REGULATORY OBSERVATION Resolution Plan	
RO Unique No.:	RO-BWRX300-003
RO- Title:	Design for Decommissioning
Technical Area(s)	Nuclear Liabilities Regulation
Revision:	Issue 2
Overall RO Closure Date (Planned):	Site specific PCSR
Linked RQ(s)	RQ-01980
Linked RO(s)	N/A
Related Technical Area(s)	N/A
Other Related Documentation	N/A

Scope of Work

Background

The GE-Hitachi Nuclear Energy, Americas, LLC (GEH) BWRX-300 Small Modular Reactor (SMR) is currently undergoing Step 2 of the UK Generic Design Assessment (GDA).

Regulatory Observation (RO) RO-BWRX300-003 was raised by the ONR on the basis of Regulatory Query (RQ)-01980, to which the Requesting Party (RP) responded on 13 June 2025 [1]. The RP has updated the Generic Design Assessment (GDA) submissions for Revision (Rev) B as a result of regulatory engagement during GDA Step 2, including incorporation of information provided in the response to RQ-01980.

Considering the submissions received from the RP and the outcomes of discussions during GDA Step 2, the Office for Nuclear Regulation (ONR) does not consider there to have been sufficient evidence presented that the BWRX-300 concept design has been developed cognisant of an overall decommissioning strategy.

This RO Resolution Plan describes the additional future work required to address any residual gaps relating to RQ-01980 that are not fully resolved through clarifications provided in the Rev B submissions or relevant Forward Actions already recorded in the project Forward Action Plan (FAP). It will describe how the two actions outlined by ONR in RO-BWRX300-003 will be addressed post GDA Step 2 by either GEH or a future development company, with the intention of providing the necessary details such that ONR assessment of the resolution plan will close out this RO.

Deliverable Description
RO-BWRX-300-003 – Action 1 – Provisional disassembly plan In response to this RO Action, the RP should: Capture, in an appropriate report, the activities and assessments which will result in a credible demonstration that nuclear safety risks arising from inadequate disassembly planning at the design stage have been mitigated and in a proportionate and graded way, any conventional safety, security and environmental protection issues. *Regulatory Expectations* In response to this action, we are seeking assurance that the RP understands how the reactor will be disassembled and that the design features that will be necessary to enable the disassembly strategy are identified and included in the design, such that risks to future operators are reduced as low as reasonably practicable. The report produced for this action can then be referenced from a future UK BWRX-300 safety case submission. **Resolution Plan for RO-BWRX300-003.A1** In response to Action 1 (A1), the RP acknowledges that at this point in design development, the formal disassembly plan has yet to be finalized for distribution. A disassembly plan is planned to be contained within the general reactor decommissioning plan, which would act as a scaffold for future country/site-specific decommissioning plans required as part of license applications. An international decommissioning plan is currently being worked on by GEH, with anticipated completion in late 2025. The decommissioning plan scope covers: • A disassembly sequence and general descriptions of associated activities, including aspects of the preparations for dismantling and site restoration • An overview of the anticipated decommissioning strategy • A description of the anticipated monitoring and survey activities conducted as part of end-of-life arrangements • Aspects of radiological safety and minimising of radiation dose to workers and members of the public • Anticipated hazards encountered during the decommissioning process • A description of the general waste management strategy • The arrangements in place for periodic review and updates. • A description of the records required to be maintained in order to undergo decommissioning An example of a preliminary decommissioning plan for the BWRX-300 is the publicly available document ‘O05-1801-005 Darlington New Nuclear Project Preliminary Decommissioning Plan’ [2], as supplied to Ontario Power Generation as part of the

preparation of its license to construct application. Examples of the disassembly steps documented therein are:

- Modification of existing storage facilities, or construction of new ones, to facilitate dismantling activities (e.g. cutting station, laydown areas for equipment removal, modification of reactor building to allow access of large equipment etc.)
- Modification of containment to support segmentation, design and construct shielding and contamination control envelopes to support deconstruction efforts
- Transfer of steam separator and dryer systems to the equipment pool for remote segmentation by weight and activity
- Separation of control blades from control blade drives for transport to fuel pool for packaging
- Core shroud, chimney, and guide tubes disassembled and segmented prior to packaging, followed by remaining reactor internals (e.g. fuel supports and core plate assembly)
- Clean-up of spent fuel pool (including removal of storage racks)
- Reactor cavity drained and spent fuel transfer gate sealed permanently
- Segmentation of reactor vessel – shielded platform installed, cutting in-air using remote equipment (water level maintained just below cuts to minimise worker dose rates), transfer of sections to equipment pool for packaging and interim storage, removal of vessel support skirt, and segmentation and removal of lower reactor head and vessel supporting structure
- Decontamination of components and piping such to minimise worker dose, followed by removal and disposal of those not required to support dismantling activities
- Removal, followed by segmentation, of isolation condensers
- Removal of those systems/components not required for the removal of the Reactor Pressure Vessel (RPV) other decommissioning activities. or worker safety
- Removal of the equipment, reactor cavity, isolation condenser and fuel pools' steel liners
- Surveying those parts of containment structure which have undergone decontamination
- Removal of any contaminated apparatus/material present within contaminated facilities (i.e. the turbine building and radwaste building). Radiation monitoring of these structures will identify when they can be released from radiation and contamination control methods. Dismantling of Structures, Systems, and Components (SSCs) within these buildings (both clean and contaminated), may be required
- Removal of remaining material and services such to support area release surveys.
- Identification of material disposal routes for that material removed during decontamination and dismantling activities
- Implementation of a final radiation survey, in accordance with local regulator guidance and expectations

As noted, whilst the previous formalised steps of dismantling are yet to be finalized for distribution for the BWRX-300 and incorporate risk reduction decisions, the formal provisional international decommissioning plan (inclusive of a disassembly plan) will be completed by GEH after the assessment timeframe of Step 2 of GDA. This is acknowledged as a limitation of the decommissioning safety case submission for GDA Step 2. It is expected that the work completed in preparing the international decommissioning plan will also support the production of detailed engineering plans/procedures relevant to the dismantling of the BWRX-300 reactor, including:

- Detailed procedures and sequence for the removal of SSCs
- Evaluation of the potential disposal methods such to determine the most suitable option to be applied to the reactor pressure vessel and reactor internals
- Decontamination methods to be applied to structures and systems
- Processes for the removal and ultimate disposal of radioactive waste arising
- A dismantling sequence such to minimise conflicts associated with particular simultaneous tasks

This work will be picked up by the future site licensee, as part of the site license application process, and integrated into the submission of a UK-specific Preliminary Decommissioning Plan (PDP) as-required.

RO-BWRX-300-003 – Action 2 – BWRX-300 Decommissioning Enabling Design Features

In response to this RO Action, the RP should:

Formally document the design feature requirements for inclusion in the detailed design, Baseline 1 (BL1), necessary to enable the production of the disassembly plan for Action 1 as well as any other requirements identified to facilitate decommissioning.

Regulatory Expectations

In response to this action, we are seeking confidence that the RP has considered the appropriate design features, during concept design, that will enable deconstruction such that future risks to operators are reduced as low as reasonably practicable (ALARP).

Resolution Plan for RO-BWRX300-003.A2

GEH has extensive experience in conducting BWR decommissioning activities and has utilised this Operational Experience (OPEX) in the system design process, although systematic documentation of decommissioning-leveraged decision making is yet to be produced at this stage of the BWRX-300 design.

Subsequently, there is a lack of formal documentation which can be drawn from to provide evidence of these considerations. However, design conscious of decommissioning activities is held within GEH's As Low As Reasonably Achievable (ALARA) Objectives (AOs) [3],

which underpin design requirements intrinsic to the BWRX-300 integrated design engineering process.

- AO7 – Design of the plant to facilitate the removal or replacement of equipment or components during facility operation or decommissioning
- AO13 – Facilitate decommissioning by minimising embedded piping, sumps, or buried equipment

GEH has ensured that the necessary requirements for supporting decommissioning, including those stemming from the ALARA Objectives, are recorded within GEH's digital Requirements Management tool (the IBM® Engineering Lifecycle Management computer program). Therefore, although there are currently no documents available for distribution recording how design features will facilitate decommissioning, adherence to GEH's Systems Engineering Design approach [4] (i.e. the evaluation of requirements held in the Requirements Management software steers design decisions) means this principle has been, and will continue to be, a key aspect of BWRX-300 design.

As part of the decommissioning plan described in the A1 response, design features within the BL1 generic design which facilitate the actioning of the disassembly strategy, in accordance with design requirements, will be described. This will include decisions made as the baseline design matures.

As detailed in A1, the submission of the decommissioning plan will be the responsibility of the future site licensee. Given the Requirements Management tool will be maintained as part of future operations, the requirements within it will be integrated into future design decisions, as per GEH's formalised design process. This will enable future UK decommissioning strategy to be cognisant of the concerns raised during this RO, and thus pay particular mind to facilitating deconstruction and dismantling activities which reduce risks ALARP. Furthermore, given adherence to the Requirements Management process inherently ensures traceable decisions, any design for decommissioning led decisions will be explicitly recorded for future audit.

Impact on GDA submissions
There is no impact on GDA submissions.
Timetable and Milestone Programme Leading to the Deliverables
All actions identified in this RO Resolution Plan would be completed post GDA Step 2 but prior to site licensing. Work relating to some of the activities detailed within this RO Resolution Plan commenced prior to UK GDA in line with GEH standard practices and will continue to be developed post GDA on all BWRX-300 projects. The activities would be completed by either GEH or by a future site licensee of a BWRX-300 installation in the UK, supported by GEH subject to appropriate contractual arrangements prior to site licensing.

As it will be the responsibility of the future developer/operator to determine an integrated delivery programme for BWRX-300 design development activities in the UK, no completion timescales or durations are specified as part of this RO Resolution Plan.

An indicative milestone programme for RO3.A1 and RO3.A2 is provided in Figure 1, showing the logic-linked series of activities for completion within a project phase but without specific dates, as described in the RO Resolution Plan. It shows an indication of critical path activities, and actions that may be completed in parallel. A future developer/operator would develop a refined schedule, which may present activities in a different order and with different durations to those indicated in Figure 1. Work should continue as early as practicable post GDA Step 2 to de-risk the project as far as possible.

References

1. M250181, “Submission of BWRX-300 UK GDA, GEH Response to RQ-01980,” Enclosure 1, GE-Hitachi Nuclear Energy Americas, LLC, June 2025
2. O05-1801-006, “Preliminary Decommissioning Plan Darlington New Nuclear Project – End of Life,” Rev 2, Ontario Power Generation, March 2023
3. 006N5081, “BWRX-300 As Low As Reasonably Achievable Design Criteria Standard Design,” Rev 0, GE-Hitachi Nuclear Energy Americas, LLC, August 2024
4. 005N9036, “BWRX-300 Requirements Management Plan”, GE-Hitachi Nuclear Energy Americas, LLC

RO-BWRX300-003 Indicative Milestone Programme				pre-GDA	GDA	Post GDA Step 2 and Prior to site licensing
	Activity	Start	Finish			
	RO3.A1 - Provisional disassembly plan					
1.1	Production of a disassembly plan: - Design features within the BL1 generic design which facilitate the actioning of the disassembly strategy, in accordance with design requirements, will be described. This will include decisions made as the baseline design matures. - Capture the activities and assessments which will result in a credible demonstration that nuclear safety risks arising from inadequate disassembly planning at the design stage have been mitigated and in a proportionate and graded way, any conventional safety, security and environmental protection issues.	Post GDA Step 2	Prior to site licensing			
1.2	Development of International Decommissioning Plan, inclusive of disassembly plan	Pre-GDA	Prior to site licensing			
1.3	Work completed in preparing the international decommissioning plan will also support the production of detailed engineering plans/procedures relevant to the dismantling of the BWRX-300 reactor, for use in a UK-specific Preliminary Decommissioning Plan (PDP) as required	Post GDA Step 2	Prior to site licensing			
	RO3.A2 - BWRX-300 Decommissioning Enabling Design Features					
2.1	Formally document the design feature requirements necessary to enable the production of the disassembly plan for Action A1	Post GDA Step 2	Prior to site licensing			
2.2	Requirements for supporting decommissioning, including those stemming from the ALARA Objectives, are recorded within the RP's digital Requirements Management tool (the IBM® Engineering Lifecycle Management computer program)	Pre-GDA	Prior to site licensing			
2.3	Adherence to the RP's Systems Engineering Design approach (i.e. the evaluation of requirements held in the Requirements Management software steers design decisions)	Pre-GDA	Prior to site licensing			
2.4	Adherence to the Requirements Management process inherently ensures traceable decisions, any design for decommissioning led decisions will be explicitly recorded for future audit.	Pre-GDA	Prior to site licensing			

Figure 1: RO-BWRX300-003 Indicative Milestone Programme