	The decommissioning strategy for the generic Holtec SMR-300 shall enable decommissioning to be safely undertaken as soon as is reasonably practicable.	26.4
2.3.2.2	The generic Holtec SMR-300 incorporates features that facilitate decommissioning and can be decommissioned using current, proven technology.	26.5
2.3.2.3	Credible disposal routes and storage facilities are available (or will be available) prior to disposal for all decommissioned wastes.	26.6
2.3.2.4	Faults and hazards of generic SMR-300 decommissioning are identified and assessed, and risks are shown to be capable of being ALARP.	26.7
2.3.2.5	The NLR expectations for decommissioning are addressed in an appropriate manner commensurate with the lifecycle phase.	26.8

26.4 DECOMMISSIONING STRATEGY

Claim 2.3.2.1: The decommissioning strategy for the generic Holtec SMR-300 shall enable decommissioning to be safely undertaken as soon as is reasonably practicable.

This sub-chapter outlines the argument and evidence approach to demonstrate claim 2.3.2.1 can be met.

The SMR-300 Decommissioning Strategy Assessment [20] was developed utilising the following documents:

- Nuclear Decommissioning Authority (NDA) Guidance: Determining the timing and pace of decommissioning - code of practice [35] – Outlines the optioneering process that can be used to assist selection of the most appropriate strategy.
- SMR-160 Design Standard for Decommissioning [21] – Identifies a high-level design features and decommissioning strategy for the SMR-160[1].
- SMR-160 Decommissioning Schedule [42] – Sets out the SMR-160 decommissioning activities and their associated timelines. It provides an indication of the sequence of activities required for the safe decommissioning of the generic SMR-300[2].

Argument 2.3.2.1-A1: Decommissioning has been considered in the generic SMR-300 design to facilitate safe decommissioning.

26.4.1 Evidence for Argument 2.3.2.1-A1:

The SMR-160 Design Standard for Decommissioning [21] identifies design features to be incorporated early in the plant design process that will facilitate decommissioning. These include enhanced accessibility to components, minimisation of activation and contamination, strategies to minimise the generation of radioactive waste and layout and shielding arrangements that ensure personnel and public dose uptake is ALARA. Strategies developed based on these design features will incorporate lessons learned available from international OPEX [22] and from the RP's ongoing decommissioning projects.

The Decommissioning Strategy Assessment [20] presents evidence of these design features being implemented in the SMR-300 design.

A significant design change from the SMR-160 to the SMR-300 is the absorption of the Radioactive Waste Building (RWB) into the Reactor Auxiliary Building (RAB). Combining radioactive waste management and auxiliary systems into a single structure reduces the number of separate buildings requiring decontamination and dismantling. It also reduces the number of structural interfaces and simplifies utility connections which may reduce civil deconstruction workloads and shorten the overall decommissioning schedule.

[1] The SMR-160 Design Standard for Decommissioning [21] was used to inform the Decommissioning Strategy Assessment [20] as it was considered suitably relevant to underpin the generic SMR-300 design based on its evolution from the SMR-160 design. The impacts of RWB absorption with in the RAB are discussed in sub-chapter 26.5.1.1.

[2] The Decommissioning Strategy Assessment has drawn on the SMR-160 documentation, recognising that detailed decommissioning activities for the generic SMR-300 will be defined during the site-specific phase. Given the design similarities, the decommissioning activities and associated timelines are expected to be broadly comparable and indicative at this stage.

The consolidation of systems into the RAB will require careful management of functional zoning and measures to prevent spread of radioactive contamination. These aspects are discussed in PSR Part B Chapter 10 Radiation Protection [6] and sub-chapter 26.5.1.1 and will be reviewed in detail at the site-specific stage.

Argument 2.3.2.1-A2: The preferred decommissioning strategy selected for the generic SMR-300 facilitates safe decommissioning.

26.4.2 Evidence for Argument 2.3.2.1-A2:

As laid out in sub-chapter 26.2.2, decommissioning may follow prompt, deferred or a combination strategy. The US NRC sets out that Licensees may choose from two decommissioning strategies: DECON[3] (prompt) and SAFSTOR[4] (deferred). US licensees may also combine the two strategies by dismantling and decontaminating some portions of the facility while leaving other parts in SAFSTOR. This hybrid approach can be used where immediate dismantling is constrained, particularly by the unavailability of disposal routes

The Decommissioning Strategy Assessment [20] for the generic SMR-300 was informed by the SMR-160 Design Standard for Decommissioning [21] which proposes a combined approach of prompt and deferred decommissioning.

It is assumed that UK disposal routes (including the Geological Disposal Facility (GDF)) will be available at the time of SMR-300 decommissioning. [REDACTED]

Based on the RP's extensive experience in nuclear decommissioning, actively managing the decommissioning of several US sites including Oyster Creek Generating Station (Boiling Water Reactor (BWR)), Pilgrim Nuclear Power Station (Boiling Water Reactor) and Indian Point Energy Center (three Pressurised Water Reactor (PWRs) units), a prompt decommissioning strategy has been selected. The adoption of a prompt decommissioning strategy for the SMR-300 is expected to deliver the key benefit of

- Alignment with the RP's strategy for ongoing US decommissioning projects. This enables LfE to be communicated to the SMR-300 Design Team, to reduce future dismantling challenges. The RP's decommissioning experience will continue to be incorporated into the SMR-300's design as it develops as LfE becomes available from ongoing US decommissioning projects.
- Early hazard reduction through rapid removal of radioactive materials and waste inventory and dismantling of activated components, reducing long-term site risk. The Decommissioning Waste Inventory [23] provides confidence that all decommissioning wastes are disposable in the UK.
- Prompt decommissioning maximises the retention of operational knowledge and workforce expertise by commencing decommissioning soon after shutdown.

[3] Under a DECON strategy soon after the nuclear facility closes, equipment, structures, and portions of the facility containing radioactive contaminants are removed or decontaminated to a level that permits release of the property and termination of the NRC licence [88].

[4] Under a SAFSTOR strategy a nuclear facility is maintained and monitored in a condition that allows the radioactivity to decay; afterwards, the plant is dismantled and the property decontaminated [88].

- PWR OPEX (introduced in Table 3) has indicated that deferral can provide only limited reduction in radioactivity as a result of long-lived nuclides (e.g., Co-60, Cs-137).
- Potential for early site reuse where areas may be repurposed for activities such as decontamination, waste storage, or other industrial functions. Prompt decommissioning also facilitates earlier site clearance and delicensing, potentially releasing land for future use decades earlier than under a deferred strategy.

[REDACTED] To address this, a GDA Commitment **C_DECO_079** has been identified to perform a comparative assessment of the potential decommissioning strategies, informed by a future quantitative decommissioning waste inventory. Sub-chapter 26.9.3 provides full details of the GDA Commitment.

Post-GDA assessments will be performed to evaluate the potential benefits of deferring specific, potentially high-dose activities within the framework of an overall prompt strategy. At the site-specific stage, the SMR-300 design will be developed and can take into account site specific factors in the production of UK decommissioning arrangements that will be future evidence for the PSR:

- Design for Decommissioning Justification Report – To provide an overview of how decommissioning has been considered in the design of the generic SMR-300. Provided demonstration that the decommissioning strategy has taken into account ALARP and BAT considerations.
- Decommissioning Waste Management Plan (DWMP) – Intended to meet the Guiding Factors set out in UK Government Guidance [56]. Provides the sequencing of decommissioning of SSC.
- FDP – Developed in accordance with the Energy Act 2008, ensuring that adequate funding is in place to support the full scope of decommissioning activities. This is discussed further in sub-chapter 26.8.

26.4.3 CAE Summary

The arguments outlined above provide confidence that the generic SMR-300 can be decommissioned safely. The Decommissioning Strategy Assessment [20] provides evidence that design features have been implemented in the generic SMR-300 design that enable safe and prompt decommissioning.

A prompt decommissioning strategy has been selected as the baseline approach for the generic SMR-300. to align with UK government policy, international OPEX and the strategic approach adopted in the RP’s ongoing decommissioning projects. Detailed assessment to justify this preferred decommissioning strategy for UK deployment has been captured as a GDA Commitment (**DECO_078**).

Within this overarching decommissioning strategy, there remains flexibility to defer selected high-dose decommissioning operations within the overall sequence. This will be assessed at the site-specific stage through the future Design for Decommissioning Justification Report, DWMP and FDP.

26.5 DESIGN FOR DECOMMISSIONING

Claim 2.3.2.2: The generic Holtec SMR-300 incorporates features that facilitate decommissioning and can be decommissioned using current, proven technology.

As stated in sub-chapter 26.2 the ONR will assess the generic SMR-300 design utilising SAPs and TAGs. SAP DC.1 states that "Facilities should be designed and operated so that they can be safely decommissioned"[5]. The SMR-300 Top Level Plant Design Requirements [57] specifies that the design life of plant and future decommissioning and dismantling activities are considered in the SMR-300 design. This expectation also broadly aligns with the EAs RSMDPs, which require design optimisation to align with BAT expectations. The Construction Design and Management (CDM) Regulation also place requirements on designers to ensure the plant is safe to decommission and deconstruct SFAIRP, which are have been . To provide evidence of how these design expectations have been developed into the generic SMR-300 design, the Decommissioning Strategy Assessment includes a section on design for decommissioning [20].

The management of design requirements on layout and features will be managed and enforced in the SMR-300 in accordance with the procedure SMR-300 Design Control [58]. The procedure sets out a design process that addresses responsibilities, required reviews, approval stages, and interfaces between disciplines, to ensure appropriate implementation of technical design requirements (e.g. Top Level Plant Design Requirements [57] and design standard specifications).

The Decommissioning Strategy Assessment details the expectations for design for decommissioning by collating information from the SMR-160 Design Standard for Decommissioning [21], SAPs [37], TAGs [38] [39], RSMDPs [41], policy [31], RGP and OPEX [59] [47] [49] [50] [51]. This identified the following design requirements and features for decommissioning:

- Reduction of the radiation source – Includes fuel design, selection of materials and reduction of surface contamination.
- Plant layouts that limit the spread of contamination
- Plant layouts that facilitate dismantling and decontamination of radioactive equipment
- Simplification of waste management systems
- Building and structure design
- Radiological data and design information management to facilitate decommissioning.

Supporting claim 2.3.2.2 are three arguments which focus on the design aspects of the generic SMR-300 which ensure that decommissioning can be safety undertaken. The first argument demonstrates that the design will facilitate safe dismantling and decontamination of SSCs. The second ensures that the generation of radioactive wastes during decommissioning will be minimised SFAIRP. The third argument demonstrates that the wastes generated during decommissioning will be safely managed. Together, these arguments and underlying

[5] ECE.26 in the civil engineering topic also has the design requirement for features that facilitate decommissioning to be incorporated.

evidence encapsulate all design for decommissioning expectations and ensure that the Level 4 claim is met.

Argument 2.3.2.2-A1: The generic SMR-300 design features and layout will ensure safe decommissioning, through facilitating dismantling and decontamination.

26.5.1 Evidence for Argument 2.3.2.2-A1

26.5.1.1 Facilitation of Dismantling and Decontamination of SSCs

The basis of designing for decommissioning is to specify SSC functions and properties in the design that aid in the safe and effective plant dismantling and decontamination in the future, taking into account the conventional and radiological risks to workers, members of the public and the environment. The SMR-300 Design Standard for Radiation Protection [60] establishes the radiation protection principles that will be demonstrated throughout the SMR-300's lifecycle. It contains design requirements particularly relevant to decommissioning that are outlined in this sub-chapter.

During Step 2, the RP changed the Design Reference Point (DRP) and GDA scope[6] to recognise the design decision to combine the separate RWB with the RAB. The Decision Paper on the Absorption of the Radioactive Waste Building Functions into the Reactor Auxiliary Building [61], discusses the technical aspects of consolidating the Liquid Radwaste Waste System (LRW) on the lowest elevation of the RAB (-38' elevation [62]). This resulted in the sub-grade relocation of LRW Effluent Holdup Tanks and Monitoring Tanks. The design decision has provided a number of plant enhancements, primarily:

- Reduced decommissioning liability as systems and components are routed to areas that allowed for their consolidation thereby minimising long piping runs.
- Operational benefit, transfer of LRW Waste Holdup Tanks to -38' elevation promotes natural (gravity) drainage from the Radioactive Drain System (RDS) and simplifies water movement from Chemical and Volume Control System (CVC) Holdup Tanks (also on -38' Elevation).

The Design Specification for the RAB [63], details holistic design requirements for the facility, many of which are aligned with decommissioning design requirements, this is discussed further in the Holtec SMR-300 Decommissioning Strategy Assessment [20].

In the Constructability section of the Plant Design Philosophy chapter of the SMR-300 Top Level Plant Design Requirements [57] report, there is an explicit statement that construction considerations must also consider the full life of a SMR-300 plant and the future decommissioning and dismantling activities. This requirement has been captured in the SMR-160 Design Standard for Decommissioning [21], which details guidance on plant layouts that limit the spread of contamination and facilitate dismantling and decontamination of radioactive equipment. This standard informed the concept design of the generic SMR-300, but will need to be revised to a SMR-300 version for detailed design development. Evidence for the application of these standards can be seen in the generic SMR-300 design with the

[6] The change was described in the Design Reference and GDA Scope Change Proposal No [87] paper.

Containment Enclosure Structure (CES) lid and steam generator being vertically aligned to facilitate Steam Generator (SGE) removal, and the RPV being accessible for lifting out of its cavity by the Polar Crane.

To fully assess aspects of sub-grade SSC will require site-specific features to be known such as the status of groundwater and its movement. SSC containing radioactive materials located in building levels below grade benefit from the additional radiation shielding of the surrounding earth. This provides a balance between ease of dismantling and decommissioning vs radiation protection and operator occupancy. Post-GDA, the Decommissioning Strategy Assessment [20] will be revised to the Design for Decommissioning Justification Report. This document will present underpinning evidence of safety and environmental optimisation in the plant layout and SSC in the detailed design of the generic SMR-300 to support the demonstration that risks have been reduced ALARP and represent BAT in decommissioning. The Design for Decommissioning Justification Report will inform the development of the DWMP in line with UK guidance [56] at the Pre-Construction Safety Report (PCSR) stage.

The following sub-chapters set out requirements and good engineering practices for consideration in design development of the generic SMR-300 design that would reduce the exposure of workers to radiation and minimise the volume of radioactive waste during decommissioning, many also have a dual benefit during the plant's operating phase. Requirements are derived from the SMR-300 Top Level Plant Design Requirements [57], SMR-300 Pipe Routing Guidelines & Best Practices [64], Equipment and Piping Layout Guidelines for Ensuring Radiation Exposures ALARA [65] and SMR-300 Design Standard for Radiation Protection [60].

26.5.1.1.1 Layout and Access

The following generic SMR-300 design requirements are applied to plant layout and support design development for ensuring access to in-service SSC for Examination, Inspection, Maintenance and Testing (EIMT) that are required during decommissioning and for access to SSC in final dismantling and waste removal operations:

- The design shall provide adequate access space for maintenance, testing, operation, and component removal or replacement necessary to achieve plant design life [57].
- provisions to equipment and components requiring routine maintenance and inspection shall consider human factors and operational experience [57].
- Equipment should be grouped based on activity inventories and process streams so that higher radiation areas may be segregated from non- or lesser-radiation areas [21].
- Valves should be located in valve galleries so that they are shielded separately from the major components containing highly concentrated radioactivity [64].
- Adequate features such as platforms or walkways, stairs, or ladders to permit prompt accessibility for inspection, maintenance, repair, replacement, and decommissioning [60].
- Providing adequate space for ease of maintenance, replacement, and decommissioning of equipment to permit tasks to be completed quickly, thereby reducing the length of exposures [60].
- Adequate space for localised containment systems, installation of temporary shielding and use of long reach tooling i.e. application of time, distance and shielding [60].

26.5.1.1.2 Equipment Properties

The following generic SMR-300 design requirements are applied to the properties of equipment:

- Surfaces, coatings, and liners will be selected to be easily decontaminated [60].
- Materials exposed to neutron radiation will be made from materials that are resistant to activation, chemical degradation, and corrosion resistant [60].

26.5.1.1.3 Pipes and Ducts

The following generic SMR-300 design requirements are applied to pipes and ducts:

- Preference should be given to welded joints over mechanical joints for greater integrity and leak resistance [64].
- Piping expected to carry significant radiation sources should be adequately shielded and strategically routed to minimise personnel exposure [64].
- Piping carrying radioactive fluids shall not be buried in concrete or underground, as it would be difficult to inspect for degradation [64].
- Valves shall preferably be placed in horizontal runs to facilitate dismantling of their top parts [64].
- Position wall penetrations with offsets to create a barrier between highly radioactive sources and areas that are regularly accessed [64].
- Minimisation of embedded pipes in the structure [60].
- Ventilation (including ducting) systems to minimise bends and contamination traps to reduce the dose burden during maintenance and decommissioning [60].
- Sloped lines to facilitate drainage [64].
- Route piping to provide adequate clearance for maintenance and equipment removal [64].
- Routing piping systems with radioactive materials away from non-radioactive piping systems [64].
- Crud traps in reactor coolant and related systems should be minimised by using seamless piping [64].

26.5.1.1.4 Drains, Tanks and Pumps

The following design requirements are applied to tanks:

- Direction of leakage via drip pans and piping to sumps and floor drains [60].
- Sumps, drains shall be provided with liquid level detectors that actuate a level alarm, as necessary [60].
- The length of the pipe runs and number of pipe fittings shall be reduced as much as possible for resin tanks [64].
- Pumps should be selected to minimise leakage and provide housing drains. The design features to collect and control leaked fluid such as sumps and drip pans piped to floor drains routed to the liquid radioactive waste system should be provided [65].
- Adequate bunding and sloping will limit spread of leaks or spills [60].

26.5.1.1.5 Electrical Systems and Equipment

Design and placement of electrical systems should enable isolation from contaminants and facilitate removal and cleaning during decommissioning. Fire detection and life safety systems must remain operational until prior to achieving cold and dark status, so segregation of their power supplies from main structural feeds is encouraged. Fire protection system requirements are further discussed in PSR Part B Chapter 12 Nuclear Site Health and Safety and Conventional Fire Safety [66].

As systems and electrical distribution may be modified from initial construction through to the end of life, care must be taken to accurately record new buried piping and electrical conduit locations. As the plant ages, abandoned systems and circuits should be well identified to facilitate future dismantlement and to support assurance they are safely isolated, and fluids drained and depressurised. This aligns with the expectations discussed in sub-chapter 26.5.1.2, which captures operational information required to facilitate future decommissioning efforts.

26.5.1.1.6 Personnel and Equipment Access

The design should ensure there is simple access to components to facilitate quick and easy dismantling which will minimise dose to workers. Suitable access to the ISF should be provided in the design as required.

26.5.1.1.7 Intact Removal of Large Components

Dismantling of large components does not require the same route used to place the component during initial construction. However, it is appropriate to consider how the component might be segmented in place or otherwise freed from its foundation especially where shutdown radiation levels may limit worker occupancy times.

26.5.1.1.8 Dismantling Aids

For equipment which cannot be removed intact, pre-placement of dismantling aids should be considered to facilitate dismantling and segmentation of components and reduce occupational exposure.

26.5.1.1.9 System Operations

Design requirements shall be made for the systems listed below which may be required during different stages of decommissioning.

- Fire Protection System – Available within areas where radioactive waste is being stored until the building has been totally decommissioned. Conventional safety aspects of the generic SMR-300 are covered in more detail in PSR Part B Chapter 12 [66].
- Radiological and Environmental Monitoring System – Required until radiological risks at the SMR-300 are assessed as sufficiently low and statutory requirements are no longer applicable (e.g. delicensing and permit surrender).
- Equipment and Floor Drainage System – Collection of potential leakages to floor drains when draining systems and conducting dismantling activities.
- LRW – Required to process remaining onsite radioactive liquid inventories, flushings used in decontamination and drain arisings. LRW design includes mobile equipment connections.
- Solid Radwaste System – Processing resins, filters and other solid arisings during decommissioning.
- Gaseous Radwaste System – Processing waste air extracted from building ventilation systems.
- Demineralised Water System – Used to transfer spent resins to Solid Radwaste System (SRW). Potential for use in supplying flushing water to contaminated systems.

- Plant Lighting and Emergency Lighting Systems – Required for normal working and in emergencies.
- RCA Heating, Ventilation and Air Conditioning (HVAC) – Requirement for air changes in the RCA and abatement of radioactive contamination in exhaust air before discharge.
- Building lifting equipment (RAB Crane, Fuel Handling Bridge Crane (FHBC), Polar Crane, Light Load Handling Machine (LLHM)) – Required for handling and moving spent fuel casks and potentially waste items and packages.
- SFP and Spent Fuel Pool Cooling System (SFC) – Required to operate until final defuelling of pool and dry storage processing of spent fuel.

The Design Specification for Reactor Auxiliary Building [63] sets the design life requirement of 80 years for the RAB and establishes that the design life of SSC in the RAB shall be such that minimum replacements are required during the design life of the plant, those requiring replacement shall include provisions to do so to the extent practical. Enduring SSC required at decommissioning shall be subject to suitable through life management to ensure reliability at the decommissioning phase. The ageing and degradation strategy for SSC will be developed post-GDA and has been captured as a GDA Commitment on PSR Part A Chapter 4 (**C_MSQA_109**) [5]. Understanding the degradation and ageing mechanisms of SSC will inform the necessary EIMT activities for scheduling and implementing during the plant's lifetime.

26.5.1.2 Information Management to Facilitate Decommissioning

As decommissioning occurs at the end of the plant's lifecycle, unexpected events, operational changes and deviations from planned activities in earlier lifecycle phases can significantly impact the decommissioning strategy and plan. The use of robust information management systems throughout design, construction, operation and decommissioning provides the capability for plant changes and history to be recorded, retained and available for future consideration. This approach enables effective risk management and informed decision making during decommissioning.

The design requirements for the information management systems will be developed post-GDA. The information management system shall be developed in line with the ONR's SAPs DC.6 and DC.8 [37] (see Table 4) and the EA's RSMDP14 - record keeping [41], to ensure an information management system that can identify, prepare, update and retain the following lifetime records for decommissioning:

- As-built design documentation.
- Site operational history.
- Abnormal events (accidents, and environmental incidents).
- Radiological surveys.
- Inventories of radioactive material.
- Environmental monitoring reports for the site, adjacent land and any monitored water pathways.
- The safety case.
- Interactions with any regulatory bodies.
- Examination, Inspection, Maintenance and Testing (EIMT) records.
- Decommissioning history records and plans.

26.5.2 Evidence for Argument 2.3.2.2-A2

Argument 2.3.2.2-A2: The generic SMR-300 design ensures that the generation of radioactive wastes at decommissioning will be minimised SFAIRP

26.5.2.1 Reduction of Radiation Source Term to Minimise Decommissioning Radioactive Waste

Design requirements in the SMR-160 Design Standard for Decommissioning [21] for minimisation of radioactive waste arisings which directly reduces radiological risks to people and the environment include:

- Fuel design that retains as much activity as possible, limiting the spread of activation and contamination.
- Material selection aimed to reduce component replacements and minimising material activation/corrosion over the lifetime of the plant, therefore minimising radioactive waste during decommissioning.
- Minimising contamination buildup and spread will reduce the amount of material contaminated that requires decontamination or disposal, minimising generation of radioactive waste produced.

26.5.2.1.1 Fuel Design

The main contamination barrier is the integrity of the nuclear fuel matrix and fuel cladding. This is maintained through rigorous management of primary system chemistry and planned operating regime. Reactor make up water will be purified to meet a water quality specification that is to be developed during design development. Thus, chemistry control for operating plants on top of a well-informed design and selection of materials is essential to minimise eventual decontamination and disposal costs.

Management of the primary system chemistry is discussed in PSR Part B Chapter 23 Reactor Chemistry [10]. The design and integrity of the reactor and its primary systems is described in PSR Part B Chapter 1 Description of the Reactor Coolant System and Engineered Safety Features [67], PSR Part B Chapter 2 Reactor Fuel and Core [68] and PSR Part B Chapter 5 Description of the Reactor Supporting Facilities [69]. The strategy for managing spent fuel is discussed in PSR Part B Chapter 24 Fuel Transport and Storage [11].

26.5.2.1.2 Material Selection

Appropriate selection of materials that are exposed to high neutron flux will minimise the radionuclide inventory at the end of the reactor's operational life. The presence of a heavy reflector in the RPV will reduce activation of materials in the Containment Structure (CS). Selection of materials influences activation behaviours.

Controlling certain elements within materials, such as cobalt within stainless steel, minimises the overall inventory of activated corrosion products (e.g. Co-58 and Co-60). Readily activated impurities within steel and concrete can be minimised through procurement specifications and strict quality assurance during manufacture. Material selection is discussed further in PSR Part B Chapter 10 Radiological Protection [6] and PSR Part B Chapter 23 Reactor Chemistry [10].

26.5.2.1.3 Reduction of Surface Contamination

SMR-160 Design Standard for Decommissioning [21] establishes the following requirements to reduce radiation sources that would minimise the decommissioning waste liability of the generic SMR-300:

- Surfaces likely to be contaminated should be designed to be easily decontaminated.
- Surfaces should be assured to be smooth to minimise potential deposition and hold-up.
- Surfaces should be pre-treated to reduce contamination.
- Provisions should be made for containment of liquid spills to reduce spread of contamination.
- Ceilings, floors, and walls should be sealed to prevent the intrusion of radioactive materials.
- reactor coolant chemistry and water purification to maintain a suitable reactor water quality reduces the transportation and depositing of activated corrosion products (see PSR Part B Chapter 23 Reactor Chemistry [10]).

26.5.2.2 Plant Layout to Minimise the Spread of Contamination

There are zoning design requirements for the plant to segregate contaminated areas from uncontaminated areas. Zoning of radiological areas and contamination control is further discussed in PSR Part B Chapter 10 Radiological Protection [6] and the SMR-300 Design Standard for Radiation Protection [60]. At the site-specific stage, human factors assessments would support the determination of an optimum layout for lifecycle phases, including decommissioning.

26.5.2.3 Design that Facilitates Decommissioning

Decommissioning has been a consideration for a number of design changes. For example, the decision was made to absorb the RWB into the RAB, as documented in the Decision Paper on the Absorption of the Radioactive Waste Building Functions into the Auxiliary Building [61]. This decision was informed by a range of design and lifecycle considerations, including the impact on decommissioning. In particular, the removal of the separate RWB results in a net reduction in building volume and structural footprint, thus decreasing both radioactive and non-radioactive waste arisings during dismantling. This design choice contributes directly to waste volume reduction.

26.5.3 Evidence for Argument 2.3.2.2-A3

Argument 2.3.2.2-A3: The generic SMR-300 plant layout and design facilitates waste processing that ensures risks will be reduced ALARP

A major part of design for decommissioning is ensuring that decommissioning wastes can be managed in a safe manner. As waste management poses conventional and radiological risks the plant layout is designed to ensure these risks can be kept ALARP.

The principal generic SMR-300 building associated with managing radioactive waste generated is the RAB. The Design Specification for Reactor Auxiliary Building for SMR-300 [63] includes a list of design requirements relevant to waste management aligned with US regulatory guides (which refer to American National Standards Institute (ANSI) standards and Electric Power Research Institute (EPRI) Utility Requirement Document (URD), including minimisation of accumulation of radioactive waste in radioactive waste SSCs and provision of capability to control, collect, process, handle, store, segregate and dispose of radioactive waste. The design decision to combined the RWB into the RAB [61] (discussed in 26.4.1), has the following impacts from a decommissioning perspective:

- Simplification of RWM systems and fewer systems to be decommissioned (e.g. elimination of RWB HVAC).
- Reduction in building interfaces of piping and other services.
- Overall reduced building footprint, though an increase in the size of the RAB.
- Relocation (from -21' to -42' Elevation) of LRW Waste Tanks and Monitoring Tanks.

26.5.3.1 Simplification of Waste Management

RWM is discussed in PSR Part B Chapter 13 [7] and PER Chapter 1 [13], key aspects relating to decommissioning are summarised in the following sub-chapters. Through simplification of the waste management systems, the volume of material requiring disposal can be minimised.

26.5.3.1.1 Waste Process Design Features

The RWMA minimise the volume of secondary wastes arising from the plant, further information on the SSCs providing radioactive waste management functions can be found in PSR Part B Chapter 13 [7]. Furthermore, through development of the generic SMR-300 Integrated Waste Strategy (IWS) [70], and engaging with Nuclear Waste Services (NWS) on the disposability assessment (discussed further within sub-chapters 26.6.2.1 and 26.6.1.2, respectively), the waste management processes have been streamlined and simplified, reducing the volume of decommissioning waste requiring disposal.

The design of LRW [71] and Gaseous Radwaste System (GRW) [72] systems incorporate flexible connections making it a potentially suitable option for installing mobile equipment and rigs to manage decommissioning gaseous and liquid wastes. The development of a quantitative waste inventory and decommissioning plan will inform the development of what SSC requirements are needed.

26.5.3.1.2 Avoiding Mixed Waste Creation

Mixed wastes such as lubricating oils contaminated with radioactive materials are very problematic for disposal. Many disposal sites are not equipped to handle mixed waste nor licensed for their disposal. Substantial costs are generally incurred with handling and disposal of mixed waste, thus avoiding their creation is a design requirement. Characterisation, Sorting and segregation of generic SMR-300 waste is covered in detail in PSR Part B Chapter 13.

26.5.4 CAE Summary

The design for decommissioning set out the foundation for the generic SMR-300 to be decommissioned safely using current technology. As decommissioning is a cross-cutting topic that interfaces with most other disciplines, design development in areas that interface with decommissioning is expected in preparation for the site-specific stage. Due to this there are areas in the design that are more mature than others. Meaning the evidence shown at this stage is a mix of completed design decisions and future areas expected to mature as the design progresses to a site-specific stage.

At this stage in the design, there is evidence available that provides confidence in meeting Claim 2.3.2.2. This has been assessed in the Decommissioning Strategy Assessment [20].

The assessment identifies both the current design features that support the claim and the design features to be developed at the site-specific stage that will provide further evidence.

GDA Commitment **C_RMWA_078** raised in PER Chapter 1 [13] impacts upon decommissioning approach. It identifies post-GDA work to develop the design of facilities for ILW storage and Low Level Waste (LLW) handling. As radioactive waste management SSCs used during operation are required to remain functional for decommissioning, it will propose consequential design considerations.

26.6 DISPOSAL ROUTES AND STORAGE

Claim 2.3.2.3: Credible disposal routes and storage facilities are (or will be available) prior to disposal for all decommissioning wastes.

The strategy for management of radioactive waste for the power plant informs the decommissioning strategy through adherence to the waste management hierarchy, application of BAT and the IWS. This sub-chapter demonstrates the interface between RWM and decommissioning and how that interface will be managed to achieve Claim 2.3.2.3.

Argument 2.3.2.3-A1: The design of the generic SMR-300 will not generate any orphan or problematic wastes during decommissioning.

26.6.1 Evidence for Argument 2.3.2.3-A1

26.6.1.1 Qualitative Radioactive Decommissioning Waste Inventory

At step 2 a Decommissioning Waste Inventory [23] was produced for the generic SMR-300 outlining the types of waste expected to arise during the decommissioning phase. A summary of this inventory is provided in Table 7 Appendix B. The inventory is qualitative at this stage and has been informed by OPEX from other PWRs. This represents a best estimate of characterisation of solid decommissioning wastes that is commensurate with the generic SMR-300's current level of design maturity.

The assessment concludes that the generic SMR-300 is not expected to generate problematic or orphan wastes and that the decommissioning waste profile is comparable to other PWRs.

The non-foreclosure of options at this stage for potential decontamination processes provides confidence that no orphan or problematic wastes will be produced. OPEX from international implementation of chemical decontamination will be reviewed and considered when defining the decontamination regime.

It is recognised that detailed decommissioning activities and associated waste arisings will be defined through the development of a DWMP at the site-specific stage. This will enable the production of quantitative inventories for both radioactive and conventional wastes.

26.6.1.2 NWS Expert View

In the UK, a disposability assessment is required for nuclear new build projects to demonstrate that conditioned radioactive waste packages will be suitable and could be accepted in final disposal facilities in the UK [73] [74]. At GDA Step 2, it is not appropriate to apply a standard Disposability Assessment due to the early stage in design of the proposals. Instead, the RP should obtain an Expert View from NWS to highlight any inherent, unmitigated risks to disposability arising from a high-level review of the Higher Activity Waste (HAW) streams and future plans for their management [75]. The NWS assessment also includes consideration of any risks associated with wastes that may sit around or below the boundary for HAW, that is, those that may be classified as LLW.

In compliance with above requirements, the RP issued an Expert View Submission [76] to NWS to seek their response in the form of an Expert View [77] on SMR-300 spent fuel and waste during the Step 2.

NWS have noted that in general, the nature of the wastes and spent fuel from the generic SMR-300 are not significantly different to those which would arise from existing and planned

PWRs with which they are already familiar, giving confidence that a disposability case could be made. Based on engagements with the NWS through the Expert View process, problematic or orphan wastes are not expected to be generated from the decommissioning of the generic SMR-300. The qualitative decommissioning inventory indicates decommissioning wastes will also be similar to that of known PWRs, it is expected that decommissioning wastes are unlikely to pose any disposability issues.

[REDACTED]

The RP acknowledges that the timing of disposals to the GDF for nuclear new build wastes is subject to UK Government policy. At the site-specific stage, the prospective developer or licensee will engage with NWS and Government to confirm both the decommissioning strategy and the timing of disposals to the GDF.

In the event that decommissioning waste arisings are unsuitable for prompt disposal to the GDF, strategies are:

- Packaged in Non-fuel Waste Canisters (NFWC) for a period of interim storage in the Underground Maximum Safety (UMAX) system (for high dose rate components) [78]; or
- Packaged in suitable NWS containers for storage in the ISF.

Packaging and storage decision will be supported by a detailed radionuclide and physical/chemical inventory for the decommissioning wastes.

To demonstrate mitigation of risks, the RP's Response to NWS Expert View [79] was prepared and will form the basis of future engagement to agree the approaches to the closure out of these risks. It is noted that optioneering of decommissioning waste package types falls outside the scope of GDA and will be undertaken at the site-specific stage.

Argument 2.3.2.3-A2: All wastes generated through decommissioning of the generic SMR-300 will be stored and disposed of through conventional routes.

26.6.2 Evidence for Argument 2.3.2.3-A2

26.6.2.1 Integrated Waste Strategy

The IWS [70] outlines the strategy for the management of waste arisings from the generic SMR-300 over the NPP's operation and decommissioning. The waste management hierarchy establishes the priority order for the management of radioactive waste arisings based upon the environmental impacts of the waste.

Figure 8 of the IWS [70] presents an overview of the decommissioning waste baseline management strategy based on the selected prompt decommissioning strategy. This baseline strategy utilises the waste hierarchy as the foundation to establishes the priority order for the management of radioactive waste arisings based upon the environmental impacts of the waste. By planning decommissioning activities strategically to control and minimise resource use, this minimises the overall inventory of radioactive decommissioning waste arising from the power plant.

During the reactor decommissioning stage, various types of radioactive waste will be unavoidably generated, especially in the process of decontamination and dismantling of SSCs. Solid waste comprises the largest proportion of decommissioning waste at the end of the plant operating phase, the main waste streams are presented in Table 7 Appendix B.

Decommissioning waste will be characterised and segregated at source to determine the most appropriate waste management route. Drawing on PWR OPEX, the majority of waste is expected to be non-radioactive, with only a small fraction (around 3%) classified as radioactive waste. Effective segregation will therefore significantly reduce the volume of radioactive waste requiring treatment and disposal. Liquid and gaseous waste will be managed by mobile facilities or existing waste management systems, such as LRW, GRW or HVAC systems. Solid waste will be classified in terms of Very Low Level Waste (VLLW), LLW and ILW, and will be managed by existing solid waste or mobile facilities with the same approach of operational waste management. The RWM SSCs are described further in PSR Part B Chapter 13 [7].

Packaged VLLW and LLW will be sent to off-site facilities for treatment or final disposal in line with waste hierarchy. Packaged ILW will be stored on site if the GDF is not available in the decommissioning stage of generic SMR-300.

The IWS [70] is a living document that will be iteratively updated throughout the lifecycle of the SMR-300. At the site-specific stage it will be revised to reflect the evolving waste management strategy including updates following the development of a quantitative decommissioning inventory.

26.6.3 CAE Summary

A qualitative Decommissioning Waste Inventory [23] has been developed during Step 2, informed by OPEX from other PWRs. This provides initial confidence that the generic SMR-300 design will not produce any orphan or problematic waste streams and that waste characteristics are consistent with the UK's existing PWR.

In addition, an Expert View [77] was obtained from NWS during GDA Step 2. The response confirms that a disposability case could be made. One disposability risk for decommissioning waste relating to potential challenges to GDF acceptance from prompt decommissioning schedules. This will be mitigated by the consideration of provisions for interim storage in the UMAX system, down-selection of waste packages and a comparative assessment of the prompt decommissioning strategy against alternatives as part of **C_DECO_079**.

The IWS defines a baseline strategy for the management of decommissioning waste that is aligned with the waste hierarchy. Appropriate measure (early characterisation, sort and segregation) to ensure waste is routed through appropriate conventional disposal facilities.

26.7 DECOMMISSIONING FAULTS AND HAZARDS

Claim 2.3.2.4: Faults and hazards of generic SMR-300 decommissioning are identified and assessed, and risks are shown to be capable of being ALARP.

The intent of this sub-chapter is to provide confidence that this claim will be fully demonstrated in future safety report submissions, recognising that hazard identification for decommissioning hazards will be undertaken prior to decommissioning following sufficient development of the decommissioning operations. This sub-chapter presents arguments regarding:

- Hazard identification process.
- Management of hazards with regards to design for decommissioning.

Argument 2.3.2.4-A1: Faults and hazards during decommissioning will be fully identified and assessed within the operational safety case.

26.7.1 Evidence for Argument 2.3.2.4-A1

26.7.1.1 Decommissioning Fault and Hazard Identification

Regulatory expectations are that safety cases are kept up to date during each stage of a facility's lifecycle [38], prior to the commencement of decommissioning, a post-defuelling safety case is required. This may be performed by either by re-writing the safety case for decommissioning operations or updating the safety case to remove fuel related faults. Historically, licensees have opted for not re-writing the entire safety case for decommissioning but instead re-baselining the existing safety case with amendments being made as decommissioning projects are proposed. As such, the operational safety case should give a preliminary indication as to the hazards expected during decommissioning.

At a Step 2-GDA, the design of the generic SMR-300 is not yet at a stage of maturity where a complete Hazard and Operability Study (HAZOP) or Fault Schedule for decommissioning activities and systems can be performed.

However, a HAZOP 1 has been undertaken for operational RWM systems, and a list of faults has been produced. Many of these operational hazards (such as loss of containment, dropped loads, and radiological exposure risks) are expected to remain applicable or endure into the decommissioning phase, particularly where the same systems or SSCs are repurposed for waste handling during decommissioning.

Following further design development and progression toward a site-specific application, a comprehensive Fault Schedule will be developed covering both RWM and decommissioning operations. This approach provides confidence that all relevant decommissioning hazards will be systematically captured and assessed within the operational safety case and post-operational safety case, as required by UK regulatory frameworks.

Throughout the operational life of the generic SMR-300, operational experience will be gained through EIMT and outage activities, which will help to inform the identification of potential hazards relevant to the decommissioning phase. These activities will provide an insight into the occurrence, progression and severity of ageing and degradation mechanisms (e.g., corrosion, material fatigue). This supports a more informed assessment risks at end of operation. Further details on the EIMT strategy is covered in PSR Part B Chapter 9 Conduct of Operations [80].

26.7.1.2 Decommissioning Risk Reduction

The design features within Section 26.5 which are implemented, or specified as a requirement to be implemented in the generic SMR-300 design, facilitate the reduction of risks to ALARP (primarily those concerning personnel dose uptake associated with decommissioning).

26.7.2 CAE Summary

Claim 2.3.2.4 has been demonstrated to the extent possible for the maturity of the design at GDA Step 2. Decommissioning hazard identification and subsequent assessment will be required following defuelling and throughout the various decommissioning phases; however, decommissioning specific hazards will not be identified prior to submission of Revision 1 of the PSR.

The work that will be undertaken to incorporate decommissioning considerations into the design as early as possible will help identify the faults and hazards associated with decommissioning and input into the decommissioning strategy. Nevertheless, the operational safety case of the generic SMR-300 should provide preliminary indication of the potential decommissioning faults and hazards that can be used as a baseline for the decommissioning safety case when required.

Current OPEX and RGP has been used during design development as highlighted in the Decommissioning Strategy Assessment [20]. Additionally, it is expected that OPEX and lessons learned from decommissioning the existing fleet of PWRs will become available to support decommissioning of the generic SMR-300, supporting further reduction of risks to ALARP.

26.8 NUCLEAR LIABILITIES REGULATIONS COMPLIANCE

Claim 2.3.2.5: The NLR expectations for decommissioning are addressed in an appropriate manner commensurate with the lifecycle phase.

This sub-chapter outlines the argument and evidence approach used to demonstrate that Claim 2.3.2.5 can be met, in accordance with the NLR requirements as set in the ONR's GDA Technical Guidance [81]. The arguments supporting this claim focus on the development of a decommissioning plan. Several NLR requirements (such as those relating to the minimisation of waste generation, accumulation and the disposability of waste) have already been addressed under earlier claims. This claim is intended to capture the remaining NLR requirements not previously covered in other sections of the chapter, thereby ensuring a complete and coherent demonstration of compliance.

26.8.1 Evidence for Argument 2.3.2.5-A1

Argument 2.3.2.5-A1: A decommissioning plan is created and updated prior to site operation.

26.8.1.1 Decommissioning Plan

The DWMP will define the proposed decommissioning activities, associated timelines, and the means by which these activities will be delivered. As part of the Energy Act 2008 [56], a DWMP will be produced as part of the FDP. The plan will be iteratively updated throughout the lifecycle of the facility. Its initial version will build upon the current Decommissioning Strategy Assessment [20], incorporating information generated through further design development and the delivery of future project-specific documentation.

The DWMP will be developed in accordance with relevant regulatory requirements and expectations highlighted in ONR's GDA Technical Guidance [81]. Specifically:

- SAP DC.4 which relates to preparation of a decommissioning plan that sets out how the facility will be safely decommissioned.
- SAP DC.9 which requires the preparation of the decommissioning safety case to demonstrate the safety of the decommissioning activities and mandates that the safety case to kept up to date as decommissioning progresses.
- The DWMP must define planned decommissioning activities, which will inform the decommissioning strategies available for the licensee to use at the time of shutdown.
- The planned activities, such as the selected decontamination regime, will determine the nature and volume of wastes produced and therefore influence the storage and disposal routes.
- The DWMP will interface with the information management plan, ensuring that decommissioning history, including objectives and progress towards the site end-state, is appropriately tracked.

The DWMP will, where possible identify the reuse of existing facilities that can be repurposed to facilitate decommissioning activities. This avoids creating new buildings and SSC which ultimately would lead to more waste produced at decommissioning.

26.8.1.2 Decontamination Regime

Design features shall be integrated to allow for ease of decontamination. The goal of decontamination is to remove entirely or reduce to the maximum extent practicable, the radioactive contamination within or on the surface of materials and SSCs. This will both reduce dose rates associated with decommissioning activities and reduce the classification of radioactive waste, potentially down to out-of-scope levels.

For development of site specific application, a full BAT and ALARP assessment for the decontamination regime will take place, including a review of international OPEX, to identify the preferred decontamination strategy. Flexibility in system design should allow for the potential use external decontamination systems to allow further decontamination of waste arisings should it be determined as being beneficial. The decontamination regime will form part of the DWMP.

26.8.2 Evidence for Argument 2.3.2.5-A2

Argument 2.3.2.5-A2: Liability management plans are maintained for decommissioning arisings.

Under the Energy Act [24], a FDP requirement was introduced, along with associated guidance to meet the requirement [56]. This requirement ensures operators of new NPPs will allocate funds to cover the full cost of decommissioning and safely managing decommissioning wastes, so there is no reliance on public funds. The FDP is also discussed in the decommissioning strategy assessment [20].

During the PCSR stage, a FDP will be prepared for approval by the Secretary of State, to enable nuclear-related construction to begin and for compliance with the Energy Act thereafter. This will involve preparation of a DWMP – setting out plans for spent fuel management, radioactive waste management and decommissioning – and a Funding Arrangements Plan (FArP). Alongside the approval of an operator's FDP, the UK Government will expect to enter into a contract with the operator regarding the terms on which the UK Government will take title to and liability for the operator's spent fuel and ILW. Associated contracts and agreements also typically need to be prepared to support the FDP. During the generating phase of the SMR-300, annual and quinquennial review updates will be made to the FDP, in accordance with the Energy Act [56].

26.8.3 CAE Summary

The arguments under claim 2.3.2.5 does not have direct evidence at this stage in the GDA. This is commensurate with this phase in the design due to:

- The decommissioning plan is a live document that will be created initially at the site-specific stage to support the FDP development. The decommissioning plan will then be regularly reviewed and updated if required throughout the reactor construction, operation and decommissioning phases. At this stage the decommissioning strategy and design for decommissioning lay out the foundations to create a decommissioning plan.
- The FDP is a legal requirement under the energy act. However, the main components of this rely on information not available until the site-specific stage such as site selection and operator input.

At this stage the Sub-chapter 26.5, 26.6 and 26.7 highlight how liabilities associated with decommissioning are minimised, such as minimising generation of waste. Further, sub-chapter 26.4 on decommissioning strategy highlights that all decommissioning strategies are available and safe, further showing how future liability management risks are minimised.

26.9 CHAPTER SUMMARY AND CONTRIBUTION TO ALARP

This sub-chapter provides an overall summary and conclusion of the decommissioning approach chapter and how this chapter contributes to the overall demonstration of ALARP for the generic SMR-300. PSR Chapter A5 Summary of ALARP and SSEC [82] sets out the overall approach for demonstration of ALARP and how contributions from individual chapters are consolidated.

This sub-chapter therefore consists of the following elements:

- Technical Summary
- ALARP Summary
  - Demonstration of RGP
  - Evaluation of Risk and Demonstration Against Risk Targets (where applicable)
- GDA Commitments
- Conclusion

A review against these elements is presented below under the corresponding headings.

26.9.1 Technical Summary

PSR Part B Chapter B26 aims to demonstrate the following level 3 claim to a maturity appropriate for a PSR:

Claim 2.3.2: The generic Holtec SMR-300 can be safely decommissioned.

Sub-chapter 26.4 outlines how decommissioning has been considered in the design of the generic SMR-300 and provides justification for a proposed prompt decommissioning strategy. It outlines how the strategy aligns with international good practice and UK Government policy, enabling decommissioning to be undertaken safely as soon as reasonably practicable. The proposed strategy does not foreclose the option of deferring particular decommissioning activities. Assessment to substantiate this preferred approach is a GDA Commitment (**C_DECO_079**) and will be supported by Future Evidence such as the Design for Decommissioning Justification Report and DWMP.

Sub-chapter 26.5 highlights how the generic SMR-300 design contributes to safety during plant decommissioning. This will be achieved by minimising contamination, waste generation and having a design in place that facilitates future decommissioning activities. This contributes to ensuring conventional and radiological risks are ALARP.

Sub-chapter 26.6 presents the current evidence that the generic SMR-300 is designed to produce no orphan or problematic wastes through the development of a quantitative Decommissioning Waste Inventory [23] and through engagement with NWS. The high-level decommissioning waste strategy outlined in the IWS [70] provides confidence that all decommissioning wastes will be compatible with existing UK waste management infrastructure and disposal routes. The use of currently available waste routes minimises risk associated with developing new disposal routes for waste streams.

Sub-chapter 26.7 discusses how the faults and hazards in RWM systems have been identified and the future approach to managing faults and risks for decommissioning post-GDA.

Sub-chapter 26.8 outlines how the generic SMR-300 can meet NLR requirements by providing preliminary documentation that will form the basis for a FDP and DWMP, both of which will be developed at the site-specific stage. The FDP will establish that sufficient funding will be available at the time of decommissioning, enabling the strategy to be completed safely.

26.9.2 ALARP Summary

26.9.2.1 Demonstration of RGP

The generic SMR-300 design aligns with relevant recognised good practices in the US and incorporates design features that support safe and timely decommissioning. This has been demonstrated in this chapter and in the Decommissioning Strategy Assessment [20], these design features are informed by international OPEX and the RP's previous and ongoing LfE in decommissioning. The strategy provides evidence of how these features that facilitate decommissioning have been implemented in the design of generic SMR-300 SSCs.

A Safety Principles Compliance Review [83] identifies areas where, in the RP's judgement, there is broad alignment between the generic SMR-300 design and the ONR SAPs. This includes a review of US and UK regulatory frameworks to find major differences and common basis for regulation, and a comparison against the basis for the SMR-300 safety and design requirements.

The decommissioning documentation produced by the RP has been produced in line with US regulatory requirements, including 10 CFR 50 [84], as well as Regulatory Guide 1.202 [85], which addresses decommissioning cost estimation for NPPs. A gap analysis undertaken (see sub-chapter 26.2.5) has demonstrated that regulatory requirements and decommissioning principles incorporated in the design, broadly align with ONR TAG for decommissioning [38]. Where differences were identified, corresponding sections of this chapter outline how these are addressed or will be taken into account post-GDA.

It is recognised that further development will be required beyond GDA to fully assess ILW and LLW management arising from decommissioning. The current Decommissioning Waste Inventory [23] is qualitative, in part due to the differences in waste classification systems between the US and UK. The inventory provides a level of detail commensurate with the generic SMR-300's design maturity at a 2-Step GDA. However, adherence to the waste management hierarchy, development of the IWS [70] and engagement with NWS on the disposability assessment, shall ensure that decommissioning wastes have a suitable disposal route within the UK.

As highlighted in sub-chapter 26.6, the Decommissioning Waste Inventory [23] and the Decommissioning Strategy Assessment [20] incorporate policy, RGP and OPEX. This provides confidence that the generic SMR-300 can align with RGP to keep risks ALARP.

26.9.2.2 Evaluation of Risk and Demonstration Against Risk Targets

The numerical targets against which the demonstration of ALARP is considered can be found in PSR Part A Chapter 2 General Design Aspects and Site Characteristics [3].

The decommissioning approach will contribute to the demonstration of ALARP by comparison against the risk targets in two ways:

- By enabling safe decommissioning in normal operations and thereby contributing to achieving Targets 1 to 3; and
- by considering accident scenarios that could occur during decommissioning, achieving Targets 4 to 9.

Risks above the Basic Safety Level (BSL) are not acceptable. Risks below the BSL require a demonstration of ALARP proportionate to the level of risk. The Basic Safety Objective (BSO) represents the modern safety standards and expectations against which the UK SMR 300 will be assessed.

As hazard identification for the decommissioning of the generic SMR-300 will not be conducted during the GDA timescales, therefore, it is not possible to quantitatively demonstrate the risks associated with decommissioning or how those contribute to the risk targets discussed above. This activity is required to support production of the PCSR and future safety submissions.

Nevertheless, preliminary evidence has been provided that demonstrates that Holtec are proceeding with a design which will support reduction of risks to ALARP through incorporation of decommissioning design considerations that align with UK RGP. This is shown through the development of the qualitative decommissioning inventory and the decommissioning strategy assessment.

The evaluation of the normal operations and accident risks against Targets 1 to 9 is summarised in PSR Part A Chapter 5 [82].

26.9.3 GDA Commitments

GDA Commitments across the SSEC have been formally captured in accordance with the Commitments, Assumptions, Requirements [4] process. Details on this process are also provided in PSR Part A Chapter 4 [9]. One new GDA Commitment has been identified in this chapter:

C_DECO_079: Additional UK-specific assessment is required to support the proposed prompt decommissioning strategy. A Commitment is raised to perform a comparative assessment of the preferred prompt strategy against a deferred strategy. This will integrate considerations from a quantitative decommissioning inventory and identify enduring SSCs and plant equipment required for decommissioning that will require maintenance beyond the plant's operational period.

Target of resolution: Issue of Pre-Construction SSEC.

26.9.4 Conclusion

This chapter summarises the overall input of design for decommissioning to the generic SMR-300 and how the approach would affect safety and environmental performance of decommissioning at the end of operation. It identifies the claims, arguments and currently available evidence that will form the basis of the safety case for the decommissioning topic area throughout the lifecycle of the SMR-300, which can be updated as the design matures.

The Decommissioning Strategy Assessment [20], supported by the qualitative Decommissioning Waste Inventory [23], NWS Expert View [77] and IWS [70], set the foundation for future evidence to be developed for the SMR-300's decommissioning approach. Arrangement at GDA show how the design and strategy of the decommissioning topic is aligned with UK expectations and has a high degree of confidence that risks will be reduced ALARP.

Design development items of Future Evidence for a prospective site-specific stage have been identified and mentioned in this chapter. The work identified will help further substantiate the evidence required for the safety case when it comes to site specific application.

Undertaking the work laid out in GDA Commitment **C_DECO_79** and associated GDA Commitments provides a high level of confidence that future development of the SMR-300 design will further reduce risks to ALARP and demonstrate compliance with all applicable NLR requirements.

Finally, PSR Part A Chapter 5 [82] concludes that it can be demonstrated that the generic SMR-300 reduces risks to ALARP and that the Fundamental Purpose of the SSEC has been fulfilled.

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26.11 LIST OF APPENDICES

Appendix A PSR Part B Chapter 26 CAE Route Map

A summary of the SSEC CAE route map for the decommissioning approach is presented in Table 6.

Table 6: PSR Part B Chapter 26 CAE Route Map

[REDACTED]

Appendix B Qualitative Decommissioning Waste Inventory

The main results table from the Decommissioning Waste Inventory [23] are presented in Table 7 below.

Table 7: Holtec Generic SMR-300 Design Qualitative Decommissioning Waste Inventory

[REDACTED]