

REGULATORY OBSERVATION	
REGULATOR TO COMPLETE	
RO unique no.:	RO-ABWR-0012
Date sent:	15th August 2014
Acknowledgement required by:	8th September 2014
Agreement of Resolution Plan Required by:	29th September 2014
Resolution of Regulatory Observation required by:	<i>To be determined by the Hitachi-GE Resolution Plan</i>
TRIM Ref.:	2014/273121
Related RQ / RO No. and TRIM Ref. (if any):	2014/121972 - RQ-ABWR-0090
Observation title:	Presence of Single Doors on Class 1 Nuclear Safety Barriers
Technical area(s) 1. Internal Hazards	Related technical area(s) 5. Fault Studies 2. Civil Engineering 6. Control & Instrumentation 19. Fire Safety 13. Human Factors
<i>Regulatory Observation</i>	
Summary	
<p>The proposed UK ABWR design includes single doors (i.e. not lobbied) on safety class 1 barriers segregating different divisions within the reactor Building (R/B). These doors have the same nuclear safety function and are required to withstand the same hazard loadings as the nuclear safety barriers segregating different divisions. This RO requires Hitachi-GE to review its current design with an aim to: a) demonstrate that the number of doors on class 1 safety barriers is minimised, b) provide a second door, where reasonably practicable, and c) for the remaining single doors, engineer local and remote alarms and provide a robust justification in line with the relevant good practice established in the UK.</p>	
Background	
<p>During ONR's meeting in Japan in February 2014 on General Arrangements of Power Block (Document LE-GD-0017) it was noted that the current UK ABWR design includes single doors on safety Class 1 nuclear safety barriers segregating safety divisions (e.g. on Level B3F). These doors have the same function and are required to withstand the same hazard loadings as the passive nuclear safety barriers. This appears to be potentially a weak point of the design.</p> <p>ONR raised RQ-0090 requesting Hitachi-GE to provide the philosophy/ strategy for the use of single doors in safety Class 1 nuclear safety barriers within the Reactor Building (R/B). This should identify the key claims associated with this approach including how the single failure criterion is addressed.</p> <p>Hitachi-GE's response to RQ-0090 is given in GA91-9201-0003-00084 (SE-GD-0082 Rev.0). It highlighted the following:</p> <ul style="list-style-type: none"> • There are 40 to 50 single doors within the R/B. • These doors are self closing as much as possible otherwise they will be monitored to ensure they are closed. Hitachi-GE considers the doors unlikely to be left open. • Installation of local alarm to satisfy the single failure criterion. The alarm will initiate personnel action to close the door reducing the likelihood that the door will be kept open in the unlikely event of an internal hazard. The door alarm is only necessary during normal operations and it should be treated as "defence in depth" (DID) claim. • The installation of double doors between different divisions as an alternative option has been 	

qualitatively considered and concluded that the double doors will degrade the function of accessibility, escapability and maintainability.

Hitachi-GE concluded that *“the single failure of the single doors is considered to be unlikely since they are designed with appropriate design standard and furthermore they are self –closing or monitored their state. To enhance their reliability, the UK ABWR design will make a DID claim against door alarms on doors in safety class 1 barriers to initiate a personnel to shut the door even in case that some components are stuck within opening of the door.”*

Hitachi-GE’s response to RQ-0090 is not robust and the following points noted:

- Hitachi-GE did not demonstrate that it has reviewed the number of single doors on safety class 1 barriers with an aim to reduce their number. Additionally the layout of key buildings is complex and shows no evidence that layout has been optimised around a principal of hazard minimisation.
- The provision of a local alarm is not in line with the relevant good practice established in the UK, where local alarms are provided for fire doors or lesser significance, but alarms to a permanently manned station are provided for doors of higher nuclear significance.
- In the UK, operational experience has identified failures in door closure mechanism and events where doors have been deliberately wedged open. In addition to the audible alarms, there may be maintenance and inspection requirements, administrative controls and safety tours to ensure that these nuclear safety barrier doors are able to perform their required safety function.
- Implicit claims on operative response to a local alarm have been made but no further justification provided.
- Hitachi-GE raised concerns with regard to the provision of a second door degrading the functions of accessibility, escapability and maintainability. However, these qualitative arguments are not robust for the following reasons: a) The extra door is not a barrier for fire fighting, but an extra defence in depth measure. UK Building Regulations actually require a lobby approach around stairs for fire fighting access; b) Provided the doors can be readily opened, then double doors provide additional layer of protection to people from fire and smoke. The slight delay in opening a second door is vastly outweighed by additional safe escape time provided by the second barrier; c) Double doors may restrict movement of large items but not necessarily prevent the movement. In any case, access requirements can be planned and door widths adjusted without necessarily increasing the size of the opening in the Class 1 nuclear safety barrier by adopting a lobby approach.

ONR expects that Hitachi – GE should review its current design of the single doors on class 1 nuclear safety barriers with an aim to: a) demonstrate that the number of doors on class 1 safety barriers is minimised b) provide a second door, where reasonably practicable, and c) for the remaining single doors engineer local and remote alarms and provide a robust justification in line with the relevant good practice established in the UK. Hitachi-GE has already commenced its work in this area.

This is a cross cutting regulatory observation led by internal hazards but supported by control and instrumentation, civil engineering, conventional fire safety, human factors and fault studies.

Regulatory Observation Actions

RO-ABWR-0012.A1: Review the current design and use of the single doors on Class 1 nuclear safety barriers.

Hitachi-GE is required to review its current design and use of the single doors on class 1 nuclear safety barriers with an aim to:

- Demonstrate that the number of single doors on class 1 nuclear safety barriers is minimised,
- Review the feasibility of providing a second door, where reasonably practicable,
- If it is necessary to retain some single doors, provide a robust demonstration that local and remote alarms are provided in line with the relevant good practice (current fleet and previous GDA) established in the UK.

ONR’s expectations for a Class 1 Safety Barrier Door Alarm System are as follows:

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- Alarm system should be appropriately classified and designed to the relevant standards. For Class 1 barriers it should satisfy the requirements of Class 2 and have a redundant architecture. Redundancy should be provided in the door monitoring system and in the power supply arrangements.
- The system should be designed to be tamperproof and fail-safe. e.g. to set the alarm on failure of the system.
- The annunciation of the alarm should be local to the door and be retransmitted to remote permanently occupied locations which should include the Main Control Room.
- Annunciation should be both visual and audible.
- Protection against internal hazards commensurate with the door requirements should be provided. e.g. fire protection.

Hitachi-GE is required to provide a strategy and a delivery plan for the above.

Resolution required by: To be determined by the Hitachi-GE Resolution Plan.

REQUESTING PARTY TO COMPLETE

Actual Acknowledgement date:

RP stated Resolution Plan agreement date: