REGULATORY OBSERVATION

REGULATOR TO COMPLETE

RO unique no.:	RO-UKHPR1000-0018
Revision:	0
Date sent:	20/09/19
Acknowledgement required by:	11/10/19
Agreement of Resolution Plan Required by:	28/02/2020
CM9 Ref:	2019/254390
Related RQ / RO No. and CM9 Ref: (if any)**:**	RQ-UKHPR1000-0236 (CM9 Ref. 2019/179488) RQ-UKHPR1000-0253 (CM9 Ref. 2019/201669) RQ-UKHPR1000-0254 (CM9 Ref. 2019/182308)
Observation title:	Substantiation of HRA Inputs in PSA Model
Lead technical topic: 15. Probabilistic Safety Analysis	**Related technical topic(s):** 11. Human Factors

Regulatory Observation

Background

ONR expects the safety case for new reactors to include a suitable and sufficient Probabilistic Safety Analysis (PSA) that adequately represents the design of the facility, that is realistic and that uses relevant data that is suitably underpinned. To this end, ONR is seeking to gain confidence in GNS's plan and approach for the modelling of human reliability in the PSA for the UK HPR1000 generic design assessment (GDA).

Despite a number of engagements on this topic, GNS has yet to present a complete and coherent justification for how and when the Human Reliability Analysis (HRA) inputs via the Human Error Probabilities (HEPs) will be justified and incorporated in the PSA. This is an important issue because the level of risk represented by human operations in the design may be significant, but unless the inputs are substantiated, the results of the PSA will continue to have a high level of uncertainty. While the response to RQ-UKHPR1000-0236, 0253 and 0254 [1, 2 and 3] have provided some useful information, they rely heavily on future reports and analysis, and thus at present, the extant analysis fails to provide:

- Justification of the source of data to be used in estimating HEPs and demonstration that it is suitably underpinned.
- Justification of how the relevant standards for modelling human reliability have been applied and how the methodology follows industry-accepted practices.

This regulatory observation has therefore been raised to:

- Explain ONR's regulatory expectations regarding the scope and content of modelling of human errors in the PSA;
- Ensure that the Requesting Party (RP) provides a suitable and sufficient methodology explaining how HEPs will be modelled in the PSA in a manner that meets ONR's regulatory expectations; and
- Ensure that the requesting party provides a realistic plan for when this work will be completed during the GDA.

Relevant Legislation, Standards and Guidance

ONR Safety Assessment Principle (SAP) [4] FA.13 expects that the PSA model presents an adequate representation of the facility.

Fault analysis: PSA	Adequate representation	FA.13
The PSA model should provide an adequate representation of the facility and/or site.		

Of particular relevance to this regulatory observation is SAPs paragraph 657, which states:

> 657. When models are used for the calculations of input probabilities, for example in human errors or failures of computer-based systems (including software errors), common cause failures, or the failures of structures, then the methodologies used should be justified, and should account for all key influencing factors.

The ONR PSA Technical Assessment Guide (TAG) [5] provides further details of ONR's expectations for reliability data that is used as an input to the PSA models for the UK HPR1000, in particular Section 5.8.

In addition, the ONR HRA TAG [6] provides further details of ONR's expectations for figures used as an input to the HRA models for the UK HPR1000 PSA.

Regulatory Expectations

ONR's regulatory expectations are that the PSA reliability information which is used as the basis for the UK HPR1000 PSA should be appropriately justified, in line with the guidance noted above. In response, ONR would therefore expect the RP to provide information which should:

1. Demonstrate that the HRA methodologies and approaches used in the UK HPR1000 PSA are substantiated and appropriate for use in the UK HPR1000 PSA.
2. Substantiate the inputs to the HRA to model the HEPs including Type A, B and C human errors.
3. Demonstrate that the quantification of the human error probabilities used in the UK HPR1000 PSA is well documented, the inputs are clearly traceable back to the underlying analysis, has been performed correctly, is underpinned by proportionate task decomposition and analysis as is in accordance with justified HRA method/s selected by the RP and quality checked.

References

[1] RQ-UKHPR1000-0236,CM9 2019/179488
[2] RQ-UKHPR1000-0253,CM9 2019/201669
[3] RQ-UKHPR1000-0254,CM9 2019/182308
[4] *Safety Assessment Principles for Nuclear Facilities*, 2014 Edition, Revision 0, Office for Nuclear Regulation, 2014. www.onr.org.uk/saps/saps2014.pdf
[5] *Nuclear Safety Technical Assessment Guide, Probabilistic Safety Assessment*, NS-TAST-GD-030 Revision 5, Office for Nuclear Regulation, 2016. www.onr.org.uk/operational/tech_asst_guides/index.htm
[6] *Nuclear Safety Technical Assessment Guide, Probabilistic Safety Assessment*, NS-TAST-GD-063 Revision 4, Office for Nuclear Regulation, 2017. www.onr.org.uk/operational/tech_asst_guides/index.htm

Regulatory Observation Actions

RO-UKHPR1000-0018.A1 – Demonstrate the Validity of the HRA Methods

In response to this Regulatory Observation Action, GNS should:

- Provide an adequate justification to demonstrate that the the methods and approaches used to create the HEPs modelled in the UK HPR1000 PSA are suitable and sufficient for use in the safety case, and meets ONR's regulatory expectations.
- Provide adequate substantiation with enough examples for GDA to demonstrate that the inputs to the UHPR1000 PSA HRA are suitable and sufficient for use in the safety case and meet ONR's regulatory expectations.

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

RO-UKHPR1000-0018.A2 – Demonstrate the Validity of the HRA Quantification

In response to this Regulatory Observation Action, GNS should:

- Provide adequate substantiation to demonstrate that the quantification of the human error probabilities used in the UK HPR1000 PSA is transparent, has been performed correctly, is underpinned by proportionate task decomposition and analysis is in accordance with justified HRA method/s selected by the RP and quality checked.

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:	