

Hitachi-GE Nuclear Energy, Ltd.
UK ABWR GENERIC DESIGN ASSESSMENT
Resolution Plan for RO-ABWR-0011
Safety case for spent fuel pool and fuel route

RO TITLE:	Safety case for spent fuel pool and fuel route	
REVISION :	1	
Overall RO Closure Date (Planned):	30. May. 2016	
REFERENCE DOCUMENTATION RELATED TO REGULATORY OBSERVATION		
Regulatory Queries	-	
Linked ROs	-	
Other Documentation	-	

Scope of work :
<p>Background Hitachi-GE's Step 2 Preliminary Safety Report (PSR) submission of the UK ABWR ("Fault Studies to Discuss Deterministic Analysis, PSA and Fault Schedule Development", GA91-9901-0009-00001 Rev B [Ref[1]]) is mainly concerned with the "traditional" faults directly associated with the reactor. Details are given on initiating events, single failure assumptions, acceptance criteria and proposed transient analyses for the reactor faults. However, an equivalent level of detail is not provided for faults associated with the spent fuel pool or the wider fuel route. The "Initial Safety Case Report on Spent Fuel Pool" (GA91-9901-0003-00001 Rev B [Ref[2]]) introduces some of these items but it needs to be developed further.</p> <p>Scope of Work This resolution plan shows some actions and milestones for preparation of the safety case with the spent fuel pool and fuel route for the UK ABWR.</p> <p>This Resolution Plan describes Hitachi-GE's current plan to address the RO. As the work develops, we may choose alternative means to address the RO.</p>

Description of work:
<p>ACTION 1 – Scope of spent fuel pool/fuel route safety case Hitachi-GE will clearly identify the scope of the spent fuel pool and fuel route safety case for GDA, in terms of:</p> <ul style="list-style-type: none"> •Operational states, •System boundaries, •Refuelling and outage operations, •Import and export of fresh and irradiated fuel. <p>Links and interfaces with other aspects of the UK ABWR safety case will be also identified.</p> <p>ACTION 2 – Identification of initiating events A comprehensive list of initiating events within the scope of spent fuel pool and fuel route safety case will be prepared for consideration in the DBA and PSA methods. Following list is included at least:</p>

- Loss of cooling faults,
- Loss of water inventory faults,
- Loss of power faults,
- Criticality faults,
- Over-raise faults,
- Internal and external hazards, including dropped loads and collisions.

ACTION 3 – Specification of suitable criteria for spent fuel pool accident analysis

Suitable criteria for demonstrating the success of safety measures and SSCs will be identified for spent fuel pool and fuel route faults.

These criteria considers following elements:

- On and off-site radiological doses,
- K-eff limits,
- Maximum permitted water temperatures,
- Avoidance of boiling,
- Avoidance of fuel uncover,
- Avoidance of fuel damage,
- Avoidance of damage to crucial SSCs.

ACTION 4 – DB Safety Case for the spent fuel pool and fuel route

A DB safety case will be prepared for all identified initiating events. Appropriate deterministic rules are applied such as the requirements for diversity, tolerance to single failures and the amount of conservatism to include within decay heat assumptions. SSCs claimed to protect against DB faults will be identified. The effective operation of these SSCs will be demonstrated through appropriate analysis.

It will be shown that the faults considered are either successfully terminated and/or a sustainable safe state has been achieved.

All faults identified as being within the design basis will be described on the UK ABWR fault schedule, along with the SSCs (including any operator actions) which protect against those faults.

ACTION 5 – SAA Safety Case for the spent fuel pool

Severe accidents associated with the spent fuel pool will be considered as appropriate. Hitachi-GE will response the following:

- To identify the scope (how will the spent fuel pool and fuel route be considered as part of the wider SAA work and what sequences will be considered?)
- To identify the severe accident sequences (What type of analysis will be undertaken?)
- To clarify the approach for SAA (where and when claims on SSCs to protect against spent fuel pool severe accidents will be identified within the UK ABWR safety case?)

ACTION 6 – Demonstration of ALARP

Hitachi-GE will demonstrate the UK ABWR spent fuel pool and fuel route design is ALARP.

A response summarises the appropriateness of the proposed UK ABWR design and why alternative designs or modifications could not provide a higher level of safety.

The Fuel Route ALARP Topic Report will be issued to the ONR as 2 drafts, and a final issued document. The first draft will focus on the ALARP justification for the layout of the UK ABWR plant fuel route, and will also contain an ALARP justification for a small number of faults. Draft 2 of the report will present the ALARP justification for prioritised high risk faults. The final issued report will provide an ALARP justification for the identified faults and will confirm that the UK ABWR fuel route risks are ALARP.

Summary of impact on GDA submissions:

<u>GDA Submission Document</u>	<u>Related GDA RO action(s)</u>	<u>Submission Date to ONR</u>
Topic Report on Fault Assessment for SFP and Fuel Route	RO-ABWR-0011 A1,A2,A3,A4	End of June 2015
Topic Report on Design Basis Analysis for SFP and Fuel Route	RO-ABWR-0011 A4	End of June 2015
Scope of Source Term Assessment for Shutdown PSA and SFP PSA	RO-ABWR-0011 A5	24 th December 2014
Preliminary Consideration of Fault for Spent Fuel Interim Storage	RO-ABWR-0011 A1,A2,A3,A4	End of June 2015
ALARP Assessment Report	RO-ABWR-0011 A6	End of September 2015 (DR1) End of December 2015 (DR2) End of April 2016 (Rev.0)

Programme Milestones/ Schedule:

See attached Gantt Chart (Table 1).

Reference:

Ref[1] Fault Studies to Discuss Deterministic Analysis, PSA and Fault Schedule Development	GA91-9901-0009-00001 Rev B
Ref[2] Initial Safety Case Report on Spent Fuel Pool	GA91-9901-0003-00001 Rev B

Table 1 RO-ABWR-0011 Gantt Chart (Continued)

Safety case for spent fuel pool and fuel route Resolution Plan for RO-ABWR-0011 (2016)				January					February					March					April					May									
				4	11	18	25	1	8	15	22	29	7	14	21	28	4	13	20	27	2	9	16	23	30								
Level	Action Title	Start	Finish																														
1	Regulator's issue of RO	5-Jun-14	14-Jul-14																														
1.1	ONR Issue RO	5-Jun-14	5-Jun-14																														
1.2	Hitachi-GE acknowledge RO & issue Resolution Plan	26-Jun-14	4-Jul-14																														
1.3	Regulator's confirm credibility of Resolution Plan	26-Jun-14	4-Jul-14																														
1.4	Regulator's publish RO and Resolution Plan	4-Jul-14	14-Jul-14																														
2	Preparation of Submissions and Closure of RO Actions	5-Jun-14	30-Jun-15																														
2.1	RO Action 1 Scope of spent fuel pool/fuel route safety case	5-Jun-14	31-Oct-14																														
2.2	RO Action 2 Identification of initiating events	5-Jun-14	31-Dec-14																														
2.3	RO Action 3 Specification of suitable criteria for spent fuel pool accident analysis	5-Jun-14	31-Oct-14																														
2.4	RO Action 4 DBA Safety Case for the spent fuel pool and fuel route	1-Nov-14	30-Jun-15																														
2.5	RO Action 5 SAA Safety Case for the spent fuel pool	1-Sep-14	31-Dec-14																														
2.6	RO Action 6 Demonstration of ALARP	1-May-15	30-Apr-16																														
3	Regulator's Closure of RO	1-Nov-14	31-May-16																														
3.1	Regulator's Assessment	1-Nov-14	30-Apr-16																														
3.2	Regulator's publication of RO closure letter	1-May-16	31-May-16																														