

<b>REGULATORY OBSERVATION</b>	
<b>REGULATOR TO COMPLETE</b>	
<b>RO unique no.:</b>	RO-ABWR-0051
<b>Date sent:</b>	6th May 2015
<b>Acknowledgement required by:</b>	28th May 2015
<b>Agreement of Resolution Plan Required by:</b>	28th May 2015
<b>Resolution of Regulatory Observation required by:</b>	<i>To be determined by Hitachi-GE Resolution Plan</i>
<b>TRIM Ref.:</b>	2015/167687
<b>Related RQ / RO No. and TRIM Ref. (if any):</b>	
<b>Observation title:</b>	Mechanical Engineering – SSCs Qualification
<b>Technical area(s)</b> 11. Mechanical Engineering	<b>Related technical area(s)</b> 6. Control & Instrumentation 7. Electrical Power Supply 12. Structural Integrity 15. Radwaste & Decommissioning
<b><i>Regulatory Observation</i></b>	
<p><b>Summary</b> This mechanical engineering regulatory observation is cross cutting. It is being raised to ensure the UK ABWR Structures, Systems and Components (SSCs') qualification arrangements are adequate to demonstrate and substantiate the SSC's design basis. In addition, it is being raised to ensure that the SSC designs reduce risks So Far Is Reasonably Practicable (SFAIRP).</p> <p><b>Assessment Observation</b> During the third Step 3 mechanical engineering technical workshop; Jan 2015; the Requesting Party (RP) provided an overview explanation of its reactor water clean-up system. The explanation continued to target in detail the system main isolation valves.</p> <p>During the explanation the RP stated:</p> <ol style="list-style-type: none"> <li>1. the system isolation valves pressure boundary confinement aspects are assigned with a safety cat "A"; class "1" demand. I advised that the valves internals also provide a pressure boundary confinement function during its isolation function. Thus, the isolation function also demands a level of engineering commensurate to a safety class "1"SSC;</li> <li>2. the valves are of a fail-to-safe design with the mechanical engineering aspects requiring to close within 30 seconds;</li> <li>3. that it is planning to procure the valves from the same supplier as the Japanese fleet of nuclear power plants;</li> <li>4. that a similar valve design is utilised within other systems, which also provide the same reactor confinement isolation function. The only design variance being the pipework diameters;</li> <li>5. that common cause failure has been considered as part of its probability safety analysis (PSA) for the reactor containment valves;</li> <li>6. the SSCs are qualified in accordance with ASME QME 1-2012;</li> <li>7. that factory acceptance test are undertaken using process fluid at an ambient temperature; I noted the plant operating temperature as being 278°C; and</li> <li>8. The pipework arrangement is of a design that allows the valve seat to be inspected and tested during a plant shutdown.</li> </ol> <p>During the fourth Step 3 KIT meeting; 26 February; the RP presented its arguments as set out in PVJ-GD-0080 Rev 0 for undertaking factory acceptance test using process fluid at an ambient temperature.</p>	

I judge the RP's factory acceptance tests as follows:

1. the proposal of using process fluid at an ambient temperature may affect the functionality and operability of the valve internal components;
2. as set out, the tests do not reduce the risks SFAIRP. In addition, it does not provide an adequate level of assurance that the valve will function in accordance with its design basis;
3. the proposal is not aligned with my regulatory expectations of demonstrating a safety cat "A"; class "1" SSC design basis. The valve factory acceptance test arrangement should take account the plant's process fluid temperature of 278°C;
4. the proposal is broadly more aligned with the design basis testing of a safety cat "C"; class "3" SSC; and
5. the test proposal is not aligned with the requirements of Safety Assessment Principles (SAPs) ECS.3; EMT.3 and EQU.1:

ECS.3 – Codes and standards - structures, systems and components that are important to safety should be designed, manufactured, constructed, installed, commissioned, quality assured, maintained, tested and inspected to the appropriate codes and standards;

EMT.3 – Type testing – SSCs' should be type tested before they are installed to conditions equal to, at least, the most onerous for which they are designed;

EQU.1 – Qualification procedures - qualification procedures should be applied to confirm that structures, systems and components will perform their allocated safety function(s) in all normal operational, fault and accident conditions identified in the safety case and for the duration of their operational lives.

I consider this regulatory observation to be cross-cutting and of interest to:

1. Structural integrity;
2. Electrical;
3. Control and instrumentation; and
4. Decommissioning and radwaste.

To conclude, I consider the RP's SSC qualification proposal:

1. is not aligned with UK legislation or RGP;
2. doesn't reduce the risks SFAIRP; thus doesn't secure an ALARP design basis; which is a requirement of UK legislation (Health & Safety at Work etc. Act 1974); and
3. does not enable a GDA to be concluded without this regulatory observation being adequately addressed in an auditable manner.

#### Regulatory Expectations

It is my regulatory expectation that the RP:

1. identifies, reviews and understands the requirements of applicable UK legislation, guidance and relevant good practice (RGP);
2. undertakes a review of all its SSCs' product testing and commissioning proposals against the UK legislation requirements to:
  - a. reduce the SSCs risks SFAIRP; a requirement of UK legislation (Health & Safety at Work etc. Act 1974) and to secure an ALARP design basis;
  - b. meet the expectations of the ONR's SAPs; and
  - c. meet the expectations of UK RGP.
3. generates an auditable trail to its safety claims, supporting arguments and substantiation evidence.

### **Regulatory Observation Actions**

Action # 1

RO-ABWR-0051.A1

1. generate a resolution plan that will:
  - a. present its detailed strategy to demonstrate the UK ABWR SSCs' testing and commissioning activities are aligned with UK legislation and risks are ALARP;
  - b. define and scope the planned activities;
  - c. include a controlled programme identifying: planned activities; deliverables; milestones; timescales and resource requirements; and
  - d. provide the audit trail to demonstrate the UK ABWR SSC's hazards and risks have been reduced SFAIRP and demonstrate the SSCs' design basis to be ALARP.

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

Action # 2

RO-ABWR-0051.A2

Provide progress updates to ONR through the planned GDA engagements

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

Action # 3

RO-ABWR-0051.A3

Make available to ONR activity deliverables, conclusions and recommendations

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

Action # 4

RO-ABWR-0051.A4

1. if appropriate:
  - a. raise design changes; and
  - b. update the UK ABWR safety case, system designs and substantiation

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

Action # 5

RO-ABWR-0051.A5

Make available any appropriate updated documents and substantiation for ONR assessment

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

**REQUESTING PARTY TO COMPLETE**

**Actual Acknowledgement date:**

**RP stated Resolution Plan agreement date:**