REGULATORY OBSERVATION

REGULATOR TO COMPLETE

RO unique no.:	RO-ABWR-0003
Date sent:	23 March 2016
Acknowledgement required by:	15 April 2016
Agreement of Resolution Plan Required by:	
Resolution of Regulatory Observation required by:	27 October 2017
TRIM Ref.:	2014/136235
Related RQ / RO No. and TRIM Ref. (if any)**:**	
Observation title:	RPV Design
Technical area(s) 12. Structural Integrity	**Related technical area(s)**

Regulatory Observation

The main pressure boundary and support structure of the Reactor Pressure Vessel (RPV) will be constructed from a number of major component parts. There is a need to ensure that this pressure boundary and support structure has the highest level of integrity as the vessel will be classified as a Very High Integrity Component (VHIC).

Whist it is necessary to manufacture the RPV from a number of major component parts that are welded together (shells, domes, support skirts, nozzles etc), there is a need to choose a product form for these major component parts which minimises the number and length of welds, it should have good material properties, and the product form should avoid placing the welds in high stress locations or adverse environments.

In order to satisfy this need, there is a general expectation that the RPV will, where possible, be manufactured from low alloy ferritic forgings which will be chosen to minimise the number and length of welds in the vessel, and that the weldments will, where possible, avoid locations of high stress or neutron irradiation.

Evidence will be required to show that:

- forgings have been chosen that minimise the number and length of the welds in the main pressure boundary of the Reactor Pressure Vessel and its support skirt, and that the weldments will avoid locations of high stress or neutron irradiation;
- consideration has been given to the use of integrally forged nozzles and flanges.

Should welded plate material be proposed for areas of the main pressure boundary, including the RPV head, or the support skirt, rather than forgings, then a detailed justification will be required to demonstrate why this proposal reduces risks to as low as is reasonably practicable (ALARP) taking into account matters such as:

- the material properties of the plate compared with forgings;
- the propensity for defects in a plate compared with forgings;
- the additional weld length required as a result of using multiple plates rather than larger forgings.

Regulatory Observation Actions

Action 1.1

Where plate material is proposed for the main pressure boundary, including the RPV head, provide **evidence** that:

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, 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.

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

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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.

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

REQUESTING PARTY TO COMPLETE

Actual Acknowledgement date:	
RP stated Resolution Plan agreement date:	