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REGULATORY OBSERVATION Resolution Plan

RO Unique No.:	RO-UKHPR1000-0053
RO Title:	Provision of Evidence to Support Bounding Case Justifications
Technical Area(s)	Internal Hazards
Revision:	0
Overall RO Closure Date (Planned):	2021-06-30
Linked RQ(s)	RQ-UKHPR100-1031
Linked RO(s)	
Related Technical Area(s)	Civil Engineering, External Hazards, Fault Studies, Mechanical Engineering, PSA, Structural Integrity
Other Related Documentation	

Scope of Work

Background and Regulator's Expectations


It is expected that during GDA the requesting party (herein referred to as RP) demonstrates through the provision of a safety case, that the risks to nuclear safety associated with internal hazards have been reduced to ALARP.

The safety case is required to provide sufficient articulation of the safety case claims, arguments and evidence to demonstrate that the internal hazards that pose a nuclear safety risk have been eliminated, minimised and mitigated, through the application of a robust hazard assessment process.

In order to achieve the above during GDA, it is considered essential that the RP provide adequate evidence to demonstrate that it has undertaken systematic identification of internal hazards and hazard scenarios, and that the analysis of such scenarios is underpinned by traceable evidence.

Step 4 of the GDA is where the evidence outlined above is subject to in-depth assessment to ensure the safety claims and arguments presented through the prior GDA steps are adequately substantiated on an evidential basis.

The RP has produced a number of reports presenting the bounding cases identified as representative of the internal hazards in the safeguard buildings, fuel building and the reactor building. ONR have assessed the merits of the bounding cases for each internal hazard identified. ONR are content that the approach undertaken is of adequately focuses on the key safety claims relating to divisional barriers, areas of multiple safety trains and impacts on HIC (high integrity component) systems, all areas that could challenge nuclear safety. The reports provide adequate coverage of internal hazards

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utilising a bounding case approach.

However, the reports do not identify the evidence underpinning the assessments presented, including the identification of hazards and justification of screening of hazard scenarios. They also lack narrative to explain, for example, how conclusions have been reached as to why the bounding cases identified are indeed bounding.

These shortfalls were raised with the RP in step 3, are captured within the step 3 assessment report [Ref. 1] and discussed with the RP in a number of engagements [Refs 2 to 9]. In addition, RQ-UKHPR1000-1031 [Ref 10] was raised looking for clarification of the internal hazards screening processes. Work is still underway on this RQ, however the RQ does not address the provision of evidence, so although the RQ response will be important to demonstrate the adequacy of the internal hazards safety case, the issues within this RO will remain to be addressed.

The lack of transparency and traceability to the underpinning evidence of the internal hazards assessments presented by the RP is a potential regulatory shortfall. Thus, ONR is now seeking improved transparency for the relevant data used for the initial identification, screening and assessment of internal hazards. This will allow the RP to demonstrate the adequate application of its methodologies, and to justify the selection of the bounding cases.

The RP should provide sufficient evidence and justification to demonstrate it has undertaken comprehensive and systematic hazard identification, screening and bounding scenario definition. This evidence is necessary to support the narrative, justification and conclusions drawn in the analysis of the various bounding cases documented within the internal hazard analysis reports.


It is ONR's expectation that a robust audit trail be in place that clearly links the source data reviewed by the RP as part of its internal hazard identification, screening and analysis, to the documents that present the bounding cases. ONR expects the RP to provide appropriate narrative to enable such traceability. These are important to provide confidence in the robustness of the internal hazards aspects of the safety case.

In summary, ONR expects all the data and evidence underpinning the internal hazards analyses to be traceable and available.

Description of the Response and of the Scope of Work

This resolution plan provides a response for demonstration that the internal hazards safety case is evidence-based.

The resolution plan will be based on examples of internal hazards assessment for the BRX building. This assessment of the internal hazards will include the input information used in the assessment and the links between the source data and the assessment.

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Deliverable Description

RO-UKHPR1000-053.A1 – Confirmation based on key examples that the UK HPR1000 internal hazards safety case is evidence-based

The Regulatory Observation Action 1 states that:

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

- *Documentation demonstrating that it has undertaken comprehensive and systematic hazard identification and screening in the reactor building.*
- *Evidence documenting the collection of information and data (eg, where appropriate, through the interrogation of source information such as the 3D model) for the identification and screening of internal hazards, and for the assessment of the identified internal hazard scenarios in the reactor building.*
- *Transparency on how the information/data has been used, i.e. the links between such evidence and the bounding cases identified as representative of the internal hazards in the reactor building (and submitted to ONR).*
- *Sufficient explanation to justify that the bounding cases identified as representative of the internal hazards in the the reactor building (and submitted to ONR) are indeed bounding.*

For Regulatory Observation Action 1, RP's planned response consists of the following work:

Task 1 - Provide “route map” for each sampled hazard

The purpose of Task 1 is to demonstrate the comprehensive and systematic process of internal hazards assessment which has been undertaken and show the actual input information which has been used.

Route maps will be developed that show the process applied to the assessment of internal hazards, including identification and screening of hazard scenarios and definition of bounding cases. The route maps will also illustrate the linkage to the input data used in the assessment. Route maps with explanation will be developed, which shows the comprehensive and systematic process applied by the RP.

The route maps will be developed on a hazard by hazard basis and will illustrate the golden thread running through the safety case. They will show how the input data used by the RP feeds into the assessment of internal hazards. Specific input information relevant to each hazard will be listed. The resultant list will be provided in the report addressing this RO.

Generic examples of the types of information which may make up the various elements of the golden thread narrative within the route maps are provided below:

- a) Documents or other information relevant to the scope of the hazard assessment, e.g. that

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define the hazard types to be assessed or the buildings included within GDA scope.

- b) Documents that define the approach applied to the internal hazards assessment, e.g. methodologies and model verification and validation reports.
- c) Documents, processes and other information sources used to systematically identify hazard sources, e.g. system design information, review of 3D model etc.
- d) Documentation, processes and screening criteria used to select relevant bounding cases, based on the screening criteria / parameters established, and to justify all other hazards are bounded.
- e) Documents or processes used in characterising hazard scenarios and deriving the hazard loads for the bounding cases.
- f) Documents or processes used to define the consequence of hazard impacts on fundamental safety functions and to identify hazard protection measures, e.g. fault studies and fault schedule, exceptions to segregation areas and HICs etc.

Task 1 will also consider how the input information will be managed during the site specific design phase, including:

- Transfer of the GDA input information (as identified in the route maps) to the site specific phase.
- Future arrangements for control of input information during the site specific phase.

Task 2 –Provide room datasheets for the sampled areas

The above Task 1 will show that a comprehensive and systematic process of internal hazards assessment has been undertaken based on the input information actually been used. However, it is recognised that room datasheets may help the understanding of the design and the assessment process.

Room datasheets will be developed for the rooms/locations relevant to the Target Sample Areas, and will enable ONR to see the source data for the Target Sample Areas on a room by room basis:

- The datasheets will include details of SSCs located in the relevant rooms.
- The datasheets will include sufficient information on each hazard source in the room to characterise the hazard. It will be ensured that this information is traceable by cross-referencing to the route maps or by specific references to other data sources as appropriate.
- It is not practical to include detailed geometry or all hazard characterisation information in the datasheets, e.g. equipment layouts or other information defining the relative location of components etc. More detailed information (relevant to each hazard scenario) is established during the hazard analysis process. This detailed information will be provided in Task 3 for

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the Target Sample Areas.

Task 3 - Address “Target Sample Areas”

The “Target Sample Areas” will be used to illustrate how the general processes defined in Task 1 are applied (see list of agreed Target Sample Areas to be addressed for this RO in Table 1, according to ONR sample selection presentation [Ref 11]):

- Responses will be prepared against the queries raised by ONR for each sample area.
- The route map developed in Task 1 will be completed (i.e. specific processes and evidence identified) for each sample hazard. Specific documents or interfaces relevant to an individual sample area will be highlighted as required e.g. specific dose consequences assessment or similar.

The RP will issue “*Justification of Internal Hazards for the Sampled Areas*” and “*Room Datasheet for the Sampled Areas*” in response to RO Action 1.

“*Justification of Internal Hazards for the Sampled Areas*” will address Tasks 1 and 3 above. Task 1 will be incorporated into the main body of the report addressing each hazard in turn and presenting the background to the work. Task 3 will be presented in separate annexes for each Target Sample Area and will refer back to the relevant route map as required. This report aims to demonstrate that the process of internal hazards assessment is comprehensive and systematic, and that the internal hazards safety case is evidence-based.

Each sample area to be included in the justification report is described in Table 1 below. Sampled areas are listed on a room/area basis as opposed to listing specific components. Approaching the sample areas in this way ensures each is considered holistically and that necessary context is easily understood e.g. adjacent rooms, relative locations of redundant SSCs etc. This in turn provides confidence that the bounding cases selected are truly bounding. The sample areas are also more easily linked to a specific room data sheet entry.

“*Room Datasheet for the Sampled Areas*” will address Tasks 2 above.

Time Schedule:

The “*Justification of Internal Hazards for the Sampled Areas*” in response to RO Action 1 is scheduled to be submitted before February 28th 2021.

The “*Room Datasheet for the Sampled Areas*” in response to RO Action 1 is scheduled to be submitted before February 28th 2021.

Table 1 – List of “Target Sample Areas” and associated rooms to be addressed for this RO. The table below highlights the specific work which will be undertaken in each sample area to confirm that the

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bounding cases identified are indeed bounding. This work will feed into the route maps established in Task 1.

Item	Target Sample Area Description	Associated Rooms / Locations
<p>Protected information</p>		

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Protected information

Impact on the GDA Submissions

These reports are new documents. So they will be added in the GDA submissions.

Timetable and Milestone Programme Leading to the Deliverables

See attached Gantt Chart in APPENDIX A.

Reference

- [1] ONR-NR-AN-19-004 - UK HPR1000 - GDA Step 3 Assessment Note - Internal Hazards, File Ref: 2019/293364
- [2] ONR Presentation - Summary of ST3 Assessment Note and Focus for ST4 - L4 Meeting 14th November 2019, File Ref: 2019/327256
- [3] Meeting No 11 - ONR Presentation - Agenda Item 1 - Step 3 Assessment Summary and Step 4 plan overview - 10th March 2020, File Ref: 2020/77891
- [4] Meeting No 11 - ONR Presentation - Agenda Item 2 - Safety Case Expectations Version 2 - 10th March 2020, File Ref: 2020/77897
- [5] ONR, Meeting No.18 - Summary of IH initial findings on the BSX HEPF report - 28th May 2020, File Ref: 2020/171571
- [6] Meeting No.21 ONR High Level Comments on Safeguard Building Submissions and

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Preliminary comments on RO-UKHPR1000-0046 Resolution Plan, File Ref: 2020/207379

[7] ONR-NR-CR-19-346 - UK HPR1000 - GDA Step 3 Internal Hazards Interaction No.6 - 14 November 2019, File Ref: 2019/345225

[8] ONR-NR-CR-20-146 - UK HPR1000 - Step 4 Internal Hazards Meeting No.18 - 28 May 2020, File Ref: 2020/171938

[9] ONR-NR-CR-20-248 - UK HPR1000 - GDA Step 4 Internal Hazards Level 4 Meeting No.21 - 3 July 2020, File Ref: 2020/203474

[10] RQ-UKHPR1000-1031, IH Query to confirm the use of the 3D model process as an input in to IH assessments, File Ref: 2020/241879

[11] ONR Presentation, Target Sample areas for provision of evidence to support bounding case justifications

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APPENDIX A RO-UKHPR1000-0053 Gantt Chart

Task and Schedule		2020			2021								
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
RO Action 1													
1	Development of deliverable - [Justification of Internal Hazards for the Sampled Areas]												
2	Submission of deliverable - [Justification of Internal Hazards for the Sampled Areas]					▲							
3	Development of deliverable - [Room Datasheet for the Sampled Areas]												
4	Submission of deliverable - [Room Datasheet for the Sampled Areas]					▲							
5	Regulatory Assessment												
6	Target RO Closure Date									▲			