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REGULATORY OBSERVATION Resolution Plan	
RO Unique No.:	RO-UKHPR1000-0040
RO Title:	Provision of an adequate safety case for the interim storage of Intermediate Level Waste (ILW)
Technical Area(s)	Radwaste, Decommissioning & Spent Fuel Management
Revision:	0
Overall RO Closure Date (Planned):	2021-01-31
Linked RQ(s)	RQ-UKHPR1000-0477, RQ-UKHPR1000-0507
Linked RO(s)	RO-UKHPR1000-0005
Related Technical Area(s)	Conventional Health & Safety,Fault Studies,Human Factors,Mechanical Engineering,Radiological Protect
Other Related Documentation	

Scope of Work

Background

ONR issued Regulatory Observation (RO)-UKHPR1000-0040 “Provision of an adequate safety case for the interim storage of Intermediate Level Waste (ILW)”.

RO-UKHPR1000-0040 placed the following action:

- **A1:** Provide a suitable and sufficient safety case for the interim storage of all ILW arising from the operation and decommissioning of the UK HPR1000.

Scope of work

General Nuclear System Limited (GNSL) has reviewed RO-UKHPR1000-0040 and produced the resolution plan presented hereafter to address the regulatory expectations.

This Resolution Plan describes the plan to respond to the Action and provides the schedule for its delivery.

Deliverable Description

RO-UKHPR1000-0040.A1 – Provide a suitable and sufficient safety case for the interim storage of all ILW arising from the operation and decommissioning of the UK HPR1000.

In response to this ROA, ONR would expect the RP to provide:

–Confirmation of all the types of ILW which may arise from the operation and decommissioning of the UK

HPR1000, including those which may arise as a result of reasonably foreseeable accidents and incidents, together with a suitable justification of the proposed waste packages.

- *The conceptual strategy for storage of ILW arising from reasonably foreseeable incidents and accidents.*
- *A suitable and sufficient demonstration of consideration of options in the selection of the design of the ILW Interim Storage Facility (including e.g., whether single or multiple phased construction of the facility is proposed, mode of storage of packages and conceptual design). The optioneering should give adequate weighting so that the final design balances health, safety, security and environmental aspects in an optimised manner such that regulatory expectations of ALARP (and BAT) are met.*
- *A clear identification of what Operational Experience Feedback (OPEX) has been used to inform the design of the ILW Interim Storage Facility and a robust justification for why this represents the optimal design solution for the ISF.*
- *A clear demonstration that the capacity of the ILW Interim Storage Facility is sufficient for the expected ILW arisings anticipated throughout the whole lifecycle of the wastes prior to disposal.*
- *For the selected design, suitable and sufficient identification and assessment of the relevant hazards and risks to: workers, members of the public and to the safety of the reactor (including any risks associated with a phased approach to construction of interim storage capacity, where applicable), and a robust demonstration that the identified risks will be reduced, SFAIRP.*
- *The identification of indicative operational limits and conditions needed for safe interim storage of the radioactive waste packages, taking account of RGP and OPEX.*
- *Provision in the design of the ILW Interim Storage Facility for protection against identified faults.*
- *An outline of the monitoring, examination, inspection, maintenance and testing arrangements for the facility and its stored wastes.*

Resolution Plan

The ILW interim storage facility is designed to safely store the ILW anticipated to be generated during the whole lifecycle of two UK HPR1000 units, including operational and decommissioning phases. According to *Scope for UK HPR1000 GDA Project*, Reference [1], the design of ILW interim storage facility is developed at conceptual level at GDA stage.

GNSL has developed the conceptual design and the associated preliminary safety (and environment) demonstration for ILW interim storage facility, which are presented in the report *Conceptual Proposal of ILW Interim Storage Facility* (Reference [2]).

This report will be updated in response to RO action commensurately to GDA scope and stage. The following aspects will be enhanced in this report:

1) The information of all the ILW arising from the lifecycle including operation and decommissioning of

two UK HPR1000 units will be more clearly presented and decommissioning ILW information complemented, so as to ensure all ILW information used as input for the design of ILW interim storage facility is consistent with the source information presented in the reports - *Waste Inventory for Operational Solid Radioactive Waste* (Reference [3]) and *Decommissioning Waste Management Proposal* (Reference [4]).

2) The RGP/OPEX in the UK and china considered will be presented and relevant justification will be provided for the RGP/OPEX selected for UK HPR1000 ILW interim storage facility, considering all relevant factors such as waste packages properties, OPEX compliance/alignment with UK applicable standard and guidance.
RGP/OPEX used to develop the facility conceptual design and operational needs will be clearly presented, including RGP/OPEX used for:

   a) The development and assessment of potential options for optioneering studies in terms of the construction plan, stacking configuration and type of storage area;

   b) The development of the facility design and operational needs, such as operational limits and conditions, monitoring of waste package, EMIT, etc.

3) High level optioneering studies for construction plan, stacking configuration and type of storage area will be improved in line with the Guidance for Optioneering (Reference [5]). A Red, Amber, and Green (RAG) scoring system will be used to present the assessment and comparison of the options against all the relevant (potentially competing) factors, including safety (conventional, radiological and nuclear), security, environment, technique and cost. The suitable factors which have been derived from Reference [5] will be clearly presented. Analysis of each option against these factors and comparison of the different options performed to recommend a preferred option, will be better presented. Information on the multidisciplinary decision-making workshop during which the practicable option to be implemented in the conceptual design of UK HPR1000 ILW interim storage facility has been selected, will also be presented in the report.

4) The sufficiency of storage capacity of ILW interim storage facility will be better demonstrated for:

   a) The normal operation ILW arising from the lifecycle of two UK HPR1000 units, including operation and decommissioning, considering the preferred option from the optioneering studies for construction plan, stacking configuration and type of storage area;

   b) The provision of storage capacity for the potential ILW arising from reasonably foreseeable incidents and accidents will be justified, by considering the free space during operation, suitable margins for the potential ILW arising from reasonably foreseeable incidents, and facilitating feasibility of future extensions for potential ILW arising from reasonably foreseeable accidents.

5) The information on the preliminary risk/hazard assessment will be enhanced in combination with the information on the design proposal. The risk/hazard assessment includes the process of

risks/hazards identification, results of risk/hazard assessment identified, and the relevant prevention/mitigation measures to ensure risks are reduced ALARP. The risks/hazards include (not limited to) radiological risks, internal fire, internal flooding and the risks/hazards associated with the selected construction plan. For the identified hazards and relevant risks, the prevention/mitigation measures will be clearly identified within the safety assessment, as well as the provisions in the design of the facility for protection against the faults associated with identified hazards. This will feed into/support the demonstration that the risks will be capable of being reduced So Far As Is Reasonably Practicable (SFAIRP).

6) The relevant operational limits and conditions for the ILW interim storage facility will be identified in line with the design proposal, considering the available RGP/OPEX identified in item 2. The identification of operational limits and conditions focuses on identifying parameters/design features on which a limit or condition should be set, e.g. temperature, humidity, etc., considering the relevant requirements of the safe storage of all ILW packages, and considering the requirement presented in the RW.5 of SAPs (Reference [6]), in the Joint guidance (Reference [7]) and in the NDA guidance on ILW interim store (Reference [8]). It is recognised that the detailed value/condition is relevant to site licensing stage, and will not be provided during GDA stage. Similarly the action(s) in case the limit/condition is exceeded/not fulfilled will not be defined during GDA.

7) The EMIT considerations for ILW packages and for the ILW interim storage facility will be provided in combination with the design proposal. The EMIT for ILW packages and the facility is considered to ensure the safety of the storage of ILW packages. Based on the EMIT methodology presented in the report – *Examination, Maintenance, Inspection and Testing (EMIT) Strategy*, the EMIT considerations will be presented, and these include the measurement of the radioactive parameters of waste packages such as the surface dose rate, the monitoring and visual inspection of waste packages, the regular inspection and the maintenance of waste package, etc. The EMIT consideration of ILW packages and the facility will be presented in a new sub-chapter.

The updated report – *Conceptual Proposal of ILW Interim Storage Facility* will be submitted on September 30th 2020, and the anticipated timescales are given in the Gantt Chart in Appendix A. A period to allow ONR consideration of the technical report for the close out of the RO is included in the schedule.

The *ALARP Demonstration Report for Radioactive Waste Management* is a deliverable in the Resolution Plan for RO-0005 (raised by ONR in Step 2), with the purpose of demonstrating that the risks associated with radioactive waste management are reduced to ALARP. This was intended to include the risks associated with storage of ILW. To enable the closure of both RO-0005 and RO-0040, the demonstration for risks associated with ILW interim storage reduced to ALARP will be provided within the updated report – *Conceptual Proposal of ILW Interim Storage Facility*, and is thus excluded from the scope of RO-0005.

Impact on the GDA Submissions

The information that form part of the response to this RO will be appropriately incorporated into the reports

identified in the resolution plan described above (as per the plan presented in the GANTT chart) as well as in V2 of relevant PCSR and PCER chapters, notably PCSR Chapter 23 and PCER Chapter 4.

Timetable and Milestone Programme Leading to the Deliverables

See attached Gantt Chart in APPENDIX A.

Reference

[1] GNSL, Scope for UK HPR1000 GDA Project, HPR-GDA-REPO-0007, Revision 001, 2019;

[2] CGN, Conceptual Proposal of ILW Interim Storage Facility, GHX00100063DNFF03GN, Rev. C, 2019;

[3] CGN, Waste Inventory for Operational Solid Radioactive Waste, GHX00100069DNFF03GN, Revision D, 2020;

[4] CGN, Decommissioning Waste Management Proposal, GHX71500009DNFF03GN, Revision E, 2020;

[5] GNSL, Guidance for Optioneering, HPR-GDA-REPO-0080, Revision 000, 2019;

[6] ONR, Safety Assessment Principles for Nuclear Facilities, Revision 1, 2020;

[7] ONR, EA, SEPA and NRW, Joint Guidance from the Office of Nuclear Regulation, the Environment Agency, the Scottish Environment Protection Agency and Natural Resources Wales to Nuclear Licensees. The Management of Higher Activity Radioactive Waste on Nuclear Licensed Sites, Revision 2, 2015;

[8] NDA, Industry Guidance: Interim Storage of Higher Activity Waste Packages – Integrated Approach, Issue 3, 2017.

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APPENDIX A RO-UKHPR1000-0040 Gantt Chart

Task and Schedule		2020									2021
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
RO Action 1											
1	Development of deliverable - [Conceptual Proposal of ILW Interim Storage Facility, Revision D]										
2	Submission of deliverable - [Conceptual Proposal of ILW Interim Storage Facility, Revision D]										
Assessment											
1	Regulatory Assessment										
2	Target RO Closure Date										