

UK ABWR

**Hitachi-GE Nuclear Energy, Ltd.
UK ABWR GENERIC DESIGN ASSESSMENT
Resolution Plan for RO-ABWR-0015
(Mechanical engineering SSC's qualification and layout provision)**

RO TITLE:	Mechanical engineering SSC's qualification and layout provision	
REVISION :	Rev. 0	
Overall RO Closure Date (Planned):	28 June 2015	
REFERENCE DOCUMENTATION RELATED TO REGULATORY OBSERVATION		
Regulatory Queries	-	
Linked ROs	-	
Other Documentation	-	

Scope of work :
<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"> - Conventional safety - Radiation protection - MSQA - Decommissioning and radioactive waste - Internal hazards - Civil engineering and external hazards

Description of work:
<p>The main actions to be undertaken to resolve the RO are described as follows.</p> <p>ACTION 1: Generation of the Resolution Plan</p> <p><u>Actions requested by the Regulator as stated in the RO:</u></p> <ol style="list-style-type: none"> 1. <i>generate a resolution plan that will:</i> <ol style="list-style-type: none"> a. <i>present its detailed strategy to demonstrate each UK ABWR mechanical engineering SSC is</i>

adequately qualified. In addition, where necessary the building layout has sufficient provision to support a replacement;

- 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:

 - i. each SSC design has been adequately qualified;*
 - ii. each SSC design risks have been reduced SFAIRP demonstrating the design is as low as reasonably practicable (ALARP); and*
 - iii. where necessary the building layout provision is sufficient to support a SSC replacement.**

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 15th to the 20th of December. The official issue of the resolution plan will be no later than the 26th of December 2014.

Deliverables:

- 1) Draft Resolution Plan: by the 31st of October 2014
- 2) Final Resolution Plan: no later than 26th 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 legislation and RGP to the design process of ME SSCs

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 June 2015)

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

ACTION 3: Review of Hitachi-GE's General Policy on SSCs Design LifeHitachi-GE's actions:

Hitachi-GE is reviewing its general policy (criteria) on the design life of ME SSCs to meet UK expectations in coordination with project management and all the engineering and design sections involved. In addition, collaboration of an independent expert will be considered as requested by ONR. This task is expected to be finalised by February 2015.

Deliverables:

- 1) Hitachi-GE's Strategy on the Design Life of ME SSCs (policy) (Revision 0, by January 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 June 2015)

Impacted GDA and GEP Submissions:

- 1) Generic PCSR Sub-chapter 5.5: Qualification of SSCs Rev. A
- 2) Generic PCSR Sub-chapter 5.7: Monitoring, Inspections and Testing Rev. A
- 3) Master Document Submission List (to include the new deliverable)

Resources:

- 1) Hitachi-GE: ME SME team and project management team
- 2) Independent expert

ACTION 4: Multidisciplinary Design ReviewActions requested by the Regulator as stated in the RO:

2. *undertake a multidiscipline review (include an independent) that will:*
 - a. *clarify a SSC design life; noting SSCs identified to support post operational clean out (POCO) and decommissioning phases for example ventilation systems will have an increased life requirement;*
 - b. *establish the design life limiting factors;*
 - c. *establish if a SSC has been fully optioneered and its design is ALARP;*
 - d. *establish the adequacy of existing qualification substantiation;*
 - e. *establish if it is reasonable and ALARP to undertake further qualification; and*
 - f. *establish where necessary if the building layout ingress/ egress provision is adequate to support a SSC replacement.*

3. *adopt a hierarchical and phased approach to undertaking the review;*
4. *provide progress updates to ONR through the planned GDA engagements;*
6. *if appropriate:*
 - a. *raise design changes;*

Hitachi-GE's actions:

Hitachi-GE is undertaking a thorough multidisciplinary design review of all ME SSCs relevant to the safety case which covers the tasks above indicated as requested by the Regulator. The tasks of Action 4 are being undertaken following a hierarchical approach by starting from ME SSCs that may represent a higher impact on the plant layout (e.g. large components which in the Japanese reference ABWR are designed for 40 years life without replacement provision) and finishing with those SSCs with minor impact. Depending on the results of the design reviews Hitachi-GE will raise design changes and perform re-qualification when necessary, which will be implemented along with the review and finalised by August 2015 (submission date of PCSR Rev. C).

The review is being carried out by all the engineering and design sections involved. These tasks are due to be finalised by August 2015 (date of submission of PCSR Rev. C) 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 4) includes the design activity after RO closure.

Deliverables:

- 1) Safety case documentation (see actions 5 and 6)
- 2) The results and conclusions from this review to be reported in the Final Report on the Conclusions and Recommendations from the Regulatory Observation (by June 2015)

Impacted GDA and GEP Submissions: see actions 5 and 6

Resources:

- 1) Hitachi-GE: ME SME team, related SMEs, systems engineering sections, civil engineering section and equipment design sections
- 2) Outsourcing: External equipment suppliers
- 3) UK consultancy as necessary

ACTION 5: 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 two representative systems will be submitted to ONR by May 2015 for assessment and discussion with the Regulator

until June 2015. The conclusions of this revision will be reflected in the rest of safety case documents, which will be fixed and submitted to ONR by the end of August 2015 and from the start of Step 4. Where substantiation or qualification needs to be extended or repeated, as a result of the review, the timescales to achieve this will be defined. If revised qualification is not possible within GDA timeframes, the proposed method and timescales for qualification will be presented during GDA.

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

Deliverables:

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

*Note; This item is the action 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 6: 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 multidisciplinary review, will be described in a final report which will be submitted to ONR after the conclusion of the process by June 2015.

Deliverables:

- 1) Final Report on the Optioneering regarding the Design Life of ME SSCs (by June 2015)

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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.

ACTION 7: Actions outside the GDA Scope

Hitachi-GE’s actions:

Depending on the results of the design reviews, the fabrication process, the qualification tasks, the installation and tests during commissioning, the EMIT tasks during operation and the decommissioning tasks might be affected. Therefore, these tasks will have to be undertaken in accordance with the policy described in Hitachi-GE’s Strategy on the Design Life of ME SSCs as well as the design documents (supporting documents of safety case + the whole suite of documents outside GDA scope) containing the results from the design reviews.

After the conclusion of the GDA, those design documents outside of its scope will be generated with the results from the design reviews of this regulatory observation reflected on them. In addition, the design documents already generated before will be updated as necessary. These documents will be applied to perform all the stages of the plant life and thus, the safety case will be implemented into the plant life cycle.

Finally, Hitachi-GE will update its general policy on ME SSCs design life described in Hitachi-GE’s Strategy on the Design Life of ME SSCs as necessary to reflect the progress during the plant life cycle.

This task (Action 7) is the design activity after RO closure.

Deliverables: -

Impacted GDA and GEP Submissions: -

Resources:

- 1) Hitachi-GE ME SME team in coordination with all the sections involved
- 2) Horizon Nuclear Power
- 3) Equipment Suppliers
- 4) Sub-contractors
- 5) Etc.

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

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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	Detailed Gantt Chart for UK ABWR Resolution Plan (Corresponding to RO-ABWR-0015)	GA91-9201-0005-00019	0

