

**Hitachi-GE Nuclear Energy, Ltd.**  
**UK ABWR GENERIC DESIGN ASSESSMENT**  
**Resolution Plan for RO0052**  
**(Mechanical Engineering – Design Process – SSCs’ Detailed Design)**

<b>RO TITLE:</b>	Mechanical Engineering – Design Process – SSCs’ Detailed Design	
<b>REVISION :</b>	1	
<b>Overall RO Closure Date (Planned):</b>	<i>31 August 2016</i>	
<b>REFERENCE DOCUMENTATION RELATED TO REGULATORY OBSERVATION</b>		
<b>Regulatory Queries</b>	-	
<b>Linked ROs</b>	<i>RO-ABWR-0016</i>	
<b>Other Documentation</b>	-	

<b>Scope of work :</b>
<p>The ONR is requesting how Hitachi-GE meets the expectation to reduce the risk SFAIRP and demonstrate each SSC is ALARP. In this RO-ABWR-0052, Hitachi-GE provides the generation process for the activities at the detail design stage to perform the requesting assessment such as optioneering and ALARP. RO-ABWR-0016, which has been issued, is the objective to the comprehensive description at concept design stage. On the other hand, in this RO-ABWR-0052, Hitachi-GE provides the procedure to address how detail design strategy is developed from the concept design stage and how the requested assessment is performed.</p> <p>Apart from Mechanical Engineering, this resolution plan is related to the following technical areas:</p> <ul style="list-style-type: none"> <li>- Structural Integrity</li> <li>- Electrical Power Supply</li> <li>- Control &amp; Instrumentation</li> <li>- Radwaste &amp; Decommissioning</li> </ul>

## Description of work:

### 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 demonstrate SSCs important to safety are aligned with UK legislation and are optioneered to be 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 each UK ABWR SSC hazards and risks have been reduced SFAIRP and demonstrate each SSC is ALARP.*

#### Hitachi-GE's actions:

Hitachi-GE agreed with the Regulator to deliver a draft Resolution Plan by 23th of April. Then, Hitachi-GE shared the final resolution plan with the Regulator during the Technical Workshop on 23th of April and Step-3 Progress Meeting on the 4th of June. The official issue of the resolution plan will be no later than 30th of June 2015.

Resolution plan includes the following activities for representative component;

- (a) Hitachi-GE defines the representative component in agreement with ONR. Hitachi-GE generates a procedure with the design arrangements to define the GAP analysis, optioneering and risk assessment methodology for the detail design stage in accordance to UK's requirements. Hitachi-GE and/or its suppliers will perform the detail design in accordance to this procedure in order to ensure that the detail design meets the original design intend from the concept stage and also satisfies UK's legislation as well as ALARP requirements for fabrication and procurement.
- (b) Components subjected to the GAP analysis, optioneering and risk assessment for the detail design include the component itself or the assembled parts. Hitachi-GE will define the unit (component and/or part) object of assessment for each component in this detail design procedure.
- (c) If the GAPS are founded, Hitachi-GE performs optioneering and risk assessment with respect to ALARP. Risk Assessment is required to identify the available supporting analysis (such as hazards analysis or FMEA etc,) to satisfy the UK safety requirement.
- (d) Hitachi-GE generates a purchase specification for representative sample equipment to demonstrate the compliance with the design procedure.

#### Deliverables:

- 1) Draft Resolution Plan: by the 23th of April 2015
- 2) Final Resolution Plan: by 30th of June 2015
- 3) Design Procedure for FEED/ EPC: by December 2015
- 4) Purchase Specification (Representative equipment): by August 2016

#### Impacted GDA Submissions:

- 1) Basis of Safety Case Documents

#### Resources:

Hitachi-GE: ME SME team, systems engineering sections, equipment design sections and QA sections involved.

## **Action 2      Progress Updates**

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

- 2) *provide progress updates to ONR through the planned GDA engagements;*

### Hitachi-GE's actions:

Hitachi-GE provides the progress updates of the design procedure, aligning with the regulator feedbacks. Timescales are given in the Table-1 Gantt-chart.

### Audit trail:

- 1) Minutes/Reports

### Deliverable:

- 1) Design Procedure for FEED/ EPC: by December 2015
- 2) Purchase Specification (Representative equipment): by August 2016

### Impacted GDA Submissions:

- 1) Basis of Safety Case Documents

### Resources:

Hitachi-GE: ME SME team, systems engineering sections, equipment design sections and QA sections involved.

## **Action 3      Make available to ONR, activity deliverables, conclusions and recommendations**

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

- 3) *Make available to ONR, activity deliverables, conclusions and recommendations.*

### Hitachi-GE's actions:

Hitachi-GE will make available to ONR, activity deliverables, conclusions and recommendations.

### Audit trail:

- 1) Minutes/Reports

### Deliverable:

- 1) Design Procedure for FEED/ EPC: by December 2015
- 2) Purchase Specification (Representative equipment): by August 2016

### Impacted GDA Submissions:

- 1) Basis of Safety Case Documents

### Resources:

Hitachi-GE: ME SME team, systems engineering sections, equipment design sections and QA sections involved.

#### **Action 4      Design change and updated documentation**

Actions requested by the Regulator as stated in the RO:

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

Hitachi-GE's actions:

If warranted by opitoneering and risk assessment after issuing Design Procedure, Hitachi-GE will implement the design change via Hitachi-GE design change process as necessary.  
The detail will be updated in the ME workshop in the GDA step-4.

Audit trail:-

Deliverable:-

Impacted GDA Submissions: -

Resources: -

#### **Action 5      Make available any appropriate updated documents and substantiation for ONR assessment**

Actions requested by the Regulator as stated in the RO:

- 5) *make available any appropriate updated documents and substantiation for ONR assessment.*

Hitachi-GE's actions:

Hitachi-GE will make available any appropriate updated documents and substantiation for ONR assessment.

Audit trail:

- 1) Minutes/Reports

Deliverables:

- 1) Design Procedure for FEED/ EPC: by December 2015
- 2) Purchase Specification (Representative equipment): by August 2016

Impacted GDA Submissions:

- 1) Basis of Safety Case Documents

Resources:

Hitachi-GE: ME SME team, systems engineering sections, equipment design sections and QA sections involved.

**Action 6 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 Design Procedure for FEED/ EPC.

Audit trail:

- 1) Minutes/Reports

Deliverables:

- 1) Design Procedure for FEED/ EPC: by December 2015

Impacted GDA Submissions:

- 1) Basis of Safety Case Documents

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. Document ID and Submission Date will be determined after sample equipment is defined in Action 1. These documents will be revised in accordance with the corresponding actions.

- 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	Safety assessment principles for nuclear facilities	—	0

Table 1 RO-ABWR-0052 Gantt-Chart

				2015												2016																																																																		
				March		April		May		June		July		August		September		October		November		December		January		February		March		April		May		June		July		August																																												
Level	Action Title	Start	Finish	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	1	8	15	22	29	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29
1	Regulator's issue of RO	6-Mar-15	29-May-15																																																																															
1.1	ONR Issue RO	6-Mar-15	6-Mar-15																																																																															
1.2	Hilachi-GE acknowledge RO & issue Resolution Plan	10-Apr-15	17-Apr-15																																																																															
1.3	Resolution Plan (DRAFT) - HGNE preparation	6-Mar-15	27-Apr-15																																																																															
1.4	Resolution Plan (DRAFT) - ONR review	27-Apr-15	27-Apr-15																																																																															
1.5	Resolution Plan Rev.0 - HGNE preparation	27-Apr-14	26-Jun-15																																																																															
1.6	Resolution Plan Rev.0 - HGNE submission	29-Jun-15	30-Jun-15																																																																															
1.7	Resolution Plan Rev.0 - ONR publish	TBD	TBD																																																																															
2	Preparation of Submissions and Closure of RO Actions	6-Mar-15	19-Aug-16																																																																															
2.1	RO Action 1: Generation of the Resolution Plan	6-Mar-15	19-Aug-16																																																																															
2.2	RO Action 2: Progress Update	1-Sep-15	30-Jun-16																																																																															
2.3	RO Action 3: Make available to ONR, activity deliverables, conclusions and recommendations	1-Sep-15	30-Jun-16																																																																															
2.4	RO Action 4: Design change and updated documentation	21-Dec-15	19-Aug-16																																																																															
2.5	RO Action 5: Make available any appropriate updated documents and substantiation for ONR assessment	14-Dec-15	19-Aug-16																																																																															
2.6	RO Action 6: Broader Application to other disciplines	1-May-15	12-Aug-16																																																																															
3	Regulator's Closure of RO	27-Apr-15	31-Aug-16																																																																															
3.1	Regulators Assessment	27-Apr-15	31-Aug-16																																																																															
3.2	Regulator's publication of RO closure letter	TBD	TBD																																																																															