

REGULATORY OBSERVATION

REGULATOR TO COMPLETE

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TRIM Ref:	2019/133072
Related RQ / RO No. and TRIM Ref: (if any):	N/A
Observation title:	Human Factors capability and integration to deliver the GDA of UK HPR1000
Lead technical topic:	Related technical topic(s):
11. Human Factors	

Regulatory Observation

Background

The UK HPR1000 PCSR – Chapter 15 Human Factors (Ref. 1) Claims (Claim 3.3.8.1) that a “*Comprehensive programme of HF activities are used to integrate HF into the entire design process of the UK HPR1000.*” To deliver such a claim, ONR consider it necessary for a suitable and sufficient Human Factors (HF) capability to exist within the Requesting Party (RP), including their supporting organisations. A vital aspect of this capability is for the RP to be able to demonstrate how ONR expectations regarding integration of HF into the design are likely to be met. Of particular importance during GDA is the expectation that the design process used to develop the UK HPR1000 design integrates suitable and sufficient HF requirements to show that associated risks are reduced to As Low As Reasonably Practicable (ALARP).

Whilst ONR acknowledges the significant progress made by the RP to date in meeting ONR’s regulatory expectations for developing its HF capability, ONR does not consider the current capability available to deliver the UK HPR1000 GDA project to be adequate. In particular there does not appear to be suitable and sufficient capability to deliver the Human Factors Integration (HFI) programme set-out in the PCSR (Ref 1) and Human Factors Integration Plan (HFIP) submitted by the RP (Ref. 2), including accommodating likely additional emergent work.

ONR has also observed that under the current HFI arrangements, CGN engineering disciplines, which should be drawing upon their in-house HF capability and actively requesting support, are not effectively doing so. This approach fails to meet ONR expectations and relevant good practice where HF is integrated into the wider design arrangements.

These issues have the potential to lead to a design that has failed to integrate adequately HF and therefore it would be very difficult for the RP to demonstrate subsequently that relevant risks have been reduced to ALARP. This RO has therefore been raised to make ONR expectations clear.

Relevant Legislation, Standards and Guidance

The provision of adequate Suitably Qualified and Experienced Personnel (SQEP) is a requirement of the Licence Conditions (LC) associated with holding a nuclear site licence, particularly LCs 10, 12, 26 and 36.

The SAPs (Ref. 3.) contain specific principles (and associated paragraphs) relating to the suitable and sufficient integration of HF into a design; specifically:

Engineering principles: human factors

Integration within design, assessment and management

EHF.1

A systematic approach to integrating human factors within the design, assessment and management of systems and processes should be applied throughout the facility's lifecycle.

444. Whilst human factors integration is expected throughout all design phases, for new designs, the majority of the human factors analysis should be undertaken during the Pre-Construction Safety Report (PCSR) stage in order to influence the design and inform the safety analysis. As the design progresses, human factors analysis should start to focus on verification of the human factors claims in the safety case.

Further ONR expectations in relation to Human Factors Integration are set out in TAG NS-TAST-GD-058 (Ref. 4). Of specific relevance are the expectations that:

- HFI requires that HF is an integral part of a project, and is not carried out in isolation.
- ...the level of HFI should be align with the size of the project, and take account of the safety reliance on humans and the consequences of human error, together with the novelty and complexity of any new technology.

Regulatory Expectations

In response to this RO, ONR expects the RP to:

- Undertake a structured and systematic approach to identifying the full scope of HF work to be completed during GDA, which should be documented appropriately.
- Demonstrate that sufficient capability is available to the RP to support its HF scope of work. ONR recognises that this capability need not be entirely provided in-house but, where this is not the case, the RP should demonstrate sufficient in-house capability to fulfil an adequate intelligent customer capability. This should include sufficient contingency to deal with emergent work.
- Demonstrate how their design processes ensure that adequate HFI is an outcome of these processes rather than a stand-alone HF driven activity.

References

- [1] UKHPR1000 PCSR – Chapter 15 Human Factors
[2] UK HPR1000 - GDA-REC-CGN-003360 - Human Factors Integration Plan Rev D - 30 November 2018
[3] Safety Assessment Principles for Nuclear Facilities, 2014 Edition, Revision 0, ONR, November 2014
[4] ONR's Technical Assessment Guide (TAG): TAG NS-TAST-GD-058 Human Factors Integration

Regulatory Observation Actions**RO-UKHPR1000-0011.A1 – Demonstration of the adequacy of Human Factors capability and integration**

In response to this Regulatory Observation, the RP should:

- Provide a demonstration of the adequacy of their approach to integrate HF into the UK HPR1000 design and the capability required to achieve this. The information provided should enable ONR to judge whether suitable and sufficient consideration has been given to the capability and integration necessary to deliver the GDA for UK HPR1000.
- In responding to this ROA, the RP should consider developing a Human Factors Capability Strategy, which considers each of the expectations described further below.
- Relating to HF capability, ONR considers that in response to this RO the RP should:
 1. Update the HF organisational model found in the UKHPR1000 Human Factors Integration Plan (Ref 2), showing the relationship between GNS, CGN, and the supply chain with supplementary information explaining how these relationships will be managed.

2. Develop role profiles for each HF and HF associated role, containing qualification, experience, and training expectations. To include within scope: GNS, CGN, and supply chain.
 3. Based on previous capability planning activities, and taking account of learning in Step 2 and Step 3, provide an estimate of resource and capability needs throughout GDA. This estimate should include contingency for emergent work.
 4. Establish a realistic time frame – with resourcing targets – during which the project HF capability will be grown to meet the HFI programme needs.
- Relating to integration of HF, ONR considers that in response to this RO the RP should:
 1. Introduce suitable and sufficient design arrangements that ensure appropriate human factors integration throughout the UKHPR1000 design.
 2. Once introduced, after a trial period, provide evidence that these arrangements are effectively integrating HF appropriately. The evidence needs to demonstrate that the design arrangements are actively and effectively engaging the HF team where appropriate to do so.
 3. Demonstrate that the HF lead has sufficient authority and responsibility to be able to intervene and make decisions to influence the design and safety case production.

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: