

Hitachi-GE Nuclear Energy, Ltd.
UK ABWR GENERIC DESIGN ASSESSMENT
Resolution Plan for RO-ABWR-0003
RPV Design

RO TITLE:	RPV Design	
REVISION :	2	
Overall RO Closure Date (Planned):	Date (29. Sep. 2017)	
REFERENCE DOCUMENTATION RELATED TO REGULATORY OBSERVATION		
Regulatory Queries		
Linked ROs		
Other Documentation	ONR Document RO-ABWR-0003, "RPV Design", Issue 01. Hitachi-GE Document RD-GD-0014, "RPV Design Philosophy Report", Issue 0. Hitachi-GE Document RD-GD-0020, "RPV Topic Report", Issue 0.	

Scope of work :
<p>RO-ABWR-0003 Issue 01 requested that Hitachi-GE supply further detailed information relating to the design of the UK ABWR Reactor Pressure Vessel (RPV). The RO was raised to improve the ONR's understanding of the technical basis for the design of the UK ABWR RPV and to provide Hitachi-GE with a clear understanding of Regulatory Expectations in relation to the topics identified. The RO also provided an indication of the nature of the evidence that the ONR expect to see as part of the GDA submission.</p> <p>The RPV Design Philosophy Report was written during Step 3 to address the issues raised by the RO. This report describes the overall philosophy for the design of the UK ABWR RPV and addresses the following topics: -</p> <ul style="list-style-type: none"> • The evolution of the design of the ABWR RPV compared with BWR; • The general principles of the design and the approach to the sizing of components; • The evaluation of design loadings; • The minimization of through life degradation through design optimisation; • The manufacturability of components; • The basis for the selection of plates and forgings; • The optimization of the number and locations of shell welds with regard to integrity, through life degradation, manufacturability and inspection; • The optimization of the design of vessel penetrations with regard to integrity, through life degradation, manufacturability and inspection. <p>During Step 3 of the GDA process ONR acknowledged the good progress made by Hitachi-GE in producing the RPV Design Philosophy Report. However, it was not deemed appropriate for ONR to close the RO because, since the report had been produced during Step 3, the full evidence behind the design decisions made had not yet been presented.</p> <p>The RO was up-issued by mutual consent between ONR and Hitachi-GE in order to request the appropriate evidence during Step 4. Actions were clarified and are detailed below.</p> <p><u>Action 1.1</u></p> <p><i>Where plate material is proposed for the main pressure boundary, including the RPV head, provide evidence that:</i></p> <ul style="list-style-type: none"> - <i>HGNE have balanced the safety risk from increased weld length and defect occurrence rates, with safety benefit improved control of the production methodology, improved materials properties and any other factors,</i>

to demonstrate that the proposed design maintains risks ALARP. HGNE should give consideration to the fact that the RPV is a component of the highest reliability and apply the principle of gross disproportionality to any non-safety-related matters.

Action 1.2

Where nozzles are proposed that not integral to the RPV, provide evidence that:

- HGNE have considered the safety risk posed in the introduction of extra weld lines and evidence to show whether the proposed design maintains risks ALARP.*

Description of work:

The information provided in the RPV Design Philosophy Report prepared in Step 3 was largely successful in addressing the ONR requirements. Therefore, the RPV Design Philosophy Report will be up-issued during Step 4 to address the actions above, introducing the necessary evidence where appropriate. Written comments and feedback on the RPV Design Philosophy Report received from the ONR during the latter part of Step 3 and early part of Step 4 will also be addressed. This updated report will support a demonstration that the design of the UK ABWR RPV accords with the principles of ALARP.

The evidence contained in the RPV Design Philosophy Report will continue to be incorporated in to the PCSR as a Level 3 supporting document. A summary of this report will be included in the RPV Topic Report produced during Step 4 of the GDA.

Summary of impact on GDA submissions:

GDA Submission Documents	C/U	Related GDA RO Actions(s)	Submission Date to ONR
PSCR (Step 4)	U	N/A	TBC
RPV Topic Report (Step 4)	U	N/A	TBC

Programme Milestones/ Schedule:

See attached Gantt Chart (Table 1).

Reference:

None

Table 1 RO-ABWR-0003 Rev.1 Gantt Chart

