

**Hitachi-GE Nuclear Energy, Ltd.**  
**UK ABWR GENERIC DESIGN ASSESSMENT**  
**Resolution Plan for RO-ABWR-0056**  
**Demonstration that adequate optioneering has been carried out**  
**for the removal of Spent Fuel from the Reactor Building**

<b>RO TITLE:</b>	Demonstration that adequate optioneering has been carried out for the removal of Spent Fuel from the Reactor Building	
<b>REVISION :</b>	0	
<b>Overall RO Closure Date (Planned):</b>	30 September 2015	
<b>REFERENCE DOCUMENTATION RELATED TO REGULATORY OBSERVATION</b>		
<b>Regulatory Queries</b>	-	
<b>Linked ROs</b>	RO-ABWR-0011, RO-ABWR-0037	
<b>Other Documentation</b>	-	

<b>Scope of work :</b>
<p><b>Background</b></p> <p>Hitachi-GE has developed a Basis of Safety Case (BoSC) for the United Kingdom Advanced Boiling Water Reactor (UK-ABWR) Spent Fuel Interim Storage (SFIS) system. The BoSC describes the safety case approach for the SFIS system based on the concrete storage cask system selected in Generic Design Assessment (GDA) Step 2.</p> <p>Hitachi-GE has identified that the removal and management of spent fuel from the reactor building is important given the potential risks posed to workers and to the public by its inadequate execution.</p> <p>RO-ABWR-0056 has been raised to clearly define the Office for Nuclear Regulation (ONR) expectations regarding the demonstration of adequate optioneering for the removal of spent fuel from the reactor building. This resolution plan sets out the strategy and plan for Hitachi-GEs response to RO-ABWR-0056.</p> <p><b>Scope of Work</b></p> <p>The objective of this resolution plan is to present the strategy and plan for responding to RO-ABWR-0056, and to demonstrate that this strategy will be compliant with ONR expectations as defined in the RO-ABWR-0056. In particular the response will demonstrate that a process of loading of spent fuel into the transfer container and spent fuel removal optimization has been followed in a transparent manner which forms part of the safety case for the UK ABWR which reduces risks SFAIRP.</p>

RO-ABWR-0056 is closely linked to RO-ABWR-0011 and as such the responses to both will be linked. The response to RO-ABWR-0056 will be specific to removal of spent fuel from the reactor building, but will clearly identify any overlap and interaction with the response to RO-ABWR-0011.

The response to the RO-ABWR-0056 will clearly identify:

- What the risks are that are being eliminated or mitigated, including a discussion of the likelihood and consequences of these risks;
- What measures are in place to mitigate these risks, including the adoption of relevant good practice measures;
- What options, or range of options, could be applied to further mitigate these risks; and
- A demonstration of whether these options are reasonably practicable to implement or not.

The response to RO-ABWR-0056 will include the following activities:

- The import of SFIS equipment into the Reactor Building for the removal of spent fuel.
- Loading of spent fuel into the transfer container.
- The export of the spent fuel from the Reactor building.

Specific to this resolution plan (in response to RO-ABWR-0056) Hitachi-GE have assumed that the spent fuel pool is located on operation floor. Justification that this location reduces overall station risk SFAIRP will be described in response of RO-ABWR-0011. This provides a basis for assessing the potential options for handling spent fuel in SFP in the reactor building.

The scope of the response to RO-ABWR-0056 will not include handling of non-SFIS specific equipment or storage of spent fuel within the spent fuel pool (which will be considered in the response to RO-ABWR-0011). The response also will not include movement of SFIS equipment outside the reactor building or storage of spent fuel outside of the reactor building as this depends upon site specific conditions and will be considered during site licencing.

### **Description of work:**

The regulatory observation (RO-ABWR-0056) includes two actions:

#### **RO-ABWR-0056. A1**

**Hitachi-GE to provide a robust demonstration to show that adequate optioneering has been undertaken for the management of removal of spent fuel outside the reactor building**

#### **RO-ABWR-0056. A2**

**Hitachi-GE to provide a robust demonstration to show that adequate optioneering has been undertaken for the loading of spent fuel into the transfer container**

The response to these actions has been split into sub tasks as follows:

**Response to RO-ABWR-0056. A1**

The response to RO-ABWR-0056. A1 will consist of the following sub-tasks:

**Task 1.1 – Define Problem Statement and Strategy**

Hitachi-GE will define the problem statement which will:

- Define the risks that are to be mitigated, including likelihood and consequences of the activities in question.
- Identify what measures are in place to mitigate these risks, including adoption of relevant good practice.

This sub task will also define the strategy for delivering the ALARP optioneering required to clearly and transparently demonstrate that risks have been adequately assessed and that the option chosen reduces risks SFAIRP.

**Task 1.2 - Generate options to determine the safest route for transporting casks into the reactor building and remove them from the reactor building once they have been loaded with spent fuel.**

Based on the strategy developed in Task 1.1, options for transporting transfer casks inside the reactor building will be generated for the following processes:

- The import of transfer casks into the Reactor Building to the spent fuel pool.
- The export of the transfer casks from the Reactor building from the spent fuel pool.

**Task 1.3 - Option review and decision of assessment criteria and its weighting**

The assessment will be conducted against agreed assessment criteria (considering nuclear safety risk, industrial safety, environmental risk and cost/difficulty considerations) and the weighting to be applied to each criteria.

**Task 1.4 - Screening, scoring of options and identification of option which reduces risk SFAIRP**

The screening and scoring for each cask route options based on the assessment criteria and their weighting developed in sub Task 1.3 will be demonstrated. A preferred option, or options, which scored the highest in the ALARP optioneering exercise, along with a discussion of the ALARP optioneering exercise, will be presented in a SFIS ALARP Optioneering Report which will be a key supporting reference to the SFIS BoSC.

**Deliverable to respond to RO-ABWR-0056.A1**

An SFIS ALARP report will be submitted on the 23<sup>rd</sup> July 2015 which will detail the results of sub-tasks 1.1 to 1.4 above. This will demonstrate the optimal route, or routes, for transporting transfer casks between the reactor building entrance and the spent fuel pool.

### **Response to RO-ABWR-0056. A2**

The response to RO-ABWR-0056. A2 will consist of the following sub-tasks:

#### **Task 2.1 – Define Problem Statement and Strategy**

Hitachi-GE will define the problem statement which will:

- Identify the key risks that are to be mitigated, including consideration of the likelihood and consequences of the activities in question.
- Identify the main measures in place to mitigate these risks.

This sub task will also define the strategy for delivering the ALARP optioneering required to clearly and transparently demonstrate that risks have been adequately assessed and that the option chosen reduces risks SFAIRP.

#### **Task 2.2- Generation of options for transport route between spent fuel pool and the reactor building entrance**

Based on the strategy developed in Task 2.1, options for transporting SFIS equipment inside the reactor building will be generated for the following processes:

- The layout of the facilities considering the transfer of spent fuel into the transfer container.

It should be noted that part of the response to this will include demonstration that the spent fuel pool is in the location that reduces risks SFAIRP.

#### **Task 2.3 – Option review and decision of assessment criteria and its weighting**

The assessment will be conducted against agreed assessment criteria (considering nuclear safety risk, conventional safety, environmental risk and financial considerations) and consideration of the weighting to be applied to each criteria.

#### **Task 2.4 – Screening, scoring of options and identification of option which reduces risk SFAIRP**

The screening and scoring for each identified irradiated fuel assembly handling route between the racks and the transfer cask will be demonstrated. A preferred option, or options, identified as reducing risks ALARP in the assessment, along with a discussion of the ALARP optioneering exercise, will be presented in a Fuel Route Layout and FPC System ALARP workshop report which will be a key supporting reference to the SFIS BoSC.

### **Deliverable to respond to RO-ABWR-0056.A2**

A fuel route layout and FPC system ALARP report will be submitted on the 30<sup>th</sup> September 2015 which will detail the results of sub-tasks 2.1 to 2.4 above. This will demonstrate the location of the spent fuel pool that reduced risks SFAIRP and also demonstrates the optimal route, or routes, for loading fuel into the transfer casks in the spent fuel pool.

**Summary of impact on GDA submissions:**

<u>GDA Submission Document Title</u>	<u>Related RO Actions</u>	<u>Submission Date to ONR</u>
Spent Fuel Interim Storage Optioneering for Spent Fuel Removal from Spent Fuel Pool to Outside of Reactor Building	A1	July 23 <sup>rd</sup> , 2015
Fuel Route Layout and FPC System ALARP workshop reports	A2	September 30 <sup>th</sup> , 2015

**Programme Milestones/ Schedule:**

See attached Gantt Chart (Table 1)

**Reference:**

N/A

