

REGULATORY OBSERVATION	
REGULATOR TO COMPLETE	
RO unique no.:	RO-ABWR-0002
Date sent:	3rd April 2014
Acknowledgement required by:	28th April 2014
Agreement of Resolution Plan Required by:	16th May 2014
Resolution of Regulatory Observation required by:	To be determined by the Hitachi-GE Resolution Plan
TRIM Ref.:	2016/126709
Related RQ / RO No. and TRIM Ref. (if any):	
Observation title:	CRD Penetration Design
Technical area(s) 12. Structural Integrity	Related technical area(s)
<i>Regulatory Observation</i>	
<p>The control rod drive (CRD) penetrations through the bottom head of the reactor pressure vessel consists of:</p> <ul style="list-style-type: none"> • a nickel alloy CRD stub tube welded via a full penetration weld to the nickel alloy cladding of the low alloy bottom head • a stainless steel CRD housing welded to the nickel alloy CRD stub tube welded via a partial penetration weld <p>The pressure boundary welds associated with the CRD penetration may not be classified as VHIC welds (still work in progress), however, due to the complexity of the design it will be necessary to demonstrate the initial and through life integrity of this pressure boundary even as Standard Class 1 welds.</p> <p>The demonstration of initial and through life integrity will need to address a number of related aspects including:</p> <ul style="list-style-type: none"> • an explanation of loading mechanisms applied to the penetration including pressure, dead weight, thermal transients, and should include seismic loads and faulted load conditions. • a demonstration of pressure vessel design code compliance, including stress, fatigue and any specific requirements associated with welding directly onto clad material. • an understanding of the inspection approaches to be employed both at manufacture and through life in order to demonstrate that the penetration has been designed to be adequately inspectable • a demonstration that the material choices and stress states of the materials are suitable for minimising the potential for through life degradation • an understanding of the operational experience with this design of penetration 	
<i>Regulatory Observation Actions</i>	
<p>Action 1.1: HGNE should provide evidence of operational experience (OPEX) from plants worldwide operating with this design of CRD, or substantially similar designs. This should include:</p> <ul style="list-style-type: none"> • Incidences of degradation 	

- Incidences of failure
- OPEX on inspection (e.g. ease of application, and confidence in results)
- Manufacturing OPEX

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

Action 1.2:

HGNE should provide evidence that the stress states are suitable for minimising the potential for through-life degradation.

- Limiting locations should be identified.
- Likelihood of degradation for the limiting locations should be assessed

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

Action 1.3:

Identify where the demonstration of suitable materials choices has been made.

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

REQUESTING PARTY TO COMPLETE

Actual Acknowledgement date:

RP stated Resolution Plan agreement date: