

Generic Design Assessment

Quarterly Report

April - June 2015

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1 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 closure phase of the GDA project for the Westinghouse AP1000® reactor design, during the period April to June 2015.
- 2 During this period we have continued our assessment of Hitachi-GE's submissions for the UK ABWR project. The challenges that we reported in earlier quarterly reports in the reactor chemistry topic area have continued, and in June 2015 the regulators published the first Regulatory Issue on the UK ABWR project relating to source terms. In addition issues have arisen in the probabilistic safety assessment (PSA) topic area, and we will report on regulatory action relating to this in the next quarterly report¹. However overall Hitachi-GE continues to make good progress and respond well to regulatory feedback.
- 3 For the AP1000 project this period has seen an increase in submissions for assessment, with no particular technical issues of note arising. Our focus has been on gaining clarity on the design reference point, recognising the design development work that has occurred during the pause period.
- 4 We have reorganised the information in this report following feedback on earlier reports, such that each reactor technology is reported on separately. This includes the metrics summary for each GDA project. We have also reflected on the overall presentation of this quarterly report and made modifications to improve clarity.
- 5 We welcome your comments on this report. Please email new.reactor.build@onr.gsi.gov.uk.
- 6 To find out more about GDA visit <http://www.onr.org.uk/new-reactors/>
- 7 To receive the latest news and information on GDA, [subscribe to our e-bulletin](#).

¹ ONR published RI-002 relating to PSA on 16th July.

2 GDA of the UK ABWR

2.1 Progress update

- 8 During this period the project has progressed towards the end of Step 3, with a significant amount of technical work being undertaken. As we continue our assessment it is expected that regulatory concerns and issues will be raised as we have built our understanding of the ABWR design, and the safety, security and environmental arguments. This is a key advantage of the GDA process and the step wise approach; Hitachi-GE have the time to address these issues, which improves regulatory certainty going forward, and leads to a more mature design going into the post-Design Acceptance Confirmation (DAC) phase.
- 9 Hitachi-GE has maintained the pace of delivery and is responding well to regulatory concerns and issues. Once again over this period they have increased their project capacity and capability, and they continue to supplement their core team with specific technical support from the supply chain. Their commitment to the project is clear and they continue to work well with the regulators.
- 10 The on-going development of the joint safety case organisation (with Horizon Nuclear Power) is commended, and we particularly note the UK specific safety case training that has been rolled out during this period and the publication of the safety case manual within Hitachi-GE. We are also seeing the benefits of the safety case steering group exerting influence on the GDA submissions, with Hitachi-GE demonstrating improved performance and a general improvement in the technical quality of submissions where the steering group has been consulted. As a result, in this quarter we are pleased to have closed RO-ABWR-0025, which raised concerns about Hitachi-GE's safety case process and capability.

2.1.1 Reactor Chemistry

- 11 We have reported increasing concerns in the topic of reactor chemistry for some time, and noted in our last quarterly report that we were considering further regulatory action. Although we recognise the significant effort that has been and continues to be applied to this issue by Hitachi-GE (as we reported in the last period), insufficient progress had been made. In response to this we issued the first Regulatory Issue for the UK ABWR project in June. RIs are statements that a serious regulatory shortfall has been identified, which is potentially significant enough to prevent provision of a DAC.
- 12 The RI relates to Hitachi-GE providing a suitable and sufficient definition and justification for the radioactive source terms in UK ABWR during normal operations. This is a fundamental part in understanding and therefore being able to control the hazards associated with any nuclear facility. In addition, once defined, it is important that Hitachi-GE is able to demonstrate and justify that this source term is appropriate to be used as the basis for the safety and environmental cases. Failure to adequately define or justify the source term could ultimately mean that the design, operations or controls specified for the UK ABWR may not be soundly based.
- 13 The resolution plan for the RI provided by Hitachi-GE is strong and has built regulatory confidence in their ability to resolve this important issue. The proposed staged submission approach will also facilitate early sight of the quality of Hitachi-GE's work, which again will help to foster regulatory confidence that the issue can be resolved with Hitachi-GE's timescales for GDA.
- 14 We are also encouraged by the enhancements Hitachi-GE have made to their team in this area, particularly the acquisition of personnel with direct experience of defining and justifying reactor source terms in a UK regulatory context.
- 15 At this stage it is our view that the RI can be satisfactorily resolved within the timescales cited in the resolution plan.

2.1.2 Probabilistic Safety Assessment (PSA)

- 16 At the end of Step 2 we highlighted that the UK ABWR PSA was under development and had not been submitted to ONR. However basic information had been provided including a preliminary bounding estimate for the core damage frequency (CDF) for internal events and fire and flooding. Our Step 2 assessment noted that the bounding CDF could result in risk figures that would not meet ONR's expectations for new reactors. However we were assured by Hitachi-GE's plan of work that showed submission of the internal events at power level 1 and 2 PSAs in December 2014, and we subsequently issued an RO to capture our concerns (insert ref) early in Step 3 (September 2014).
- 17 Hitachi-GE submitted an internal events at power PSA in December on schedule, and we have been undertaking our assessment of the document since January. During this period it had become clear that there are significant gaps and quality issues throughout the submission, and we have been working with Hitachi-GE on their resolution. Without further work we are not confident that Hitachi-GE will be able to deliver a modern standards, full scope PSA for the UK ABWR.
- 18 As our regulatory concerns in this area are wide ranging, and as we are approaching the end of Step 3, it is our intention to issue an RI relating to the PSA in general². This will essentially be an escalation of RO-13, and highlights that we consider the lack of information in this area a significant safety shortfall.
- 19 Over the coming weeks we will continue to work with Hitachi-GE on the way forward in this topic, and to influence further achievements in the adoption of international modern standards in PSA, and the strengthening of their team with world-class expertise.
- 20 We will report on developments in this area in our next quarterly update.
- Other Topic Areas*
- 21 There are emerging issues in other technical areas, as described in the metrics summary. However as noted earlier this is expected at this stage and is beneficial in terms of providing regulatory clarity to Hitachi-GE, particularly as there is over two years remaining on Hitachi-GE's GDA programme.
- 22 We do not envisage the current RIs having an impact on completion of GDA by the end of 2017, and we emphasise that ROs and RIs are routine regulatory business in GDA that provide clarity and focus on technical areas requiring action.
- 23 Within the period the regulators have issued 89 Regulatory Queries (RQs), 15 Regulatory Observations (ROs) and 1 Regulatory Issue (RI).

2.2 Meetings in Period

- 24 Within the period there were 74 technical meetings and 15 non-technical project meetings.

2.3 Communications

- 25 Within the period there were three comments posted on the Hitachi-GE comments website bringing the total number submitted to 40 at the end of June 2015. There were no repeated questions.
- 26 The regulators' public dialogue (supported by Sciencewise, [www.sciencewise-erc.org.uk.]) on the GDA is making good progress. All three public dialogue workshops,

² This RI was published on 16th July 2015.

together with an on-line national survey, are now complete and the findings are due to be published on the Sciencewise web site in the autumn.

- 27 The aim of the project, is to identify what members of the public need/want to know in relation to GDA, and how they want to be involved, particularly in public consultation. The project outputs will inform how the regulators engage and consult with members of the public on GDA in the future.

2.4 Enhanced collaborative working – Hitachi-GE and Horizon Nuclear Power

- 28 During this quarter we have seen progress in the establishment of Hitachi-GE's and Horizon's Joint Safety Case Office (JSCO). The JSCO is a collaborative working arrangement between Hitachi-GE and Horizon Nuclear Power to deliver Hitachi-GE's GDA and Horizon's site specific safety case objectives, while preserving obligations and governance arrangements for both organisations. During this quarter JSCO scoping workshops have been held and ways of working have been delineated. JSCO managers from both organisations are in place, an office is ready and relocation of staff has commenced. A JSCO implementation plan has been defined and a JSCO Joint Steering Group has been created. The JSCO was launched in June 2015 and is expected to be fully operational in December 2015. Currently JSCO staff are working in the development of new chapters of the GDA PCSR added for additional GDA scope items, with the aim of achieving mutually acceptable levels of quality and presentation. These developments are welcome by ONR.

2.5 International Work

- 29 During this quarter we have continued engaging with overseas regulators, mainly via activities of the Multinational Design Evaluation Programme (MDEP). In April we attended the third meeting of MDEP's ABWR Working Group (ABWRWG) and the first face-to-face meetings of its technical expert sub-groups (TESG) on severe accident (SA) and instrumentation & control (I&C). The Swedish Radiation Safety Authority hosted these meetings in Stockholm and also a visit to Forsmark Nuclear Power Plant.
- 30 During these meetings ABWRWG members progressed their understanding (and documentation) of the similarities and differences among the various ABWR designs the group deals with; this is an important effort that informs the direction of the technical work to be undertaken by the group and its TESSGs. In addition, the ABWRWG reviewed the first draft of the "ABWR Common Position Paper Addressing Fukushima Related Issues", originally prepared by ONR's GDA team. The current plan is for this paper to be released to ABWR industry stakeholders later in 2015 for their review and consideration.
- 31 The I&C TESSG members identified a number of ABWR I&C specific issues to be investigated and followed up in the near term. The SA TESSG held detailed technical discussion on alternative methods of water injection and containment venting following a severe accident.
- 32 The benefit to ONR of membership of these groups is the engagement with key international stakeholders who have experience of regulating BWR and ABWR designs which have not been assessed by ONR. The information, knowledge and assessment experience obtained will assist ONR in the delivery of the UK ABWR GDA.

2.6 Technical Support Contracts

33 Between April and June 2015 ONR have let three technical support contracts relating to the UK ABWR project:

Topic Area	Contractor Organisation	Value
Human reliability assessment and substantiation of human based safety claims	Greenstreet Berman	£106,334
Allocation of function for the UK ABWR	Greenstreet Berman	£37,856
Control and Instrumentation support activities	Altran	£155,812

2.7 Summary of Regulator Charges

Office for Nuclear Regulation:

- Charges for the quarter April – June 2015 £ 2,046,918
- Cumulative charges: £ 11,361,236

Environment Agency:

- Charges for the quarter April – June 2015 £ 227,229
- Cumulative charges: £ 2,501,213

2.8 Metrics Summary

GDA Metrics Definitions	
Category 1 (Programme)	Category 2 (Quality of submissions)
<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> <p>Grey – No submissions received during the period.</p>
Category 3 (Quality of interactions)	Category 4 (Regulatory Observations/Issues progress)
<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 Regulatory Nuclear Interface Protocol (RNIP)³ have been compromised.</p>	<p>Red - Submissions are not addressing the Regulatory Observation / Regulatory Issue (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>

³ The Regulatory Nuclear Interface Protocol (RNIP) and the associated ways of working, is a standard protocol that has been introduced to maximise the effectiveness of ONR, Environment Agency, licensee, and requesting party relationships

<p>Amber - Communications and interactions have been below expectations in terms of clarity, openness, timeliness or technical content, This has resulted in a degree of ambiguity and a lack of confidence in the other parties' intentions. Some aspects of the RNIP have been challenged</p> <p>Green - Communications and interactions have met expectations, resulting in confidence in the other parties' intentions.</p> <p>Blue – Communications and interactions have exceeded expectations, resulting in a high degree of confidence in the other parties' intentions</p>	<p>OR</p> <p>The draft RO/RI Res Plan cannot be agreed even after several discussions and revisions of drafts</p> <p>Amber - Submissions are not fully addressing the RO/RI and action may be required to ensure the successful completion of the RO/RI.</p> <p>There is a risk that further RO/RI or associated Actions may be raised or transferred to a GDA Issue(s)</p> <p>OR</p> <p>The draft RO/RI Res Plan is under development but will require further revisions to enable agreement</p> <p>Green - The RO/RI is likely to be closed; Submissions are addressing the RO/RI</p> <p>OR</p> <p>The draft RO/RI Res Plan is under development and is on track to be agreed</p> <p>Blue - No RO/RI Issued</p> <p>OR</p> <p>The RO/RI has been closed</p>
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	Civil Engineering			External Hazards			Internal Hazards			Mechanical Engineering			Structural integrity			Conventional Safety			Fire Safety			PSA			Reactor Chemistry					
Category 1 - Programme	Orange	Orange	Green	Orange	Orange	Green	Green	Orange	Green	Green	Orange	Orange	Orange	Orange	Green	Green	Green	Green	Green	Orange	Orange	Green	Orange	Orange	Red	Red	Red			
Category 2 - Submissions	Green	Green	Green	Orange	Orange	Green	Green	Orange	Green	Green	Orange	Green	Orange	Orange	Green	Orange	Orange	Orange	Orange	Red	Red	Orange	Red	Red	Orange	Orange	Orange			
Category 3 - interactions	Green	Green	Green	Green	Green	Green	Green	Orange	Green	Green	Orange	Green	Green	Green	Green	Green	Green	Green	Green	Orange	Green	Green	Orange	Green	Red	Red	Orange			
Category 4 - Existing Issues	Green	Green	Green	Grey	Grey	Green	Green	Green	Green	Orange	Orange	Orange	Green	Green	Orange	White	White	White	Green	Green	Green	Orange	Red	Red	Red	Red	Red			
Category 5 - Emerging Issues	Y	Y	N	Y	Y	Y	N	Y	N	Y	Y	Y	N	N		N	N	N	N	N	N	Y	Y	N	Y	Y	Y			
	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J
	Radiation Protection			Human Factors			MSQA			Rad Waste			Decommissioning			Spent Fuel Interim Store			Severe Accident			Fault Studies			C&I					
Category 1 - Programme	Orange	Orange	Orange	Green	Green	Green	Green	Green	Green	Orange	Orange	Orange	Orange	Orange	Orange	Green	Green	Orange	Green	Green	Green	Green	Green	Green	Green	Green	Green			
Category 2 - Submissions	Orange	Orange	Orange	Green	Green	Green	Green	Green	Green	Orange	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green			
Category 3 - interactions	Green	Green	Green	Green	Green	Green	Orange	Orange	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green			
Category 4 - Existing Issues	Green	Green	Green	Green	Green	Green	White	White	Green	Orange	Orange	Red	White	White	Green	Green	Orange	Orange	Green	Green	Green	Orange	Orange	Orange	Green	Green	Green			
Category 5 - Emerging Issues	N	N	N	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N			
	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J
	Electrical Engineering			Fuel & Core Design			Security			Environmental																				
Category 1 - Programme	Orange	Orange	Orange	Green	Green	Green	Green	Green	Green	Orange	Green	Green																		
Category 2 - Submissions	Green	Green	Green	Green	Green	Green	Green	Green	Green	Orange	Green	Green																		
Category 3 - interactions	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Orange																		
Category 4 - Existing Issues	Green	Green	Green	Green	Green	Green	Blue	Blue	Blue	Red	Red	Green																		
Category 5 - Emerging Issues	N	N	N	N	Y	Y	N	N	N	N	Y	N																		
	A	M	J	A	M	J	A	M	J	A	M	J																		

2.9 Metrics Detail

2.9.1 Civil Engineering

- 34 Hitachi-GE has submitted a large amount of material in the period, enabling the Step 3 schedule to remain on track. However the overall schedule is dependent on cross cutting issues, and the risk remains that changes due to developments in other technical areas may impact on the civil engineering programme due to potential changes in layout. Work is in hand to mitigate this. The quality of the Hitachi-GE submissions appears to be very good, and our assessment indicates that major issues are unlikely. We are confident that Hitachi-GE understands regulatory expectations in this topic area.
- 35 The key issue regarding the delivery of the External Hazards Generic Site Envelope seismic hazard assessment, in order to define the design basis, has been discussed and GDA and site licensing aspects are now clearly separated. A delivery programme to the end of Step 3 has been agreed and a way forward identified.
- 36 The effects of the GDA scope and optimisation have been considered and these will result in some increase in Civil Engineering scope, particularly in Step 4. This will be included in the forthcoming planning discussions.

2.9.2 External Hazards

- 37 Our assessment remains in progress, with the overall quality of submissions being good. However, due to delays in obtaining TSC support for ONR, there will be significant External Hazards technical assessment work held over from Step 3 that will be completed as part of Step 4. However we remain confident that the overall programme can be met.
- 38 A key issue will be the delivery of the External Hazards Generic Site Envelope. As part of this work, and in response to RO-ABWR-0055, Hitachi-GE has provided an updated GDA reference design. ONR has requested that Hitachi-GE consider whether the selection of adjacent sites is appropriate, and whether there is additional data on UK seismicity that could be used for comparison with the EU stress test results.

2.9.3 Internal Hazards

- 39 The baseline programme has been reviewed and revised throughout Step 3. Overall however Hitachi-GE has delivered an ambitious scope of submissions for GDA Step 3. The programme revisions have caused some delay in ONR's assessment of the submissions and in particular in ONR's TSC assessment progress work. However, ONR has completed its draft assessment report taking into account all submissions from Hitachi-GE in this area.
- 40 The quality of Step 3 document submissions has been overall adequate in terms of structure and clarity. A meaningful assessment of the claims, arguments and evidence (where applicable) in line with the agreed scope of work has been completed.

2.9.4 PSA

- 41 ONR has reported concerns with Hitachi-GE's PSA capability in previous metrics. These and other issues are now captured in an RI and part of this work will need to be completed in Step 3 to enable the transition to Step 4. Hitachi-GE is now improving their PSA capability to be able to address these issues and will submit additional information to ONR in July as part of the RI resolution plan.
- 42 The RI reflects the fact that Hitachi-GE needs to undertake substantial work to update the UK ABWR PSA for internal events at power to meet regulatory expectations. A substantial part of this work needs to be developed in Step 3. In addition, the review of

the methodologies related to other areas of the PSA cannot be completed until additional information from Hitachi-GE is provided and discussed during the PSA workshop in July 2015.

2.9.5 Severe Accident Analysis

- 43 A number of documents have been supplied to ONR in the latter part of Step 3, and are currently being assessed. So far we have not identified any issues that would prevent Hitachi-GE (or ONR) completing Step 3 to the agreed timescales.
- 44 The Hitachi-GE resolution plan for RO-ABWR-0023 sets out the timescales for the delivery of the major pieces of work. Some information required by ONR for Step 3 is not currently scheduled for submission until Step 4, and we aim to gain further information on the submissions and resolve this programme issue in the planned July workshop.

2.9.6 Fault Studies

- 45 Our Step 3 schedule remains on track. Revisions of major topic reports have been recently been supplied, and although they have not been fully assessed; our initial views are positive about the quality.

2.9.7 C&I

- 46 Our Step 3 schedule remains on track. The ONR C & I TSC contract has been placed during this period and assessment work will commence in July. We have considered three draft 'Basis of Safety Case' documents, which has given us confidence in the scope and quality of the planned final submissions.

2.9.8 Electrical Engineering

- 47 The Hitachi-GE submissions made for Step 3 are adequate to support a meaningful assessment. We have begun our engagement on Step 4 planning and are working with Hitachi-GE on a programme for the submission of a topic report on Station Black-Out analysis during Step 4, which defines the electrical engineering requirements on loss of AC power. More detail is also required for the system studies programme of activities to show that how this work will be completed during Step 4.

2.9.9 Fuel and Core design

- 48 There are no issues of note in this period and our assessment is nearing completion. The additional material supplied in June was helpful and demonstrates high technical competence.

2.9.10 Reactor Chemistry

- 49 Progress in this topic areas has not been sufficient in the period to enable a meaningful Step 3 assessment. RO-0043 (suppression pool Ph) will now be delivered late at the end of August 2015. The response to this RO is a key Step 3 output which links to ONR's priority items identified in Step 2. In addition, there is on-going concern regarding the adequacy of Hitachi-GE's response to Action 2 of RO-0019 – safety case plan. The response to Action 2 illustrates that Hitachi-GE still need to make progress to ensure that they have sufficient understanding of the required scope for the reactor chemistry aspects of the generic safety case for the UK ABWR.

50 Hitachi-GE has also submitted responses to ROs-0022, -0034 and -0035. Based on our assessment of the submissions, further regulatory intervention may be required to ensure adequate progress in this area. Other technical concerns have recently been noted regarding Hitachi-GE's proposed approach to the treatment of chemistry effects during accidents.

2.9.11 Radiation Protection

51 Hitachi-GE is working to resolve RI-AWBR-001 on source terms, and until the work is completed there will continue to be impacts on all areas of the radiological protection assessment. In order to complete the GEP, the EA require ONR's view on Hitachi-GE's assessment of doses to the public, and Hitachi-GE has proposed a revised programme that takes the output of RI-ABWR-001 into account.

52 All radiation protection submissions have been received in line with the plan. However, a number of Topic Reports including those covering radiation shielding, Zoning of Areas and Worker and Public doses have areas still incomplete. Significantly until resolution of the Reactor Chemistry RI-ABWR-001 on source terms, the adequacy of all radiological protection submissions and their quality/completeness may be insufficient to undertake a meaningful assessment.

2.9.12 Mechanical Engineering

53 Hitachi-GE has stated that one of its Mechanical Engineering submissions is now scheduled to be issued in the latter part of Step 3. The submission is expected to provide the information necessary for Step 3. We are considering the impact of this and whether additional regulatory intervention is required. Hitachi-GE is continuing to progress their responses to numerous RQs and ROs, and this is forming the basis of our assessment.

2.9.13 Structural Integrity

54 There have been sufficient submissions made to support a meaningful Step 3 assessment, however a significant amount of work has been moved into Step 4; notably work regarding the Material Selection Report. The quality of submissions remains a key concern within Structural Integrity.

2.9.14 Human Factors

55 Our assessment of recently provided deliverables indicates that these are of a suitable quality, structure and clarity. Hitachi-GE has continued to develop their Human Factors capability to support GDA (Step 3 and Step 4), and this provides us with confidence that they will be able to meet their programme.

2.9.15 Management of Safety and Quality Assurance Arrangements (MSQA)

56 There are no safety case submissions for MSQA

57 Hitachi-GE has the necessary procedures and systems in place to complete Step 3 by the agreed date. The Quality Management Plan is up to date and procedures are in place. We have seen evidence that non-conformity reports are being used to report discrepancies with submissions, and corrective action are being implemented and completed. The MSQA arrangements are generally adequate however the recent MSQA inspection identified some deficiencies in the arrangements and their implementation, which are being addressed by Hitachi-GE.

2.9.16 Radioactive Waste Management

58 A large number of submissions have been issued and assessed. The ALARP assessment for liquid waste management and solid waste management has not met regulatory expectations. We have discussed this with Hitachi-HE and they are working on resolution of our concerns.

2.9.17 Decommissioning

59 We have concerns with the amount (over 8km) of embedded pipework, and note that a large amount of this pipework will remain in the ground in line with the assumed end state. This would make it extremely difficult for the licensee to demonstrate that the de-licencing criteria could be met. This concern arises from our understanding of the UK ABWR design, rather than from an inadequate submission from Hitachi-GE. As a result RO-ABWR-0054 is being tied to decommissioning, although it aligns with many other topic areas.

2.9.18 Spent Fuel Management

60 Hitachi-GE has delivered all submissions on schedule, and we are progressing our assessment in this area.

2.9.19 Security

61 Hitachi-GE has delivered all submissions on schedule and the quality of draft submissions of the CSA Rev B has been satisfactory.

2.9.20 Environmental (GEP)

62 The draft GEP Rev E was submitted as programmed at end May. Discussions are ongoing regarding impact of the Source Terms RI Resolution Plan on the GEP programme.

2.9.21 Conventional Safety

63 A cross-cutting meeting as part of the programme of Civil Engineering routine meetings was held with Conventional Safety in April 2015 to ensure that Hitachi-GE were fully aware of ONR's expectations regarding the Construction (Design and Management) Regulations 2015 and particularly those relating to the duties of the Designer. Hitachi-GE is developing their strategy for compliance. We have concluded our overall assessment with no issues of note.

2.9.22 Fire Safety

64 There are no issues of note and step 3 remains on track. However we await a worked example to illustrate management of a 'generic departure from codes of practice with challenging means of escape condition' in fire safety design to be submitted for assessment.

2.10 Forward Look

65 Over the coming months we will:

- Continue to work with Hitachi-GE on the GDA Issues.

- Focus on documenting our judgements at the end of Step 3.
- Preparations for the gateway review to consider whether the project is ready to move to GDA Step 4.
- Planning for Step 4.

3 GDA of the AP1000

3.1 Progress update

66 This has been the first period of significant assessment work across the outstanding GDA Issues. 20% of the deliverables expected for the closure phase have been submitted, largely on schedule, with some delivered ahead of schedule.

67 In this period we have focused on gaining clarity on the design changes since the pause of GDA in 2011 and on understanding the Design Reference Point. (DRP). We reported in our last quarterly update that we expected this to be resolved by May 2015, but we are still working with Westinghouse on finalising this.

68 Westinghouse has now submitted ~60 design change proposals for regulatory assessment, together with a DRP, and we will report on our assessment of this in our next report. To reflect the importance of this, we have added an experienced project inspector to our regulatory team to focus specifically on cross cutting issues including the DRP and the very challenging GDA Issue relating to the safety case.

69 Westinghouse has not been able to submit information relating to mechanical engineering issue 01. This GDA Issue requires specific information relating to the initiator element of the squib valves, which form part of the stage 4 automatic depressurisation system. This information is protected by the United States International Traffic (in) Arms Regulations (ITAR), and Westinghouse has been working for many months to achieve a license enabling the information to be released. Although currently this is not affecting the overall integrated programme, it is affecting the ability of our Inspectors to witness physical trials currently being undertaken in the US. This trial information would provide useful support to the safety case and close out of the GDA Issue. Westinghouse expects to resolve this matter in the coming weeks.

70 At this early stage in the closure phase there are no significant technical issues of note. This is reflected in the metrics for this period, which with the exception of the cross cutting issue 2 and mechanical engineering issue I, the GDA Issues remain green for the quality of submissions category. There are a number of amber metrics relating to the programme (category 1), and for the majority of topics this relates to ONR resources and reflects the fact that we did not have TSC support in place during the period due to internal process delays. We expect this to be resolved for the next period and the corresponding metrics to turn green.

71 Within the period the regulators have issued 33 RQs.

3.2 Meetings in Period

72 Within the period there were 116 technical meetings and 11 non-technical project meetings.

3.3 Communications

73 Within the period there were no comments posted on the Hitachi-GE comments website, and none submitted so far on the AP1000 project.

3.4 Tripartite discussions

74 The Regulators presented information on tripartite working and potential benefits to Westinghouse and NuGen within the period.

3.5 Technical Support Contracts

75 Between April and June 2015 ONR have let 3 technical support contracts relating to the AP1000 project:

Topic Area	Contractor Organisation	Value
Independent review of Westinghouse's validation evidence for the effectiveness of the AP1000 passive core cooling system	AMEC Foster Wheeler	£88,493
Independent review of Westinghouse's revised AP1000 Design Basis Fault Analysis	GRS	£95,460
PSA support activities	Jacobsen Analytics	£372,223

3.6 Summary of Regulator Charges

Office for Nuclear Regulation:

- Charges for the quarter April – June 2015 £ 698,413
- Cumulative charges: £ 25,403,386

Environment Agency:

- Charges for the quarter April – June 2015 £ 42,281
- Cumulative charges: £ 2,463,080

3.7 Metrics Summary

GDA Metrics Definitions	
Category 1 (Programme)	Category 2 (Quality of submissions)
<p>Red – Significant slippage against the baseline programme has occurred, with delays highly unlikely to be recoverable. Successful completion of the closure phase 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 closure phase in accordance with the Regulators Baseline Programme.</p> <p>Green – Activities are generally on plan to successfully deliver the closure phase in accordance with the Regulators Baseline Programme.</p> <p>Blue – Activities are ahead of plan to successfully deliver the closure phase in accordance with the Regulators Baseline Programme.</p>	<p>Red - For the closure phase, 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>Amber - For the closure phase, 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>Green - For the closure phase, submissions have generally met the expected scope and quality.</p> <p>Blue - For the closure phase, submissions have exceeded the expected scope and quality.</p> <p>Grey – No submissions received during the period.</p>
Category 3 (Quality of interactions)	Category 4 (GDA Issues progress)
<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 of ambiguity and a lack of confidence in the other parties' intentions. Some aspects of the RNIP have been challenged</p>	<p>Red - Submissions are not addressing the GDA Issue and immediate action is required to enable closure. There is a high risk that further GDA Issue Actions or GDA Issues may be raised.</p> <p>Amber - Submissions are not fully addressing the GDA Issue and action may be required to enable closure. There is a risk that further GDA Issue Actions or GDA Issues may be raised.</p> <p>Green - Submissions are addressing the GDA Issue and closure appears likely.</p>

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

Blue - Submissions have addressed the GDA Issue and the GDA Issue has been closed.

	C&I			Fault Studies			Internal Hazards			Structural integrity			Civil Engineering			Fuel & Core Design			Mechanical Engineering			Reactor Chemistry		
Category 1 - Programme																								
Category 2 - Submissions																								
Category 3 - interactions																								
Category 4 - GDA Issue 1																								
Category 4 - GDA Issue 2																								
Category 4 - GDA Issue 3																								
Category 4 - GDA Issue 4																								
Category 4 - GDA Issue 5																								
Category 4 - GDA Issue 6																								
Category 4 - GDA Issue 7																								
Category 4 - GDA Issue 8																								
Category 4 - GDA Issue 9																								
Category 4 - GDA Issue 10																								
Category 5 - Emerging Issues	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	N	N	Y	N	N	N
	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J
	PSA			Electrical Engineering			Radiological Protection			Human Factors			Cross Cutting 1			Cross Cutting 2			Cross Cutting 3					
Category 1 - Programme																								
Category 2 - Submissions																								
Category 3 - interactions																								
Category 4 - GDA Issue 1																								
Category 4 - GDA Issue 2																								
Category 4 - GDA Issue 3																								
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Category 4 - GDA Issue 5																								
Category 4 - GDA Issue 6																								
Category 4 - GDA Issue 7																								
Category 4 - GDA Issue 8																								
Category 4 - GDA Issue 9																								
Category 4 - GDA Issue 10																								
Category 5 - Emerging Issues	N	N	N	Y	Y	Y	N	N	N	N	N	Y	N	N	N	Y	Y	Y	N	N	N			
	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J	A	M	J			

3.8 Metrics Detail

3.8.1 Civil Engineering

76 Within this period we have received submissions from Westinghouse, however they have not been fully assessed as we await procurement of TSC services. There are no emerging issues to report.

3.8.2 Structural Integrity

77 Within this period we have received submissions from Westinghouse, however they have not been fully assessed as we await procurement of TSC services. There are no emerging issues to report.

3.8.3 Mechanical Engineering

78 We have completed our assessment of a number of submissions in this topic area. The submissions have not met regulatory expectations in some cases. We also note a further change in the Westinghouse lead for this area. This lack of continuity and loss of knowledge and experience has the potential to compromise the schedule for ME-01. This quarterly report has also highlighted the problems relating to the release of initiator information earlier, due to ITAR restrictions.

3.8.4 Electrical Engineering

79 There are no issues of note and submissions received so far have been adequate.

3.8.5 Control and Instrumentation

80 Submissions have been made within this period and are undergoing assessment. At this time we are not able to offer a judgement on their quality. Our main concern in this area relates to ONR resource. We are not able to complete the assessment in this topic area without significant support from TSCs, and the procurement of this support is in hand. At this stage we do not expect that this will result in a schedule impact.

3.8.6 Fault Studies

81 A number of submissions have been made within the period and assessed by ONR. In some cases the submissions have not met regulatory expectations, and we have provided feedback to Westinghouse on what is required to address our concerns. We have also highlighted that the quality of submissions in this areas will need to improve to maintain the overall schedule.

3.8.7 Fuel and Core

82 GDA Issue FD-001 is close to closure. We have also received submissions relating to the other GDA issues in this topic area, and we have provided feedback on areas that need to be addressed; including the numerical adequacy of the shockwave calculations and the categorisation and classification arguments for the BEACON computer code.

3.8.8 Human Factors

83 Submissions specific to this Issue have been made on schedule. So far the material has met regulatory expectations and we have high confidence that future submissions will be of sufficient quality such that this issue can be closed. We have some reservations on

how Human Factors issues in other topic areas will be captured, and so far, although not directly related to GDA Issue HF-01, we have been linking that with this issue. We are now reconsidering our regulatory options around how we can best capture the work required to address Human Factors issues in other topic areas, and we will report on our deliberations in our next quarterly update.

3.8.9 Internal Hazards

84 We have received a series of 'roadmaps' and a large amount of documentation, which has proved difficult to navigate and relate to the safety case for internal hazards. Westinghouse has also informed us that there will be delays to further submissions in this area, although we do not expect this to impact the overall schedule at this stage. We are encouraged by the procurement of specialist support in this area by Westinghouse.

3.8.10 PSA

85 We have not been able to undertake detailed assessment of submissions in this area due to internal delays with our procurement of essential TSC resource. We expect this to be resolved within the coming weeks.

3.8.11 GI-AP1000-CC-01 Limits and Conditions

86 There have not been any submissions made within the period against this topic area; however presentations by Westinghouse demonstrate a good understanding of what is required to address the issue.

3.8.12 GI-AP1000-CC-02 PCSR to support GDA

87 We recognise that a submission on the DRP was made on schedule, supplemented by 63 proposed category 1 and category 2 design change proposals a week later. However there is still insufficient information for us to understand the implications of the design changes proposed for the UK AP1000. The inadequacy of the information provided suggests a gap in understanding on the part of Westinghouse in terms of what is required.

3.8.13 GI-AP1000-CC-03 Consider and Action Plans to Address the Lessons Learned from the Fukushima Event

88 There have not been any formal submissions in this period. However our interactions to date have not highlighted any concerns in this area.

3.9 Forward Look

89 The next period will focus on:

- Agreement on the design change proposals and design reference point.
- Continued assessment of submissions.
- Resolution of the ITAR issue relating to mechanical engineering information.

4 WIDER GDA

Assessment Findings Workshop

- 90 During last quarter we reported that we had held a stakeholder's workshop in March 2015 to learn lessons from past experience and compile recommendations to make the Assessment Findings (AF) process for current and future GDAs more slick and efficient. The recommendations provided by the workshop participants have now been considered by ONR and the following changes are being progressed:
- Future GDA AFs will not have associated completion milestones. Instead, ONR's New Reactor Licensing, New Reactor Construction and relevant Environment Agency's teams will agree with licensees (or prospective licensees when appropriate) suitable AF resolution programmes, including suitable and project-relevant milestones. This transfers discussions on licensee's matters to the regulators' relevant teams and provides a better defined end point for GDA.
 - We have developed guidance to help GDA assessors to determine whether a matter raised during assessment is an AF, and, if not, to decide the course of action. This guidance requires inspectors to check for related/repeated AFs and to consolidate as appropriate. It also requires assessors to provide early visibility of identified AFs to the requesting party and prospective licensee. We expect that this guidance will enhance consistency and traceability of inspectors' decision-making during GDA Step 4 and GDA close-out phase.
- 91 The regulators are implementing modifications to the GDA guidance to capture the above changes.