

**GENERIC DESIGN ASSESSMENT
PROGRESS REPORT
REPORTING PERIOD July - September 2014**

INTRODUCTION AND BACKGROUND

- 1 This report provides information on the work that we have been carrying out on the Generic Design Assessment (GDA) of Hitachi-GE's UK Advanced Boiling Water Reactor (UK ABWR), and the re-mobilisation of the GDA project for the Westinghouse AP1000[®] reactor design, during the period July - September 2014.
- 2 This has been a period of significant progress when the Regulators completed Step 2 of the UK ABWR GDA and concluded that the project could continue to Step 3. We also began re-mobilising our project team to begin the work required to close out the 51 outstanding GDA Issues for the Westinghouse AP1000 plant design. This included a launch event to familiarise new assessors with the AP1000 technology and to brief all on the design changes that have occurred during the pause period of 2011 – 2014.
- 3 For the first time, this report includes the performance metrics for the UK ABWR project. These provide a clear overview of the status of the project in all of the technical areas, and our judgements on the quality of submissions and forward programme.
- 4 In this period we have also continued our work with the Multinational Design Evaluation Programme (MDEP).
- 5 We welcome comments on this report. Please send them to us at new.reactor.build@onr.gsi.gov.uk.

GDA STEP 2 - UK ABWR

- 6 During the period July to September we focused on preparing the Step 2 technical assessment and summary reports, in addition to undertaking governance activities related to the end of Step 2 and the readiness for Step 3. This culminated in the publication of 17 technical assessment reports and 2 summary reports on 28th August 2014 (<http://www.onr.org.uk/new-reactors/uk-abwr/index.htm>).
- 7 The completion of Step 2 was a significant achievement for both Hitachi-GE and the Regulators, demonstrating the progress made and the commitment of all parties.
- 8 The Step 2 summary reports recognise the significant work that has been undertaken by Hitachi-GE, the knowledge and experience of UK regulation that they have acquired during the Step, and the progress they have made in building the capability and capacity of their GDA team. The reports also identify the, "known" challenges that lie ahead, both technically and organisationally. For Hitachi-GE to have a successful GDA these issues will have to be addressed. Hitachi-GE has recognised this need, and is putting the necessary arrangements in place.
- 9 Already GDA has highlighted design changes that will be required to meet UK regulatory expectations and significant safety analyses that will have to be developed. This is one of the key benefits of GDA.

- 10 Hitachi-GE is adapting to the UK Regulatory regime which is different to that applied in other countries where it has already secured safety certification for its ABWR design and consequently they have made greater progress in some assessment topics than others. However their commitment to addressing gaps in capability and capacity have been demonstrated, which helps to build regulatory confidence.
- 11 UK safety case knowledge and experience is an area that requires continued focus by Hitachi-GE. Ensuring that safety submissions are consistent and link to provide a holistic, integrated safety case will be key. Hitachi-GE has recognised this need, and is putting the necessary arrangements in place.
- 12 Within this period the regulators:
- Participated in 66 meetings across the project.
 - Raised 33 Regulatory Queries (RQs).
 - Formally issued 14 Regulatory Observations (ROs), which are matters that require resolution by Hitachi-GE.
- 13 For the Regulatory Observations that have been raised during the period, Hitachi-GE will be required to produce a resolution plan. The resolution plan sets out the work that Hitachi-GE needs to do, to address the matters raised by the Regulators and identify how long this will take. Following the agreement of the resolution plan, the Regulatory Observation and associated resolution plan will be published on the Joint Regulators Website (<http://www.onr.org.uk/new-reactors/uk-abwr/ro-res-plan.htm>)
- 14 There have been no Regulatory Issues (RIs) identified so far. RIs are the highest category of regulatory concern, and indicate that the regulators consider the issue so significant that it could result in the technology being unsuitable for licensing and or permitting in the UK.
- 15 On 26th August, the Regulators held their Gateway Review meeting, to consider the case for progressing to GDA Step 3 or otherwise. This is a formal GDA process that considered Hitachi-GE's progress, their readiness to commence Step 3, their capability and capacity and the readiness of the Regulators to proceed. A number of improvement actions were identified from the review that are being progressed, and the process and outcome has been documented.
- 16 The Gateway Review meeting concluded that there was sufficient progress and evidence to recommend progress to Step 3, and this was subsequently ratified by the Office for Nuclear Regulation (ONR) and Environment Agency Programme Boards respectively.
- 17 Hitachi-GE also undertook a review to consider their readiness to commence Step 3, and this informed the Regulators' Gateway Review meeting.
- 18 Step 3 formally commenced on 28th August, and was supported by the Step 3 launch event on 10th & 11th September.

METRICS

- 19 During Step 3 we will be supplementing our regular progress reporting with the inclusion of GDA Metrics, to provide a clear overview of the status. Metrics are part of the normal GDA project arrangements and are shared with the Requesting Party on a monthly basis to help inform project progress and prioritise management action. The metrics at Annex 1 provide a red, amber, green & blue 'traffic light' indication for current and predicted progress, quality of interactions / submissions and areas of risk for each of the GDA topic areas. These metrics are based on current performance and help forecast completion of

the current GDA Step (ie GDA Step 3 for the UK ABWR). Red or amber metrics indicate that additional or revised activity is required in order to resolve current issues and to ensure completion of the GDA Step in accordance with the programme. A more topic-by-topic overview is provided in Annex 2.

GDA ISSUES RESOLUTION – AP1000 PLANT DESIGN

- 20 In September 2014, Westinghouse formally recommenced the GDA of the AP1000 plant design.
- 21 Westinghouse was issued an Interim Design Acceptance Confirmation (iDAC) and Interim Statement of Design Acceptability (iSODA) in December 2011, having completed Step 4 of GDA, but with 51 GDA Issues outstanding (<http://www.onr.org.uk/new-reactors/ap1000/gda-issues-res-plan.htm>).
- 22 These GDA Issues require resolution before the Regulators can issue a final DAC and SODA, and before any nuclear island construction can begin on site.
- 23 Westinghouse hosted a launch event for the Regulators to provide an update on the AP1000 plant design. This included an overview of the modifications arising from construction in China and the USA, and an overview of the technical work that has been undertaken during the pause period of 2011 – 2014.
- 24 A number of technical meetings have been held to help the Regulators understand in detail the status of the GDA resolution plans (<http://www.onr.org.uk/new-reactors/ap1000/gda-issues-res-plan.htm>), the timescales for closure desired by Westinghouse, the technical work that has already been undertaken and the work still required to do. These meetings will inform the development of technical assessment plans and the development of an integrated programme for the project.
- 25 There have been 53 meetings in the period across the project.
- 26 The next period will continue the mobilisation phase and the commencement of technical assessment in some areas where relevant information is available. The regulators will complete their mobilisation of the project and begin the formal governance activities. The next period will also involve the development of suitable metrics for the project, which will be published following agreement and trial, as per with other GDAs.

COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT

- 27 Within the period there were 9 comments posted on the Hitachi-GE public comments website <https://www8.hitachi.co.jp/inquiry/hitachi-hgne/en/general/form.jsp> bringing the total number submitted to 34 until the end of September 2014. Hitachi-GE responded to all questions within the indicative timeframe, and there have been no repeat questions.
- 28 The Regulators updated and re-launched their website on 28th August 2014, which aims to improve access to information and understanding of the GDA process, the work of the Regulators and the reactor designs currently being considered.
- 29 On 28th August the Regulators published 17 assessment reports and 2 summary reports in English and Welsh. Communications included a web news update, e-bulletin and emails to stakeholders, use of social media to raise awareness and publication of a new leaflet about GDA for communities living near potential new build sites. The regulators

have also been talking to stakeholders about GDA at conferences and site stakeholder groups.

- 30 Hitachi-GE also issued a press release on 28th August and other communications to stakeholders.

TECHNICAL SUPPORT CONTRACTS

- 31 Between July and September ONR have let 3 technical support contracts relating to the UK ABWR project:

Topic Area	Contractor Organisation	Value
Provision of Confirmatory Core Design Calculations to Support Generic Design Assessment of ABWR	GRS	£300,000
Development of a Thermal Hydraulic Model for the UK ABWR (package 1)	GRS	£60,000
Development of a Thermal Hydraulic Model for the UK ABWR (package 2)	GRS	£798,000

FORWARD LOOK

- 32 The next quarter will focus on progressing the Step 3 assessments of the UK ABWR, and engaging with Westinghouse across all of the technical topics areas to build our understanding of the status of the project, and any progress that has been made on the GDA Issues during the pause and the impact of design changes.

WORKING WITH OVERSEAS REGULATORS

- 33 In September ONR attended the second MDEP ABWR Working Group in Tokyo. This working group, which was created in January 2014, is chaired by the UK. Finland, Japan, Sweden, United States and United Kingdom are members of the ABWR Working Group. The objective for the meeting was to begin engagement with ABWR stakeholders (vendors and their customers, licensees, applicants, and requesting parties). The meeting provided informative presentations about the various ABWR designs and design differences.
- 34 Also in September, ONR attended the 10th meeting of the MDEP AP1000 Working Group in Beijing. This meeting was particularly informative for ONR as matters arising during the construction and testing activities of the AP1000 reactors being built in China (Sanmen and Haiyang) and the USA (Vogtle and Summer), and the design modifications being implemented, were discussed in detail. The meeting also provided an update of the regulatory assessments in the participating countries, and the views of the various regulators.

MORE INFORMATION ON GDA

To find out more about GDA visit <http://www.onr.org.uk/new-reactors>

To receive the latest news and information on GDA, subscribe to our eBulletin by visiting www.onr.org.uk/newreactors/ebulletin.htm

SUMMARY OF REGULATOR CHARGES

UK ABWR

Office for Nuclear Regulation:

- Charges for the quarter July - September 2014: £1,497,083
- Cumulative charges: £5,638,064

Environment Agency:

- Charges for the quarter July - September 2014: £341,724
- Cumulative charges: £1,578,091

AP1000 plant design

Office for Nuclear Regulation:

- Charges for the quarter July - September 2014: £ 188,786
- Cumulative charges: £23,488,786

Environment Agency:

- Charges for the quarter July - September 2014: £22,727
- Cumulative charges: £2,364,550

Annex 1 – UK ABWR Progress Metrics – September 2014

GDA Metrics Definitions	
Category 1	Category 2
<p>Red – Significant slippage against the baseline programme has occurred, with delays highly unlikely to be recoverable. Successful completion of the step in accordance with the Regulators Baseline Programme will require the programme to be re-baselined and the target dates changed (via Change Control).</p> <p>Amber – Some slippage against the baseline programme has occurred, with delays capable of being recovered. Prompt action is required to ensure that there is an improvement in delivery in order to successfully complete the step in accordance with the Regulators Baseline Programme.</p> <p>Green – Activities are generally on plan to successfully deliver the current step in accordance with the Regulators Baseline Programme.</p> <p>Blue – Activities are ahead of plan to successfully deliver the current step in accordance with the Regulators Baseline Programme.</p>	<p>Red - For the current Step, submissions are significantly below expectations in terms of scope and/or quality. The Regulators will require significantly improved submissions to support their assessment.</p> <p>The Regulators should explain what is required to meet their expectations.</p> <p>Amber - For the current Step, submissions are below expectations in terms of scope and/or quality. The Regulators will require submissions to be updated/ revised to support their assessment.</p> <p>The Regulators should explain what is required to meet their expectations.</p> <p>Green - For the current Step, submissions have generally met the expected scope and quality.</p> <p>Blue - For the current Step, submissions have exceeded the expected scope and quality.</p>
Category 3	Category 4
<p>Red – Communications and interactions have been significantly below expectations, in terms of clarity, openness, or technical content. This has resulted in a high degree of ambiguity and/or a lack of confidence in the other parties' intentions. The values in the RNIP have been compromised.</p> <p>Amber - Communications and interactions have been below expectations in terms of clarity, openness, timeliness or technical content, This has resulted in a degree</p>	<p>Red - Submissions are not addressing the RO/RI and immediate action is required to ensure the successful completion of the RO/RI.</p> <p>There is a high risk that further RO/RI or associated Actions may be raised or transferred to a GDA Issue(s)</p> <p style="text-align: center;">OR</p>



of ambiguity and a lack of confidence in the other parties' intentions. Some aspects of the RNIP have been challenged

Green - Communications and interactions have met expectations, resulting in confidence in the other parties' intentions.

Blue – Communications and interactions have exceeded expectations, resulting in a high degree of confidence in the other parties' intentions

The draft RO/RI Res Plan cannot be agreed even after several discussions and revisions of drafts

Amber - Submissions are not fully addressing the RO/RI and action may be required to ensure the successful completion of the RO/RI.

There is a risk that further RO/RI or associated Actions may be raised or transferred to a GDA Issue(s)

OR

The draft RO/RI Res Plan is under development but will require further revisions to enable agreement

Green - The RO/RI is likely to be closed; Submissions are addressing the RO/RI

OR

The draft RO/RI Res Plan is under development and is on track to be agreed

Blue - No RO/RI Issued

OR

The RO/RI has been closed



	Civil Engineering	External Hazards	Internal Hazards	PSA	Severe Accident	Fault Studies	C&I	Electrical Engineering	Fuel & Core Design	Reactor Chemistry	Radiation Protection
Category 1 - Programme											
Category 2 - Submissions											
Category 3 - interactions											
Category 4 - Existing Issues											
Category 5 - Emerging Issues	N	N	Y	N	Y	Y	Y	Y	N	Y	Y
	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14
	Mechanical Engineering	Structural integrity	Human Factors	MSQA	Rad Waste	Decommissioning	Spent Fuel Interim Store	Security	Environmental	Conventional Safety	Fire Safety
Category 1 - Programme											
Category 2 - Submissions											
Category 3 - interactions											
Category 4 - Existing Issues											
Category 5 - Emerging Issues	N	Y	Y	N	Y	Y	Y	N	Y	N	N
	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14	Sep-14

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Annex 2 – Topic-by-Topic Summary

Civil Engineering / External Hazards

Hitachi-GE are continuing to make good progress into Step 3, with delivery of submissions being in accordance with the agreed Civil Engineering / External Hazards programme of submissions. Communications between ONR and Hitachi-GE are being successfully maintained within the topic and also with related topics.

Internal Hazards

Hitachi-GE are continuing to make progress into Step 3 and have developed a good document route map structure, underpinned by sufficient resources to deliver the agreed Baseline Programme for Step 3. During the period 2 ROs were issued and ONR is discussing RO Resolution Plans with Hitachi-GE.

Probabilistic Safety Analysis (PSA) / Severe Accident Analysis

Hitachi-GE has demonstrated good technical knowledge and understanding of UK regulatory expectations. In addition, Hitachi-GE demonstrated close working relationships between the PSA and the engineering teams, which are key to ensuring that high quality inputs from engineering are provided into the UK ABWR PSA. Hitachi-GE has started to deliver information in accordance with the agreed programme of submissions, with a significant amount of additional information to be delivered during Step 3. During the period 1 RO was issued.

Fault Studies

Hitachi-GE are continuing to make progress in this area and have delivered a significant amount of documentation for assessment in accordance with the agreed programme of deliverables. During the period, communications have been good and understanding of UK regulatory expectations by the requesting party is increasing. Good progress is being made on ROs, RO-ABWR-007 to RO-ABWR-0011, which have been published on ONR's website.

Control & Instrumentation (C&I)

The C&I Step 3 assessment has progressed well during the period with all planned deliverables being submitted in line with the baseline programme. Further documents are scheduled for delivery over the coming months and these will be the subject of discussion during technical meetings to be held in October. Meetings during this period have been productive with Hitachi-GE demonstrating good technical knowledge and an understanding of UK regulatory expectations.

Electrical Engineering

Step 3 assessment is progressing well, with Hitachi-GE demonstrating an understanding of UK regulatory expectations. Submissions provided to date have been in accordance with the agreed programme and have been of an adequate quality. A number of areas have been identified for discussion during technical meetings to be held in Japan during October.

Fuel & Core Design

Hitachi-GE are continuing to make good progress into Step 3, with delivery of submissions being in accordance with the agreed Fuel & Core Design programme of submissions. Communications remain positive with Hitachi-GE demonstrating a clear understanding of UK regulatory expectations.

Reactor Chemistry

The Step 3 Reactor Chemistry assessment is progressing in line with expectations. Progress is being made on RO-ABWR-006, relating to source terms, with a dedicated progress meeting held to discuss Hitachi-GE's proposed approach to addressing the RO. Communications and interactions during the period between the Regulators and Hitachi-GE require improvement. In order to successfully complete Step 3, Hitachi-GE will need to improve the overall Reactor Chemistry safety case. Consequently, during the period 1 RO was issued in this area.

Radiation Protection

Step 3 assessment is progressing in line with the baseline programme. Meetings and videoconferences continue to be constructive, open and honest and the use of translators has further increased the effectiveness of interactions. It is encouraging that Hitachi-GE has engaged specialist support in this topic area and this has been reflected in an improved understanding of regulatory expectations. However, in order to successfully complete Step 3, Hitachi-GE will need to improve the scope and quality of submissions in this area. Consequently, during the period 1 RO was issued.

Mechanical Engineering

Hitachi-GE have demonstrated good technical knowledge and understanding of expectations in the topics. A number of planned deliverables were submitted in accordance with the Mechanical Engineering programme and ONR will seek to use external contractors to support their assessment of these deliverables and planned future deliverables. During the period 4 ROs were issued.

Structural Integrity

Step 3 assessment is progressing well, with Hitachi GE delivering the appropriate Structural Integrity documents in accordance with the agreed programme. During an initial assessment, a number of areas have been identified for discussion during technical meetings to be held in October. Communications and interactions in this topic continue to be clear and well defined with useful input from Hitachi-GE's support contractors. Good progress is being made on ROs, RO-ABWR-001 to RO-ABWR-004, which have been published on ONR's website.

Human Factors

Hitachi-GE are continuing to make good progress into Step 3, with delivery of submissions being in accordance with the agreed Human Factors programme of submissions. Good progress is being made on RO-ABWR-005, relating to Hitachi-GE's capacity and capability, based on the

enhancements made to Hitachi-GE's Human Factors team and recognition of cross-cutting issues. Interactions held in this area continue to be open and honest. A number of areas have been identified for discussion during technical meetings to be held in October.

Management of Safety and Quality Assurance Arrangements (MSQA)

The Step 3 assessment is on plan, with Hitachi-GE delivering the required MSQA documentation to time. During September a routine progress meeting took place in the UK to discuss the 'summary of design' and 'moving the safety case into the operating regime'. The topics for inclusion in October's planned MSQA meeting were also discussed. During the meeting, Hitachi-GE demonstrated good technical knowledge and understanding of UK regulatory expectations.

Radioactive Waste Management, Spent Fuel Management and Decommissioning

All planned deliverables have been provided in accordance with the baseline programme of submissions. Communications and interactions with Hitachi-GE have improved and it is encouraging that Hitachi-GE has engaged specialist support in this topic area. A number of areas have been identified for discussion during technical meetings to be held during October.

Security

Communications and interactions in this area are clear and unambiguous, with Hitachi-GE demonstrating a good understanding of UK regulatory expectations. Support being provided to Hitachi-GE by external contractors has further increased the level of understanding in this topic and will be a key factor in the successful delivery of the current Step. All planned deliverables have been provided in accordance with agreed Step 3 programme.

Environmental (GEP)

Step 3 assessment is progressing well, with Hitachi-GE delivering all submissions in accordance with the programme. Communications and interactions continue to be clear and well-structured with Hitachi-GE demonstrating a good knowledge of regulatory expectations. Work is progressing on RO-ABWR-006, relating to source terms. A number of areas have been identified for discussion during technical meetings to be held in Japan during October.

Conventional Safety

Hitachi-GE have presented a good understanding of Conventional Health and Safety requirements. A forward programme of deliverables has been agreed and there is a high degree of confidence that Hitachi-GE will deliver this programme to time.

Fire Safety

Step 3 assessment is progressing well, with Hitachi GE delivering the appropriate fire safety strategy documents in accordance with the agreed programme. The documents received are of a high quality and demonstrate an understanding of the UK regulatory expectations.