

**Hitachi-GE Nuclear Energy, Ltd.**  
**UK ABWR GENERIC DESIGN ASSESSMENT**  
**Resolution Plan for RO-ABWR-0016**  
**(Mechanical Engineering Design Process Arrangement)**

<b>RO TITLE:</b>	Mechanical Engineering Design Process Arrangement		
<b>REVISION :</b>	Rev. 2		
<b>Overall RO Closure Date (Planned):</b>	26 June 2015		
<b>REFERENCE DOCUMENTATION RELATED TO REGULATORY OBSERVATION</b>			
<b>Regulatory Queries</b>	-		
<b>Linked ROs</b>	RO-ABWR-0015, RO-ABWR-0017, RO-ABWR-0018, RO-ABWR-0047, RO-ABWR-0049, RO-ABWR-0050, RO-ABWR-0051, RO-ABWR-0052, RO-ABWR-0054		
<b>Other Documentation</b>	-		

<b>Scope of work :</b>
<p>This Resolution Plan describes Hitachi-GE's current plan to address the RO. It contains the detailed strategy, the planned activities, deliverables, milestones, timescales, resources assignment as well as reference to the audit trail.</p> <p>Apart from Mechanical Engineering, this resolution plan is related to the following technical areas:</p> <ul style="list-style-type: none"> <li>- Conventional safety</li> <li>- Structural integrity</li> <li>- Civil engineering</li> <li>- Control and instrumentation</li> <li>- Electrical</li> <li>- MSQA</li> <li>- Fault studies</li> <li>- PSA</li> <li>- HFE</li> <li>- Radwaste &amp; Decommissioning</li> </ul>

## Description of work:

The main actions to be undertaken to resolve the RO are described as follows.

### **ACTION 1: Generation of the Resolution Plan**

#### Actions requested by the Regulator as stated in the RO:

1. *generate a resolution plan that will:*
  - a. *present its detailed strategy to implement a robust design process for optioneering its mechanical engineering SSCs’;*
  - 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 its proposed design process arrangement.*

#### Hitachi-GE’s actions:

Hitachi-GE agreed with the Regulator to deliver a draft Resolution Plan (this document) by the end of October. Then, Hitachi-GE and the Regulator will revise this resolution plan and agree the final plan during the Second Technical Exchange Workshop from the 15<sup>th</sup> to the 20<sup>th</sup> of December. The official issue of the resolution plan will be no later than the 26<sup>th</sup> of December 2014.

#### Deliverables:

- 1) Draft Resolution Plan: by the 31<sup>st</sup> of October 2014
- 2) Final Resolution Plan: no later than 26<sup>th</sup> of December 2014

#### Impacted GDA and GEP Submissions: -

Resources: Hitachi-GE ME SME will prepare the resolution plan in coordination with all the engineering and design sections involved.

### **ACTION 2: Identification of all applicable ME SSCs and search for design manuals**

#### Actions requested by the Regulator as stated in the RO:

3. *Identify all the applicable mechanical engineering SSCs*

#### Hitachi-GE’s actions:

Hitachi-GE will produce a list where all the ME SSCs relevant to the GDA safety case will be reflected by May 2015. In addition, a complete list of all the existing and auditable design manuals will be produced as well. This task is expected to be finalised by June 2015.

#### Deliverables:

- 1) List of Applicable SSCs to the ME Safety Case (Revision 0, by May 2015)
- 2) List of Design Manuals for ME SSCs (Revision 0, submitted in September 2014)
- 3) List of Design Manuals for ME SSCs (Revision 1, by May 2015)
- 4) The results and conclusions from this action to be reported in the Final Report on the Conclusions and

Recommendations from the Regulatory Observation (by December 2015\*)(provisional)

Impacted GDA and GEP Submissions:

- 1) Master Document Submission List
- 2) Basis of Safety Case Documents
- 3) Support Evidence Documents (design manuals)

Resources: Hitachi-GE ME SME team and all the engineering and equipment design sections involved.

\*Note: the planned closure of this RO will be extended.

**ACTION 3: Identification of all applicable legislation and RGP to the design process of ME SSCs**

Actions requested by the Regulator as stated in the RO:

2. *Define all the UK applicable, guidance and legislation*

Hitachi-GE's actions:

Hitachi-GE is undertaking a thorough multidisciplinary search for all the applicable legislation and RGP to the ME safety case. A data base to manage all the documents and share the contents with all the sections involved has been constructed and will be regularly updated. In addition, a list indicating all the applicable legislation and RGP per SSC was generated and will be revised and updated regularly as well.

Deliverables:

- 1) List of Applicable Legislation and RGP to ME SSCs Rev.0 (submitted in September 2014)
- 2) List of Applicable Legislation and RGP to ME SSCs Rev. 1 (by December 2014)
- 3) List of Applicable Legislation and RGP to ME SSCs Rev. 2 (by February 2015)
- 4) The results and conclusions from this action to be reported in the Final Report on the Conclusions and Recommendations from the Regulatory Observation (by December 2015\*)(provisional)

Impacted GDA and GEP Submissions:

- 1) Master Document Submission List
- 2) Basis of Safety Case Documents
- 3) Support Evidence Documents

Resources:

- 1) Hitachi-GE: ME SME team, systems engineering sections and equipment design sections involved
- 2) Horizon Nuclear Power ME SME
- 3) UK Consultancy for specific areas as necessary

\*Note: the planned closure of this RO will be extended.

**ACTION 4: Review of Hitachi-GE's General Design Process Arrangements**

Hitachi-GE's actions:

Hitachi-GE is reviewing its general design process arrangements to meet UK expectations in coordination with all the engineering and design sections involved as well as MSQA group. This task is expected to be finalised by June

2015.

- 1) Hitachi-GE's General Design Process Arrangements for ME SSCs (Revision 1, by May 2015)
- 2) The results and conclusions from this action to be reported in the Final Report on the Conclusions and Recommendations from the Regulatory Observation (by December 2015\*)(provisional)

Impacted GDA and GEP Submissions:

- 1) Master Document Submission List (to include the new deliverable)

Resources:

- 1) Hitachi-GE: ME and MSQA teams

\*Note: the planned closure of this RO will be extended.

**ACTION 5: Gap analysis and design review**

Actions requested by the Regulator as stated in the RO:

4. *Examine and review its extant design process arrangement against the stated expectations*
6. *if appropriate:*
  - a. *raise design changes;*
7. *Provide progress updates to ONR through the planned engagements*

Hitachi-GE's actions:

Based on the revised General Design Process policy for ME SSCs of Action 4, each design section will first undertake the revision and modification of their specific extant design process arrangements for all ME SSCs against the stated expectations to ensure conformance with UK relevant good practice as necessary during Step 3. The concept design of ME SSCs will be implemented based on the revised design process arrangements. Depending on the results of the concept design process Hitachi-GE might raise design changes, the major part of which will be implemented and finalised by August 2015 (design reference point).

The review is being carried out by all the mechanical engineering and design sections involved as well as the interfacing disciplines. These tasks are due to be finalised by August 2015 (design reference point) and update on the progress will be provided during all the regular progress meeting video conferences and workshops already agreed with the Regulator.

This task (Action 5) includes the design activity after RO closure.

Deliverables:

- 1) Hitachi-GE's General Design Process Arrangements for ME SSCs (see action 4)
- 2) Supporting documents (see action 6)
- 3) The results and conclusions from this review to be reported in the Final Report on the Conclusions and Recommendations from the Regulatory Observation (by December 2015\*)(provisional)

Impacted GDA and GEP Submissions:

- 1) Basis of Safety Case Documents

- 2) Support Evidence Documents
- 3) Master Document Submission List

Resources:

- 1) Hitachi-GE: ME team, systems engineering sections and equipment design sections involved
- 2) Hitachi-GE: interfacing disciplines with ME (see scope of work)
- 3) Horizon Nuclear Power ME SME
- 4) UK Consultancy for specific areas as necessary

\*Note: the planned closure of this RO will be extended.

**ACTION 6: Update of the safety case documents**

Actions requested by the Regulator as stated in the RO:

7. *if appropriate:*
  - b. *update the UK ABWR safety case, system designs and substantiation;*
8. *make available any appropriate updated documents and substantiation for ONR assessment.*

Hitachi-GE's actions:

The results of the review, including the design changes, will be reflected in the UK ABWR safety case documentation (substantiation), which will clearly show the claims, arguments and evidence. The fixed documents of the mechanical systems related to the safety case will be submitted to ONR by the end of August 2015 and from the start of Step 4. Where substantiation needs to be extended or repeated, as a result of the review, the timescales to achieve this will be defined. If evidence is not possible within GDA timeframes, the proposed method and timescales will be presented during GDA.

This task (Action 6) includes the design activity after RO closure.

Deliverables:

- 1) Basis of Safety Case Documents:
  - A) Fixed Basis of Safety Case Documents for mechanical systems (Revisions 1 or 2, by August 2015)
- 2) Support Evidence Documents:
  - A) Evidence documents of safety case mechanical systems (Revision 0, from the start of Step 4)\*\*
  - B) Generation Plans for those systems that evidence will not be available during the GDA (from the start of Step 4)\*\*

\*\*Note: This item might be extended after RO closure.

Impacted GDA and GEP Submissions:

- 1) Generic PCSR Sub-chapters Rev. A (changes to be reflected in Revisions B and C)
- 2) Basis of Safety Case Documents
- 3) Support Evidence Documents
- 4) Master Document Submission List

Resources:

- 1) Hitachi-GE: ME SME team, systems engineering sections, civil engineering section and equipment design sections
- 2) Outsourcing: External equipment suppliers

**ACTION 7: Report on the conclusions and recommendations**

Actions requested by the Regulator as stated in the RO:

5. *make available to ONR the review conclusions and recommendations;*

Hitachi-GE's actions:

The conclusions and recommendations from the all the actions of the regulatory observation, including the results of the gap analysis and design reviews, will be described in a final report which will be submitted to ONR after the conclusion of the process by December 2015\* (provisional).

Deliverables:

- 1) Final Report on the Design Process of ME SSCs (by June 2015)

Impacted GDA and GEP Submissions:

- 1) Master Document Submission List (to reflect the new deliverable)

Resources: Hitachi-GE ME SME team in coordination with all the sections involved.

\*Note: the planned closure of this RO will be extended.

**ACTION 8: Broader Application to Other Disciplines**

Hitachi-GE's actions:

Since this RO is potentially applicable to other disciplines due to its broad scope, Hitachi-GE is planning to share the revised design process arrangements from the ME perspective with all the cross-cutting disciplines that follow the same design methodology and to standardize them as part of the Process Quality Control (PQC) during Step 3.

Resources: Hitachi-GE ME SME team, Project Management and all related cross-cutting disciplines.

**Summary of impact on GDA submissions:**

The GDA submissions that will be affected by the actions to resolve this RO are summarised below. These documents will be originated and/or revised in accordance with the corresponding actions.

Document

Master Document Submission List  
Generic PCSR Sub-chapters  
Basis of Safety Case Documents  
Support Evidence Documents

**Programme Milestones/ Schedule:**

Refer to the attached Gantt-chart for the programmed activities and the schedule for the resolution of the RO.

**Reference:**

Ref	Document Title	Document ID	Rev.
1	Technical Assessment Guide: Design Safety Assurance	TAST/057	Issue 2
2	Detailed Gantt Chart for UK ABWR Resolution Plan (Corresponding to RO-ABWR-0016)	GA91-9201-0005-00020	2

Table 1 RO-ABWR-0016 Gantt Chart

