REGULATORY OBSERVATION

REGULATOR TO COMPLETE

RO unique no.:	RO-UKHPR1000-0042
Revision:	0
Date sent:	29/4/20
Acknowledgement required by:	23/05/20
Agreement of Resolution Plan Required by:	30/06/20
TRIM Ref:	2020/127180
Related RQ / RO No. and CM9 Ref: (if any)**:**	RQ-UKHPR1000-0047 (CM9 Ref. 2018/36318) RQ-UKHPR1000-0105 (CM9 Ref. 2018/175723)
Observation title:	Robust Demonstration of ALARP for Decommissioning of the UK HPR1000
Lead technical topic: 17. RadWaste, Decommissioning & Spent Fuel Management	**Related technical topic(s):** 1. Chemistry 2. Civil Engineering 5. Conventional Health & Safety 11. Human Factors 13. Management of Safety Quality Assurance 14. Mechanical Engineering 16. Radiological Protection 20. Structural Integrity 21. Environmental

Regulatory Observation

Background

A key objective of the Generic Design Assessment (GDA) process is demonstrating compliance with the legal duty that the risks to human health arising from the operation of a power station based on the proposed design are reduced "So Far As Is Reasonably Practicable" (SFAIRP, noting this term is interchangeable with the term "As Low As Reasonably Practicable" (ALARP)). During Step 4 of GDA of the UK HPR1000 reactor design, ONR is undertaking a detailed assessment of the design against our Safety Assessment Principles (SAPs, Ref.1), to assess whether the proposed design ensures relevant risks will be reduced to ALARP. This assessment includes consideration of the risks associated with the decommissioning of the UK HPR1000 following cessation of electricity generation.

ONR raised two Regulatory Queries (RQs) during Step 2 of GDA, relating to design for decommissioning (Ref.2 and Ref.3), which sought further information on the process used by the Requesting Party (RP) to review the design with respect to facilitating decommissioning of the UK HPR1000. The RP's responses to the RQs indicated that further information would be provided during Step 3 of GDA, in a number of submissions which support the Pre-Construction Safety Report (PCSR) Chapter 24 Decommissioning (Ref.4), most notably the Preliminary Decommissioning Plan (Ref.5) and the Consistency Evaluation for Design of Facilitating Decommissioning (Ref.6). ONR assessed these submissions during Step 3, with particular focus on Ref.6. ONR has now started to assess the updated version of Chapter 24 of the PCSR submitted at the beginning of Step 4 of GDA, which includes a specific section on ALARP assessment (Ref.7).

ONR has identified a number of shortfalls arising from assessment of Refs. 4 – 6 and other submissions relevant to decommissioning assessed during Step 3 of GDA, namely:

- Insufficient evidence has been provided on the implementation of the stated methodology for assessing design requirements for facilitating decommissioning;

- There is a lack of clarity on how decommissioning considerations have been balanced against other factors (such as operational safety) in the overall demonstration of ALARP (and the Environment Agency's (EA) expectation for the application of Best Available Techniques (BAT));
- The basis of the statement made by the RP that, the risks of decommissioning can be demonstrated to be ALARP is not clear, nor is it adequately supported by referenced evidence; and
- ONR has some reservations regarding the RP's planned scope of work to address the demonstration of ALARP for decommissioning during Step 4 of GDA.

Overall, there is currently insufficient information for ONR to reach a judgment on whether relevant risks associated with decommissioning will be reduced to ALARP. This RO is therefore being raised to:

- Articulate ONR's regulatory expectations;
- Ensure that the gap identified is resolved in a satisfactory and timely manner during the GDA of the UK HPR1000; and
- Obtain confidence and the necessary assurances that the risks associated with decommissioning will be reduced to ALARP.

Relevant Legislation, Standards and Guidance

ONR's SAPs (Ref. 1) include a number specifically concerned with decommissioning (SAPs DC.1 – DC.9). Although decommissioning is the last stage of the overall lifecycle of a nuclear power station, the UK regulators expect that the need to ultimately decommission the plant should be taken into account during the earliest stages of design. DC.1 states that, *"Facilities should be designed and operated so they can be safely decommissioned".* DC.2 states, *"A decommissioning strategy should be prepared and maintained for each site and should be integrated with other relevant strategies".* DC.4 states that, *"A decommissioning plan should be prepared for each facility that sets out how the facility will be safely decommissioned".*

ONR has a specific Technical Assessment Guide (TAG) on decommissioning (Ref. 8), which contains further information including on the design of new facilities to optimise decommissioning and consideration of avoidance of the foreclosure of options for future decommissioning.

ONR's TAG on ALARP (Ref. 9) also makes specific reference to decommissioning. As the UK HPR1000 has an assumed operational lifetime of 60 years, the risks of decommissioning are expected to affect future generations of workers and the public.

IAEA's General Safety Requirements Part 6 Decommissioning of Facilities (Ref.10) provides guidance on the application of the graded approach to decommissioning.

Regulatory Expectations

ONR expects the claims presented in the PCSR to be adequately substantiated by suitable and sufficient arguments and evidence. ONR's expectation is that the UK HPR1000 generic safety case should provide an adequate demonstration the relevant risks associated with decommissioning will be reduced to As Low As Reasonably Practicable (ALARP). To achieve this, in response to this RO, the RP will need to provide the following:

- A suitable and sufficient substantiation, or justification (i.e. evidence), that the relevant risks associated with decommissioning of the UK HPR1000 will be reduced to ALARP. The justification should take account of health, safety and environmental aspects in an optimised manner. It will require consideration (i.e. potential inputs/outputs) of technical disciplines other than decommissioning, for example: chemistry, radiological protection, mechanical and civil engineering. It should take into account Relevant Good Practice (RGP) and provide a robust justification for what the RP considers to be RGP, and identify any gaps.
- ONR expects the RP to assess the risks in a holistic manner and this should not be restricted to part of the overall time period, or part of a process. In general, future generations should be protected at least as well as the present one. Consideration of uncertainties argues for a precautionary approach and thus a stringent demonstration that risks are ALARP. ONR expects the RP to demonstrate that risks to future generations arising from decommissioning are at least consistent with the levels of risk that would be accepted as adequate protection for the present generation.
- ONR expects the RP to apply a graded approach in its demonstration of ALARP for the decommissioning of the UK HPR1000. The type of information and the level of detail provided should

be commensurate with the scale, complexity, and stage in the lifecycle of the UK HPR1000 and with the hazards associated with its decommissioning. ONR also expects the demonstration of ALARP to address the non-foreclosure of options for future decommissioning.

References

[1] *Safety Assessment Principles for Nuclear Facilities*, 2014 Edition, Revision 1, Office for Nuclear Regulation, January 2020.
[2] Regulatory Query RQ-UKHPR1000-0047, ONR, January 2018, CM9 Ref. 2018/36318.
[3] Regulatory Query RQ-UKHPR1000-0105, ONR, June 2018, CM9 Ref. 2018/175723.
[4] *Pre-Construction Safety Report Chapter 24 Decommissioning, HPR/GDA/PCSR/0024 Rev 000-1,* November 2018, General Nuclear Systems Ltd, CM9 Ref. 2018/369727.
[5] *Preliminary Decommissioning Plan,* GHX1500004DNFF03GN, Revision D, July 2019, CM9 Ref. 2019/230644.
[6] *Consistency Evaluation for Design of Facilitating Decommissioning,* GHX1500009DNFF03GN*,* Revision C, July 2019, CGN, CM9 Ref. *2019.*
[7] *Pre-Construction Safety Report Chapter 24 Decommissioning, HPR/GDA/PCSR/0024 Rev 001,* January 2020, General Nuclear Systems Ltd, CM9 Ref. 2020/13971.
[8]. Nuclear Safety Technical Assessment Guide Decommissioning, NS-TAST-GD-026, Revision 5, Office for Nuclear Regulation, September 2019.
[9] Nuclear Safety Technical Assessment Guide Guidance on the Demonstration of ALARP (As Low As Reasonably Practicable), NS-TAST-GD-005, Revision 10, Office for Nuclear Regulation, December 2019.
[10] *General Safety Requirements Part 6: Decommissioning of Facilities*, No. GSR Part 6, IAEA, Vienna, 2014.

Regulatory Observation Actions

RO-UKHPR1000-0042.A1 – Robust ALARP demonstration for decommissioning of the UK HPR1000

In response to this Regulatory Observation Action (ROA), the RP should provide:

- A suitable and sufficient substantiation or justification (i.e. evidence) that the relevant risks associated with the decommissioning of the generic design of the UK HPR1000 are reduced to ALARP. The scope of this substantiation should be holistic and address all aspects associated with decommissioning relevant to the risks. The overall justification that relevant risks relating to decommissioning will be reduced to ALARP should balance health, safety and environmental aspects, in an optimised manner.

ONR notes that demonstration of ALARP for decommissioning for the UK HPR1000 will need to consider a range of technical topic areas, in addition to the decommissioning topic area, under which this RO is being raised.

Resolution required by '*to be determined by General Nuclear System Resolution Plan*'

REQUESTING PARTY TO COMPLETE

Actual Acknowledgement date:	
RP stated Resolution Plan agreement date:	