REGULATORY OBSERVATION

REGULATOR TO COMPLETE

RO unique no.:	RO-UKHPR1000-0007
Revision:	0
Date sent:	12/12/18
Acknowledgement required by:	02/01/19
Agreement of Resolution Plan Required by:	01/02/19
TRIM Ref:	2018/374768
Related RQ / RO No. and TRIM Ref: (if any)**:**	RQ-UKHPR1000-0087 TRIM 2018/148440 RQ-UKHPR1000-0112 TRIM 2018/178126
Observation title:	Aircraft Impact Safety Case for UK HPR1000
Lead technical topic: 8. External Hazards	**Related technical topic(s):** 2. Civil Engineering 12. Internal Hazards 18. Security

Regulatory Observation

Background

During Step 2 of the UK HPR1000 GDA ONR wrote to the Requesting Party (RP) outlining regulatory expectations for the consideration of aircraft impact hazards for a UK site (Ref.1). Two Regulatory Queries (RQs) were also raised regarding the protection of UK HPR1000 against aircraft impact. RQ-UKHPR1000-0087 asked about the RP's Aircraft Impact Assessment Safety Case Strategy (Ref. 2). RQ-UKHPR1000-0112 sought formal clarification of information provided in a technical exchange workshop, including the UK HPR1000 design features for aircraft impact protection of buildings (Ref.3).

The RP's responses to the above RQs and information exchanged during subsequent technical Level 4 meetings (Ref. 4) have not provided ONR with sufficient confidence that their approach to this topic will result in an adequate aircraft crash safety case for UK HPR1000. In particular, the responses to RQ-UKHPR1000-0087 questions 1 and 2 do not provide confidence in the completeness of the planned Aircraft Impact Safety Case and the ability of the UK HPR1000 generic design and analysis to reflect the expectations in the UK context.

At present it is unclear if the UK HPR1000 Aircraft Impact Safety Case will satisfy UK expectations, as defined in Ref.1.
In particular, ONR is uncertain how:

- The generic design will be optimised in light of the differing/additional aircraft impact analysis requirement in the UK context and how overall, relevant risks will be managed.
- The external hazards safety case will be complete and provide the appropriate inputs into the civil engineering and other assessments (eg internal hazards), required for UK HPR1000.

Relevant Legislation, Standards and Guidance

The following items are considered to be relevant to this Regulatory Observation (RO), the list is not exhaustive.

The commentary paragraphs to SAP EHA.8 – Aircraft Crash state that:

"251. The direct and indirect effects of aircraft crashes on structures, systems and components needed to achieve a stable, safe state should be analysed. These should include effects relating to mechanical resistance, vibrations and structural and component integrity.

"252. The analysis should include fire and explosion hazards deriving from aircraft crashes including fires caused by aircraft fuel, fire ball and pool fire combinations and other consequential fires due to the aircraft crash. Buildings (or parts of buildings) containing nuclear fuel or housing structures, systems and components needed to achieve a stable, safe state should be designed to prevent aircraft fuel from entering them".

Other relevant sources of standards and guidance include:

- Guidance to ONR Inspectors is provided in Annex 4 of NS-TAST-GD-013 Revision 7 - External Hazards (Ref.5).
- Accidental aircraft crash is also considered in the ONR Technical Advisory Panel on Accidental Aircraft Crash Hazard Assessment Final Report (Ref. 6).
- Methodology for Performing Aircraft Impact Assessments for New Plant Designs NEI 07-13, Revision 8P (Ref. 7)

Regulatory Expectations

ONR has expressed its expectations for the analysis of aircraft impact through the letter sent to the RP in January 2018 (Ref. 1). The letter covers expectations for; the aircraft and parameters to be considered, modelling and key aspects of the safety demonstration.

It is expected that the RP is able to provide clear evidence that the UK HPR1000 design has been informed and optimised in light of the aircraft impact analysis that has been undertaken to meet UK expectations.

In order for the Aircraft Impact Safety Case to be coherent and robust, it is expected that it is developed at the same time as the safety case for other external hazards, and that appropriate links are made to the civil engineering analysis.
Where potential modifications to the UK HPR1000 generic design are considered, they should be appropriately documented within the generic safety case, and done with an understanding of the overall risk balance, including that from aircraft impact and other risks, to demonstrably show relevant risks are managed.

Resolution of the RO will require ONR having confidence that the approach to aircraft impact will deliver a suitably substantiated safety case and optimised UK HPR1000 generic design within the timescales of GDA.

References

1. Letter – UK Expectations – Aircraft Impact – 23 January 2018, UK HPR1000 – REG-GNS-0017N
2. Aircraft Impact Assessment Safety Case Strategy, RQ-UKHPR1000-0087, TRIM 2018/148440
3. Clarification from workshop, RQ-UKHPR1000-0112, TRIM 2018/198035
4. Level 4 meetings on Aircraft Impact,20/2/18 TRIM 2018/57229, 5/9/18 TRIM 2018/282154
5. External Hazards Technical Assessment Guide, NS-TAST-GD-013 Rev 7, http://www.onr.org.uk/operational/tech_asst_guides/index.htm
6. ONR Technical Advisory Panel on Accidental Aircraft Crash Hazard Assessment, May 2015, http://www.onr.org.uk/documents/2015/tap-report.pdf
7. Methodology for Performing Aircraft Impact Assessments for New Plant Designs NEI 07-13, Revision 8P, https://www.nrc.gov/docs/ML1114/ML111440006.pdf

Regulatory Observation Actions

RO-UKHPR1000-0007.A1 – Aircraft Impact Safety Case Delivery Strategy

In response to this Regulatory Observation Action, GNS should:

- Provide a programme of how GNS intend to deliver both accidental and malicious aircraft impact safety cases, including supporting evidence.
- Provide information on how the malicious aircraft impact analysis will be used to support the safety

case.

- Provide details of how information sharing will be managed between GNS, CGN and UK third party suppliers in order to deliver adequate analysis and optioneering for the Aircraft Impact Safety Case.
- Provide a risk log for the delivery of the aircraft impact safety case.

RO-UKHPR1000-0007.A2 – Design Optimisation in Response to Aircraft Impact

In response to this Regulatory Observation Action, GNS should:

- Provide details of how GNS will ensure UK HPR1000 meets UK expectations given that it may require modification to the reference plant design in response to the analysis.
- Provide details of the process by which any potential modifications would be identified and optioneered, including any information sharing between UK third party suppliers, GNS and CGN.

RO-UKHPR1000-0007.A3 – Provision of Aircraft Impact Safety Case

In response to this Regulatory Observation Action, GNS should:

- Provide the aircraft impact safety case for UK HPR1000.
- Provide evidence that the UK HPR1000 design is optimised against the UK context for the aircraft impact safety case.

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:	