



GENERIC DESIGN ASSESSMENT

PROGRESS REPORT

REPORTING PERIOD 1 OCTOBER 2010 – 31 DECEMBER 2010

FOREWORD

This is our final substantial quarterly report on the progress of Generic Design Assessment (GDA) of the AP1000 and UK EPR reactors before we are due to publish our conclusions on 30 June 2011. Our production of reports thereafter will be dependent upon our conclusions in June.

This report summarises the progress we have made on our assessments, discusses the key challenges that we are dealing with, and looks forward at what remains to be done to complete our GDA assessment. Our intense activity on GDA has continued throughout the quarter, with the focus being on moving towards finalising of our assessments and reaching agreement with the Requesting Parties (RPs) on the remaining key issues. One of the key elements has been our convergence meetings where we have agreed with the RPs what further information they will provide, what further work can be done within GDA Step 4, and what issues are likely to remain for addressing beyond June 2011.

For the Environment Agency, a significant milestone was reached on 18 October 2010 with the completion of the consultations on its GDA findings to date on environmental and radioactive waste matters.

Subject to further progress in some key areas over the next few months, we expect to be able to complete our GDA assessment of the generic safety cases by June 2011, at which time we also expect to be able to issue an Interim Design Acceptance Confirmation and Interim Statement of Design Acceptability for both UK EPR and AP1000. Associated with these interim positions, there will be some limited requirements for further work (called GDA Issues) that we will require both RPs to complete before we can come to final decisions on GDA.

The potential GDA Issues we have identified so far are summarised in this report, together with areas where assessment is still underway and where new issues could yet emerge, although, at this late stage in the assessment process, we would not expect these to be of major significance. We continue to communicate these to the RPs so that there are no surprises as we move forward. The convergence meetings have been pivotal to this, as was a meeting with the new build industry sector representatives in November.

We remain confident that GDA is proving to be an effective and efficient step to ensuring that safety, security and protection of the environment can be assured throughout the new build programme. Our early identification of the emerging issues demonstrates robustly our independent regulatory role and provides an opportunity for the industry to clear them at an early a stage as possible in line with its plans to build new reactors in this country.

If you have comments on any aspect of this report then please send them to us at: new.reactor.build@hse.gsi.gov.uk.

Kevin Allars

Programme Director for Nuclear New Build
Health and Safety Executive

Joe McHugh

Head of Radioactive Substances Regulation
Environment Agency

EXECUTIVE SUMMARY

On 18 October 2010, the Environment Agency completed its consultations on its GDA findings to date on environmental and radioactive waste matters. The responses received are currently under consideration and summaries of responses for both reactor designs have been published. Based on consultation responses and some additional information received from the Requesting Parties (RPs), the Environment Agency is reasonably content that there will be no significant unresolved environmental issues remaining after June 2011 on either design. However, as any ongoing assessment work by HSE after June could impact on the Environment Agency's conclusions, the Agency intends that only Interim Statements of Design Acceptability (SoDAs) would be issued until HSE is finally in a position to consider whether to issue full Design Acceptance Confirmations (DACs). Importantly, this will also mean that the final DAC and SoDA will be based on the same design reference.

HSE's main focus this last quarter has been on progressing the Step 4 assessments for both designs. We have also been holding convergence meetings where we have agreed with the RPs what further information they will give us during the coming months and which areas are likely to require further work beyond June 2011: these will be designated as GDA Issues¹. The RPs have responded well to the continuing pace of our work and wherever possible we have agreed with them what additional work can be completed to address the issues within our Step 4 assessment timescale. However, our assessors will begin writing their reports very soon and this leaves limited time for further assessment work, particularly if we need to use Technical Support Contractors (TSCs). We will endeavour to balance the priorities of report writing and continuing assessment in key areas, even if that means that there is a short delay beyond June 2011 for publication of the relevant detailed Technical Assessment Reports. We will, however, have completed our assessment and recorded it sufficiently by June 2011 to support our conclusions on whether to provide a DAC or Interim DAC.

Because we in ND are still reviewing a large quantity of technical information, we are still at this late stage identifying new technical questions that the RPs need to address. However, during this last quarter, there has been a notable reduction in the number of new technical questions that we have identified, and we have also agreed ways forward for the majority of observations that we have already made.

A full topic-by-topic review is included within the annexes to this report. This, together with the information on metrics, is intended to give a balanced summary and improved visibility of the progress and trends in each technical area, as well as the remaining challenges and potential GDA Issues that may remain at the end of Step 4 in June 2011.

We have not identified any showstoppers at this point, but some of the observations are likely to result in design changes. In these cases we are seeking to agree the principal aspects of the changes within GDA Step 4. Subject to further progress in some key areas over the next few months, we expect to be in a position to consider issuing an Interim DAC for both UK EPR and AP1000 in June 2011. Those Interim DACs would be accompanied by publicly available Summary Assessment Reports, a schedule of the GDA Issues still to be addressed, together with Resolution Plans (produced by the RPs and accepted by the regulators) for each GDA Issue.

No nuclear island safety-related construction will be allowed until all of the GDA Issues have been addressed to our satisfaction and a Final DAC and SoDA have been issued. By doing

¹ GDA Issues are those issues that are unresolved at the end of our examination of the safety case for the generic design and are considered by regulators to be significant, but resolvable, and which require resolution before nuclear island safety-related construction of such a reactor could be considered. Where there are GDA Issues, and we were otherwise content with the design, the Design Acceptance Confirmation or Statement of Design Acceptability would be provided, but designated as 'Interim'. See our guidance about the management of the outcomes from GDA - www.hse.gov.uk/newreactors/reports/management-gda-outcomes.pdf.

this, we are confident that safety, security and protection of the environment can be assured throughout the new build programme.

REPORT

Programme

- 1 HSE and the Environment Agency remain on course to complete a meaningful GDA assessment by June 2011. For HSE, the chief remaining threat to this is the significant amount of detailed information we have only recently received, or have yet to receive and examine, as a result of both our assessment and the RP delivery programme being heavily back-end loaded.
- 2 Our last quarterly report explained that we had experienced delays in our ability to place TSC contracts. Although we were able to address this, and all contracts were placed, some TSC reports were delivered later than we had originally planned. However, we do not expect this to have any significant impact on our programme.
- 3 The Environment Agency completed consultation on its GDA findings on environmental and radioactive waste matters on 18 October and a summary of the responses received was published in December. These responses are being considered as the Environment Agency prepares its final reports.
- 4 HSE's Step 4 assessment has been progressing well and the rate of work and interchange with the RPs remains high. Although there are a number of significant technical issues that remain to be addressed for both reactor designs, we remain of the opinion that both are capable of being shown to be acceptable in the UK. For some issues this will require additional generic safety case justification work by the RPs after June 2011, and these are highlighted in the annexes to this progress report where relevant. However, it should also be noted that the RPs have responded to many questions during the last quarter, a large number have been resolved, and for others, ways forward to address the observations have been identified and agreed in principle.
- 5 We have planned the closing stages of the GDA assessment in detail and discussed these with the RPs. This is fairly complex as we seek to progress technical questions, work towards meaningful conclusions, liaise with RPs about making their final GDA submissions, write our Step 4 reports and have them formatted and approved for publication. We also need to plan to work with the RPs to clarify any GDA Issues and agree credible resolution plans. An important element of this was the key planning meetings we held with the RPs in November. The aim of these meetings was to agree our plans with the RPs so that they understand them and so that their remaining contributions are clearly programmed. These contributions must be timely and of high quality as any late delivery will have significant impact on our plans to conclude the assessment and report in June 2011.

Key Requesting Party (RP) Interactions

- 6 In previous quarterly reports we have noted the steps that Westinghouse had taken to improve its project management arrangements, and to provide more resource to the GDA project. We are pleased to say that we have seen a concerted effort by Westinghouse to drive forward on GDA, propose solutions to clear a number of issues, and identify credible forward work plans. We hope to see this level of effectiveness maintained for the remainder of the GDA programme in order to allow us to come to a meaningful GDA conclusion.
- 7 EDF and AREVA are continuing to work well with us and remain committed to clearing as much as possible as early as they can, but there have been some slippages in key information that we requested from them.

- 8 The interactions with both RPs have continued to be positive and generally of good quality, and they have responded well to the fast pace of work as we have progressed our detailed assessment. This last quarter we have seen a high level of RP interaction workload on GDA in terms of meetings held and responses delivered to our technical questions. This level of activity is set to continue into early 2011.
- 9 The RPs' performance in responding to our technical questions in most areas has been good. For example, Annex 1 shows the increase in the rate of responses to Technical Queries. However, we are still seeing some instances where the quality of key information is not of the high standards we expect, as well as some instances of late delivery. These shortfalls in information delivery have been difficult for us to manage within the decreasing time available for us to conclude the assessment and report in June 2011.
- 10 Although we received a significant amount of RP information late in 2010, more remains due in early 2011, which leaves limited time for assessment and follow-up of any matters arising. Consequently, this increases the potential for additional GDA Issues to remain in June 2011.
- 11 During November we had a joint meeting with the RPs and the potential new UK operators. This highlighted known key issues for both designs and those that are likely to become GDA Issues, and identified work in progress which could potentially lead to new GDA Issues. The detailed information given in the annexes to the last quarterly report helped build towards this, and is further reflected in this report.
- 12 During this last quarter the RPs agreed to increase the financial limits of liability for our cost recovery charges. The regulatory charges levied to date are shown in Annex 1.
- 13 We are also now starting to plan for the work beyond June 2011 and we are in discussion with the RPs about the options and timescales they might wish to follow for resolution of GDA Issues. We will be looking to further detail these plans in the coming months so that we can plan ahead for the most effective use of our resources.
- 14 Finally, as GDA is running in parallel with some site specific projects, notably NNB Genco's plan to build twin UK EPRs at Hinkley Point, we had further discussions with EDF and AREVA about key points from GDA that may have an effect on significant contracts for detailed design, procurement and construction of the reactors. Our early identification of emerging issues in GDA allows the industry to clear them as early as possible thus helping to ensure safety, security and protection of the environment are properly addressed throughout the new build programme.

HSE GDA Assessment

- 15 HSE has continued to make good progress in all of its technical areas, as indicated in annexes 2 and 3. Although we have thus far identified a number of significant technical issues that need to be resolved, we remain of the opinion that both reactor designs are capable of being shown to be acceptable in the UK.
- 16 We expect to complete our GDA assessment of the generic safety cases in June 2011, but there will be some limited GDA work required by the RPs beyond that date before we can come to final decisions on GDA. The magnitude of this work will depend on what further progress the RPs can make within Step 4. We have identified the potential for GDA Issues in Annexes 2 and 3 and we have started to discuss with the RPs potential paths for their resolution. We will continue to identify any new potential GDA Issues as early as possible, and communicate these to the RPs so that there are no surprises as we move forward, and to give the RPs every opportunity to address them as early as possible.
- 17 The pace of our assessment continues to be high, and we are continuing to hold a significant number of technical meetings with the RPs with the aim of closing-out our

technical questions. This can be seen in the interaction metrics in Annex 1. From the graphs of Technical Query responses it can be seen that we have reduced the rate at which we are raising new TQs, and we are now seeing convergence. This has helped us move forward towards the phase of finalising assessments.

- 18 Nevertheless, a combination of our assessment starting later than we would have liked in some technical areas, late delivery of certain key information from the RPs to date, and the delays experienced in placing TSC contracts, results in some increased back end loading of the programme which means that this convergence phase is running slightly later than originally planned.
- 19 An essential element of our assessment has been the support work of our TSCs. The work commissioned has again increased significantly during this last quarter with both new contracts being placed and existing ones being amended. Up to the end of December HSE had placed 149 support contracts with a value around £14.9M. The delay we encountered last quarter in placing new TSC contracts has been resolved, but has left us with TSC reports arriving later than we had planned. We have taken actions to manage this and we do not expect it to have any significant impact on our programme for completing Step 4 in June 2011.
- 20 One of the key elements of our work last quarter was the completion of a series of 'convergence' meetings with the RPs in each of the technical areas. These meetings were successful and proved effective in:
 - Confirming that the agreed GDA scope has been, or will be, addressed.
 - Reviewing the status of outstanding technical issues, including RP response plans, and whether these items can credibly be closed in the next few months.
 - Reviewing outstanding technical matters that may become GDA Issues and discussing what the associated Resolution Plans might be.
 - Identifying HSE assessment that is complete together with the work that is outstanding, and where new issues could yet arise.
- 21 These convergence meetings have proved pivotal in getting agreement with the RPs on exactly where we are in the project, what needs to be completed in the time remaining before June 2011, and what may have to become GDA Issues. To maximise what can be achieved within Step 4, it is important that the RPs maintain their high rate of work and deliver quality and timely information in order to help us come to a meaningful conclusion in June 2011.

Metrics

- 22 The current dashboard metrics are shown in Annex 4. Overall, the metrics show a general improvement in status and many areas are progressing well. The metrics indicate where there is the potential for GDA Issues remaining at the end of our Step 4 assessment, and more detailed information on this is given in Annexes 2 and 3. The potential for GDA Issues mean that any DAC or SoDA we might provide in June 2011 will be 'interim', pending their resolution.
- 23 The dashboard metrics will not be included in the report for the period January – March 2011 as that report will only be published shortly before our main GDA reports are published and the metrics would be of little value at that stage.

Topic-by-Topic Review

- 24 Information on all the technical topic areas is provided in Annexes 2 and 3. This includes identification of areas where there is the potential for GDA Issues to remain after June 2011; those where there are no major observations; and those where assessment is ongoing and notable challenges remain if we are to complete GDA Step 4 by June 2011.
- 25 For the AP1000 significant progress has been made in some key areas, notably on Control and Instrumentation where we had identified some major concerns and where Westinghouse has proposed some design changes to address them. There remains a Regulatory Issue (RI) on the safety case for the civil structures (see below), and a number of other important topics remain under discussion and assessment, such as structural integrity and the safety case for criticality in the spent fuel pond, but resolution paths have been identified for the majority.
- 26 For the UK EPR the most significant development was the closure of the RI on Control and Instrumentation (see below) and there has been good progress on other items. However there are other important topics that remain under discussion, such as civil structures and structural integrity, and although some of the RP deliverables have slipped beyond their identified delivery dates, resolution paths have been identified for the majority.

Regulatory Issues

- 27 Control & Instrumentation of the UK EPR: Our assessment identified significant concerns about the complexity of the architecture and on the very high reliabilities that EDF and AREVA were claiming. Regular discussions have continued on this topic since the RI was raised in April 2009 and a series of meetings were held in the last quarter where EDF and AREVA provided additional evidence on the design changes and safety case improvements proposed to respond to the RI. Our assessment of these has led us to conclude that, while there are outstanding actions to complete, we are satisfied that the majority of the key actions associated with the RI have been addressed and we wrote to the RP in November 2010 to confirm that the RI was closed. The remaining work will be pursued as part of the ongoing GDA assessment and there will be GDA Issues on this topic.
- 28 Civil Engineering of the AP1000: This RI was raised in February 2010 and relates to the proposed new steel-concrete-steel sandwich construction design for key structures within the Nuclear Island including the shield building. We requested appropriate evidence to demonstrate that the strength and durability of the structures have been adequately justified. Regular discussions have continued on this topic with a view to agreeing the principal design changes and other additional evidence that is required. Although there has been slippage in some of the deliverables, we have now received from Westinghouse the majority of the information to respond to the RI (some is scheduled to arrive in January 2011). We are making progress on assessing this and Westinghouse has committed to provide the necessary resource to address any remaining concerns and to allow us to progress towards closing out the RI, which is likely to be a pre-requisite for issuing an interim DAC in June 2011. There will still be remaining work that we will pursue as GDA Issues.
- 29 Information on RIs can be found at <http://www.hse.gov.uk/newreactors/regissues.htm>.

Working with Overseas Regulators

- 30 We are continuing to work with overseas regulators, particularly those in the USA, France, Finland and China, where the two designs originate from and/or are being constructed. We use these regulatory information exchanges to inform our

assessment (and theirs), to confirm that we are applying the best international standards and to obtain knowledge of other countries assessment and construction experiences.

- 31 Recent interactions have included meetings with the US regulator (NRC), including on general progress on the AP1000 and EPR assessments, and specific exchanges on the AP1000 Enhanced Shield Building, AP1000 C&I, and a Management of Safety and Quality Assurance inspection. Other interactions have included one with NRC and STUK (the Finnish regulator) on EPR civil engineering and on severe accidents. Additionally, two of our inspectors had a technical visit to the Olkiluoto 3 EPR construction site in Finland and held technical exchanges with STUK on internal hazards and electrical engineering. We have also been involved in MDEP (Multi National Design Evaluation Programme) discussions that cover a number of topics relevant to GDA, including an EPR meeting in China and a technical visit to the Taishan EPR construction site.

Environment Agency Consultation

- 32 On 18 October 2010 the Environment Agency completed consultation on its GDA findings to date on environmental and radioactive waste matters. The responses received are currently under consideration to inform our final decision and summaries of responses for both designs have been published and can be viewed at <https://consult.environment-agency.gov.uk/portal/ho/nuclear/gda>.
- 33 Based on consultation responses and some additional information received from the RPs, the Environment Agency is reasonably content that there will be no significant unresolved issues remaining after June 2011 on either design. However, as ongoing assessment work by HSE after June 2011 could impact on the Environment Agency's conclusions, our intention is that only Interim SoDAs would be issued until HSE is finally in a position to consider whether to issue full DACs. This will also result in the final DAC and SoDA being based on the same Design Reference. Therefore, in June 2011, the Environment Agency is likely to issue an Interim SoDA for each reactor design, and these will be supported by Decision Documents that:
- Set out the decision.
 - Summarise the consultation responses and issues raised.
 - Set out views on those issues.
- 34 Further information is available on the Environment Agency's website at <https://consult.environment-agency.gov.uk/portal/ho/nuclear/gda>

Stakeholder Engagement

- 35 A significant contribution to our recent stakeholder engagement has been provided by the Environment Agency's consultation described above.
- 36 The number of visitors to our joint new reactors website remains consistent at an average of 5000 per month, and the number of e-bulletin subscribers has increased to 4400. We have revised the format for the e-bulletins, making them more accessible and consistent with the website in terms of look and usability.
- 37 We continue to engage at stakeholder events and conferences and provide presentations, talks and answer questions on GDA. We have participated at the following events in this quarter
- Springfields Site Stakeholder Group meeting – 5 October
 - Marcus Evans 2nd Annual Nuclear Power Generation Conference – 7 October.

- Nuclear Industry Association event – 26 October.
 - Somerset Nuclear Energy Group (SNEG) – 26 October
 - Department of Energy and Climate Change Nuclear Development Forum – 28 October.
 - HSE and Environment Agency GDA Requesting Party event – 29 October.
 - Finnish Young Generation Network event – 29 October.
 - 2010 Information System on Occupational Exposure (ISOE) event – 17 November.
 - ARENA European Nuclear Supply Chain Conference - 18 November.
 - HSE and Environment Agency GDA Industry event – 23 November.
 - Marketforce Nuclear New Build Forum - 25 November.
 - Somerset Nuclear Energy Group (SNEG) 30 November
 - Nordic Symposium on Nuclear Technology on 1 December
 - NIA Energy Choices event – 2 December.
 - Department of Energy and Climate Change – Non Governmental Organisation meeting - 8 December.
- 38 Media interest in the GDA process continues to increase as our assessment progresses, and we continue to offer media interviews.
- 39 The Public Comments process for GDA, whereby stakeholders can provide comments to the RPs on the reactor designs, has now closed. However, general comments can still be submitted to HSE and the Environment Agency via the GDA Joint Programme Office, 4NG Redgrave Court, Merton Road, Bootle, Merseyside, L20 7HS, or via e-mail: new.reactor.build@hse.gsi.gov.uk

WORKING WITH DEPARTMENT OF ENERGY AND CLIMATE CHANGE (DECC)

- 40 We have continued to provide expert advice to DECC's Office for Nuclear Development (OND), the sponsoring Government Department for new nuclear development. OND is leading on topics such as new build siting, regulatory justification, waste and decommissioning costs, and the nuclear National Policy Statement (see <http://www.decc.gov.uk> for further information).
- 41 During this quarter we have provided advice to DECC in relation to: the draft ministerial decisions on the Regulatory Justification of the AP1000 and EPR reactor designs; the preparation of the Government's second public consultation on the draft Nuclear National Policy Statement; and on DECC's guidance on Decommissioning and Waste Management Plans and operators' Funded Decommissioning Programmes. We also attended the Nuclear Development Forum on 28 October to provide an update on progress with GDA, and we participated in DECC's meeting in November with RPs and potential future operators that reviewed regulators' progress on the overall new nuclear build programme.
- 42 We have engaged with DECC on its early thoughts on whether a second round of GDA should be entered into on other potential nuclear power station designs, noting that there are significant planning and resource implications for HSE and the Environment Agency. We have supported DECC's position that any second round of GDA should be organised in a way that avoids any conflicts with GDA, the licensing and permitting work associated with the proposed new reactors at Hinkley Point C, and the regulators'

other work priorities in securing the protection of people, society, and the environment from the existing nuclear facilities.

MORE INFORMATION ON GDA

To find out more about Generic Design Assessment (GDA) - log onto:

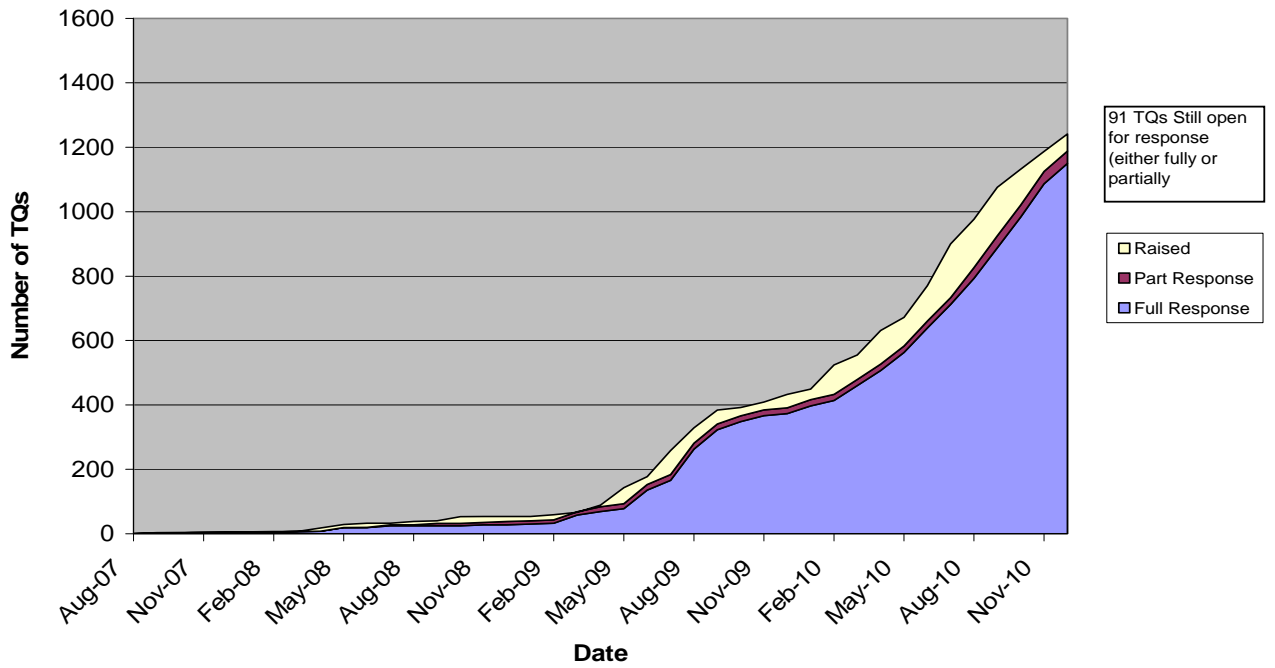
<http://www.hse.gov.uk/newreactors/index.htm>

Receive the latest news and information on GDA - subscribe to our free e:mail bulletin -

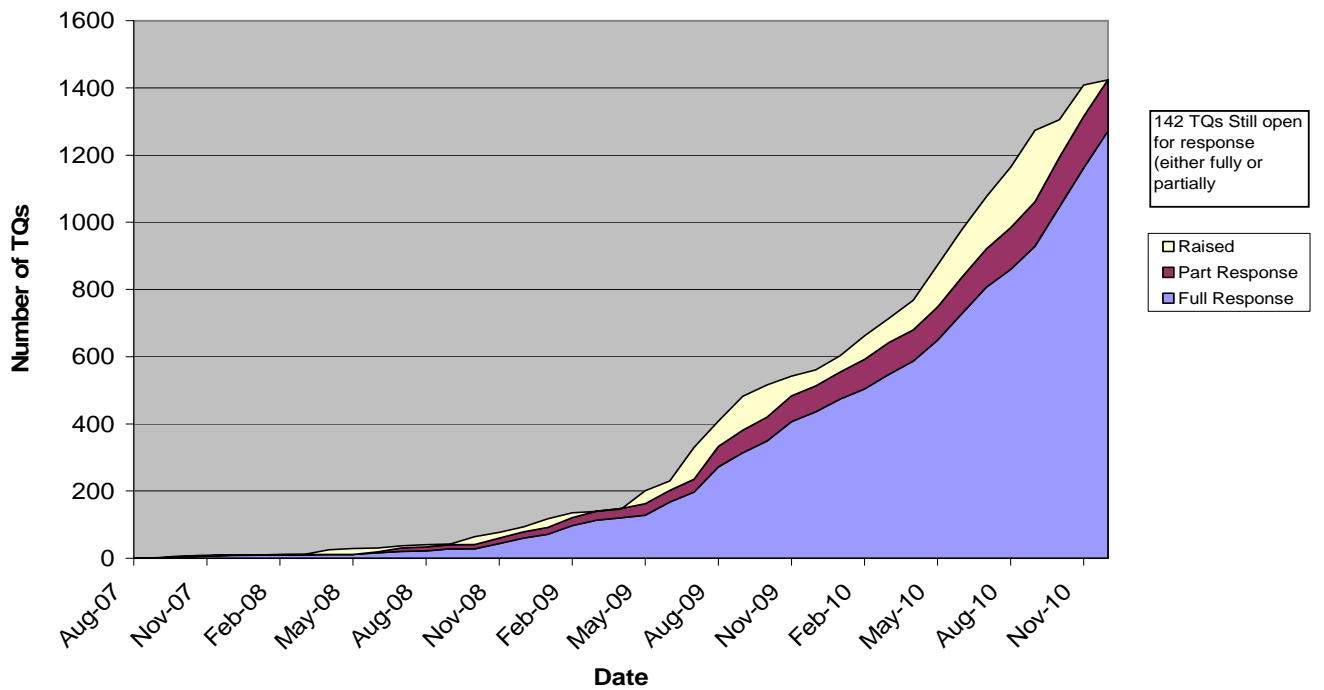
<http://www.hse.gov.uk/newreactors/ebulletin.htm>

**Annex 1
GDA Interaction Metrics**

Westinghouse response to TQs (as at 31 December 2010)



EDF and AREVA response to TQs (as at 31 December 2010)



Annex 1
GDA Interaction Metrics

Meeting summary during October - December 2010

Westinghouse 59 of which 49 were in the UK, and 10 in the USA
EDF and AREVA 56 of which 35 were in the UK, and 21 in France

Regulatory costs charged to RPs to end September 2010
(One quarter behind the rest of this report):

Nuclear Directorate

Westinghouse: £14.52M
EDF and AREVA: £15.34M

Environment Agency

Westinghouse = £1.71M
EDF and AREVA = £1.66 M

Annex 2

UK EPR Topic-by-Topic Summary

Internal Hazards

The assessment is progressing well. Interactions are good and EDF and AREVA are mostly providing comprehensive good quality technical responses. However, there are delays in responses to some of the questions we have asked (with some of the dates now extending to the end of March 2011), which will make assessment and inclusion within our Step 4 report more difficult, and increases the risk of having GDA Issues in these areas. A convergence meeting was held in October and potential GDA Issues were identified in the following topics:

- Potential dropped loads from cranes and resultant impact scenarios.
- The safety case for internal flooding is inconsistent with the deterministic approach that we would expect to be used.
- Completeness of evidence associated with safety claims on internal missiles, cable routing, internal flooding, and pipewhip, through provision of verification and validation reports.

Civil Engineering

We have previously reported that this remains an area of intense activity where there are significant issues outstanding, primarily due to a combination of late delivery of information from EDF and AREVA and lack of clarity in the safety arguments and documentation. While some progress has been made in the quarter, this still remains the case, and now given the proximity to the end of Step 4, is becoming critical. A large amount of information was delivered in December, but several key responses to some of our main technical issues are still awaited, for example key submissions related to the civil structure design code ETC-C and on the proposed use of grouted tendons. In addition, there remain around 70 outstanding technical questions and meeting actions for which we await responses. The recently received information is currently under assessment by us and our TSCs but it is proving problematic for us to complete within the time required. A key ongoing work stream is the assessment of the revised civil structure design code ETC-C. In addition, from the assessment completed so far, we have identified a number of areas where the information is unclear or incomplete.

A convergence meeting was held in October where this work was discussed in detail with EDF and AREVA. We made it clear that there are potential GDA Issues in the following six areas below, and this was still the case in December:

- Verification and validation of the Software packages used in the analysis and design of the nuclear island structures.
- Computer modelling of the nuclear island structures.
- The design code ETC-C.
- The layout, sensitivity and operation of the containment instrumentation.
- The design analysis of the containment.
- The lack of overarching safety documentation for the nuclear island structures.

We remain optimistic that the bulk of these can be resolved by June 2011. However, the volume of work and technical issues are challenging and require high quality, timely and complete responses to be delivered by EDF and AREVA.

Annex 2

UK EPR Topic-by-Topic Summary

External Hazards

The assessment of seismic analysis of the nuclear island structures is nearing completion, and many of our queries on detailed aspects of the analysis methodology are linked to progress on the civil engineering assessment (for example on the codes used for seismic analysis of the nuclear island structures) and many of the same challenges apply.

Progress on aircraft impact remains reasonable and we have gained confidence from the regular and good quality meetings held with the RP. We have received the bulk of documents related to aircraft crash, the original programme for which has slipped.

There is a concern over the ability to exchange information on security door design due to inter-national security issues. There is now limited time available to complete a detailed assessment of the design principles and engage on technical issues, should there be substantive queries over the approach adopted.

At the end of December, we were still awaiting security classified information on aircraft crash and door design. This arrived during January and now needs to be assessed in a short timescale and in parallel with writing of our assessment reports. Although we believe this could be completed by June 2011, it does remain a significant challenge for us to manage and increases the potential that some confirmatory analysis could be required as a GDA Issue.

Probabilistic Safety Analysis

This complex topic draws together many other technical areas. A convergence meeting was held in November and interactions with EDF and AREVA are generally positive. Only a small number of technical queries remain to be progressed. Our assessment remains on plan and critical milestones are being met. We do not anticipate any GDA Issues at the end of our assessment.

Fault Studies, Transient Analysis and Severe Accidents

Assessment has been progressing well and convergence meetings were held in November. Almost all technical responses have been received and are generally of good quality. Design modifications have been proposed in some areas to respond to our observations. Nevertheless, the volume of work and technical issues that still need to be addressed by us and by EDF and AREVA during Step 4 remain challenging, and it is clear that some matters are unlikely to be fully resolved by the end June 2011.

A number of the areas remain under discussion and have the potential to become GDA Issues. These include the following:

- Further justification for some Boron Dilution faults. Modifications may be required to provide extra protection.
- Extra protection may be required in the C&I systems to improve the level of diversity.
- Improvements to the safety case for the spent fuel cask loading pit.
- Further justification on the required operator action to provide protection against Steam Generator Tube Ruptures.
- The completeness of the list of initiating events on the fault schedule for essential support systems (electrical system, cooling chain, ventilation etc).

These are more likely to affect the safety case and possibly the C&I systems rather than the plant layout itself.

Annex 2

UK EPR Topic-by-Topic Summary

Included within the fault studies area is the topic of severe accident mitigation. Here we are looking at safety arguments for design features that are provided to cope with such things as a molten core. For the EPR one of the key features of the safety case is the claimed ability to retain and cool the molten core within a core catcher, built into the containment structure underneath the reactor pressure vessel. One of our main lines of investigation is the examination of the key uncertainties with the modelling of these complex phenomena and how they are validated.

Control & Instrumentation (C&I)

Our questions on the C&I architecture were significant enough to be raised as a Regulatory Issue (RI) in April 2009. EDF and AREVA have been working to address the RI since then, including provision of a hardwire-based backup system. We had a series of constructive meetings during the last quarter where EDF and AREVA provided additional evidence on the design changes and safety case improvements proposed to respond to the RI. Our assessment of these has led us to agree that, while there are outstanding actions to complete, we are satisfied that the majority of the key actions associated with the RI have been addressed and we wrote to EDF and AREVA in November 2010 to confirm that the RI was closed. The remaining work will be pursued as part of the ongoing GDA assessment and there will be a number of GDA Issues on this topic.

On the C&I architecture, and a number of other C&I assessment aspects, we require further submissions from EDF and AREVA and these are falling behind programme, which is particularly problematic at this late stage in Step 4. A convergence meeting was held in October where we emphasised that it is essential that EDF and AREVA now provide timely, high quality submissions to outstanding technical questions. Overall, we still believe that an acceptable position can be reached, but there is limited time for assessment of further detailed information, and we therefore expect a number of GDA Issues to remain. These are likely to include the following items:

- EDF and AREVA have committed to provide a hardware based backup system but further information on its design is required.
- Closure of remaining actions on C&I architecture.
- Further evidence on the categorisation and classification aspects of the C&I systems.
- The definitive approach to statistical testing, static analysis and compiler validation needs to be defined for example on statistical testing we are looking for significantly more testing than is currently intended by EDF and AREVA.
- An appropriate justification for equipment that incorporates SMART devices (i.e. all the equipment that makes use of built-in computer chips and software).
- Evidence to support some of the safety case claims.
- Changes that EDF and AREVA are considering to overcome likely obsolescence issues on one of the C&I platforms.

Electrical Engineering

- Progress remains on course for achieving a meaningful GDA and programmes of work have been identified to deliver outstanding documentation. A convergence meeting was held in September and there are some areas that remain under assessment, but subject to timely and quality delivery of information by EDF and AREVA these could be resolved by June 2011. The potential for GDA Issues will depend on the progress made on these.

Annex 2

UK EPR Topic-by-Topic Summary

Fuel Design

Assessment is on target and progressing well with significant effort on the part of EDF and AREVA to deliver technical responses such that only a small number remain outstanding. A convergence meeting was held in October and a number of our observations have been resolved. We are on programme to complete the planned assessment, and no GDA Issues are expected.

Reactor Chemistry

This complex topic has many interactions with other assessment areas. Our assessment is generally to plan although delays to TSC contract placement has impacted on delivery dates for their work. A convergence meeting was held in October and a number of matters remain under active discussion such as the potential for boron dilution accidents, the characteristics of radioactive source terms, and severe accident chemistry. Progress recently has generally been good, with a large number of technical responses being received from EDF and AREVA. While progress is being made there remains the possibility that some matters might not be fully resolved by June 2011, some of which have the potential to impact the design, and these may therefore become GDA Issues. These include:

- Further justification of the suitability and sufficiency of technology proposed for boron metering.
- Evidence that high levels of contamination (CRUD) will not be generated during normal operation.
- Provision of further evidence on post accident combustible gas control.
- Provision of greater clarity and substantiation of chemistry aspects of the molten core during severe accidents.

Radiation protection

Key work areas this last quarter have included criticality, shielding, high dose work activities and impacts of accidents on site. TSC reports are awaited, but the work is generally progressing well, and interactions with EDF and AREVA are good. The convergence meeting was held in November. Although our assessment is nearing completion, several new technical questions have been raised, primarily to ensure clarification on information already submitted to us.

One problematic area that remains is related to the supporting arguments and substantiation documentation for the radiation shielding. Currently the claims made in the generic safety submission are not supported by a radiological zoning classification scheme underpinned by shielding calculations and we would expect this information to be available within GDA. We do not believe there is a fundamental problem with the design. However, the construction concrete provides a key element of radiation shielding for restriction of exposure of workers to ionising radiations. As this is fundamental to the basic design of the UK EPR we judge it appropriate to have further arguments and evidence supplied within GDA, but it now seems unlikely that it can be provided by June 2011. This matter is therefore likely to become a GDA Issue. However, this should be fairly straightforward to resolve.

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UK EPR Topic-by-Topic Summary

Mechanical Engineering

The assessment is progressing to plan and a convergence meeting was held in October, with a final technical meeting in November where a number of our technical questions were resolved. EDF and AREVA continue to make good progress, and we remain satisfied with the level of technical interactions and quality of responses to our technical questions. There is, however, a lack of detail and evidence in the safety case for some equipment as this will only become available during the procurement and supply phase. We accept that this is appropriate at this stage of the design and that these will be progressed at the site specific stage. We do not anticipate there being any GDA Issues in this topic area.

Structural Integrity

A convergence meeting was held in October, but there remain significant issues relating to primary pressure circuit components where it is claimed that the likelihood of gross failure is so low that it can be discounted. Key to this is completion by EDF and AREVA of additional component fracture assessments in order to demonstrate an appropriate level of defect tolerance and the capability of the inspection techniques to confirm the absence of critical defects. In particular, assessment of the fracture analysis has become challenging because of differences in methodology between EDF and AREVA's predictions and our independent calculations. Resolution of these discrepancies has been a major priority and a way forward has been reached. A further topic of significant discussion is whether the inspection techniques proposed for the qualified manufacturing inspection will have adequate detection and characterisation capability. Progress has been made but there may be a need for some further enhancements to the proposals. Finally, we have some further questions about the proposed safety classification of the pressure systems (other than the primary circuit) and the standards to which they will be built.

The RP has devoted significant effort to develop an acceptable way forward and progress is being made on these matters, most recently at a meeting on 22 December. A large number of documents were delivered late in December, and some further key documents are scheduled for delivery very late in the GDA process, in January and March 2011. We are prioritising key areas for a high level review, but given the volume of work and technical issues involved, it may not be possible to resolve all matters. There will therefore be matters that will need to be progressed after June 2011 as GDA Issues. Dependent on the amount of assessment we are able to undertake over the coming months, an element of the Resolution Plan could be for us to complete the assessment of information that has already been delivered. The GDA Issues may include the following:

- Implement a fracture analysis approach that takes account of the discrepancies between the initial fracture analyses performed by ND's contractors and the results obtained by EDF and AREVA.
- Provide an overall procedure for integrating defect tolerance with evidence of absence of defects through appropriate NDT capability.
- Provide evidence for the capability of the qualified NDT for detecting and correctly characterising defects at the end of manufacturing.
- Demonstrate that the standards adopted for the design of safety class 1, 2 or 3 pressurised mechanical components is appropriate.

Human Factors

Our progress in this topic area is being hampered by a lack of evidence to support claims made about the relative risk contribution from human actions. EDF and AREVA have

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UK EPR Topic-by-Topic Summary

previously provided a forward programme (for during and beyond Step 4) for provision of the evidence they can deliver and they have made notable efforts to achieve this. Their response has been good, with submissions provided on dates agreed at the convergence meeting held in November. The work submitted recently has been of good quality.

A large number of documents have been delivered in the latter part of 2010 and this is a major challenge for us to assess. We are prioritising key areas for review, but given the volume of work and technical issues involved, it may not be possible to resolve all matters before June 2011. There may therefore be matters that will need to be progressed after June 2011, as GDA Issues. Dependent on the amount of assessment we are able to undertake over the coming months, an element of the Resolution Plan could be for us to complete the assessment of information that has already been delivered. The potential GDA Issues relate to the following:

- Detail of how the human based safety claims have been identified and the completeness or substantiation of the claims made.
- Further evidence to demonstrate that Human Factors have been appropriately integrated into the UK EPR project. This needs to include activities outside the main Control Room, such as equipment design, maintenance, and consideration of error reduction.

Our judgement at this point is that key safety claims can be substantiated in the future and, while the lack of current information is a gap in the safety case, it is not, we believe, indicative of a significant design deficiency.

Management of Safety and Quality Assurance (MSQA)

Assessment is generally on plan. This last quarter included a convergence meeting in October, and inspections of the EDF and AREVA design offices on QA arrangements supporting Design Development and Design Change. EDF and AREVA demonstrated a good design change process that meets ND expectations. However it was noted that a number of design changes will not be fully implemented by June 2011. Therefore, further work is required on some aspects, including the control, review, acceptance and implementation of design changes into GDA documentation, and the arrangements for the transfer of incomplete design changes from GDA to site-specific work. EDF and AREVA are developing arrangements for this, however, these will not be available for testing until after June 2011 and this could therefore lead to a GDA Issue on this topic.

Other topics that have been discussed recently include the Submission Master List and Out of Scope items, but we do not expect to have any GDA Issues in these areas.

Radioactive Waste and Spent Fuel Management

Progress on this topic is generally proceeding to plan and recent interactions on decommissioning and waste conditioning have gone well. We are continuing to discuss the case to ensure that the spent fuel and Intermediate Level Waste can be stored, transported and disposed of safely. As part of this work we had a meeting with the Nuclear Decommissioning Authority's Radioactive Waste Management Division about their work programmes on waste packages and the future repository. To complement this, EDF and AREVA have very recently (during January 2011) provided a response to our questions on this topic which at first sight appears to contain sufficient information to demonstrate the credibility of its future plans for wastes and spent fuel, although this will still leave further detailed work to be completed as the site specific projects progress. On decommissioning, we have discussed EDF and AREVA's initial responses in technical meetings following which they agreed to provide some additional information. Based on the discussions, we

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are confident that EDF and AREVA have the information required and that this should be sufficient to address our queries. We do not envisage any GDA Issues on this topic.

Environmental

Based on consultation responses and some additional information received from EDF and AREVA, we are largely content that there will be no significant unresolved environmental issues for the UK EPR remaining after June 2011. However, as ongoing assessment work by HSE after June could impact on the Environment Agency's conclusions (e.g. in the reactor chemistry area), our intention is that only Interim SoDAs would be issued until HSE is in a position to consider whether to issue full DACs. This will also ensure that the final DAC and SoDA for the UK EPR will be based on the same Design Reference.

Security

Assessment of physical security aspects is progressing to plan. Recent meetings have been constructive and the quality of submissions is satisfactory. Meetings have been held to provide comment and guidance, in addition to the written feedback, on the draft Conceptual Security Arrangements (CSA) documents. The updated CSAs are due to be submitted to us in January. We currently do not envisage any GDA Issues arising from our assessment.

Cross Cutting Topics

Design changes: EDF and AREVA have proposed a number of changes to the UK EPR reference design that they wish to have included in GDA. This includes changes as a result of matters we have raised during our assessment, for example on the C&I architecture. We have agreed a process for how these will be managed within GDA but the details of implementation remain under assessment (in the MSQA topic area) and there may be a GDA Issue on this aspect as discussed in the MSQA topic summary. EDF and AREVA have also requested that a large number of detailed design changes emerging from Flamanville 3 EPR construction are considered within GDA after June 2011. We are discussing this with them, within the wider New Build Programme arrangements, and have agreed to consider their design changes in more detail after June 2011.

Safety Classification and Categorisation: This is an important element of the safety case as it allows a graded approach to safety, based on importance, and allows us to focus our assessment on those functions that are the most important. It also helps ensure that appropriate codes and standards are applied, according to the safety requirements for that system, structure or component. Much progress has been made in this cross-cutting topic area and EDF and AREVA has revised its methodologies for safety function categorisation and classification for structures, systems and components (SSC) and these now broadly meet our expectations. However, further work will be required after June 2011 in the Structural Integrity and C&I topic areas (see above). Additionally, the further application of the revised SSC classification methodology within the GDA safety case across all other technical topic areas may need to be progressed after June 2011 as a GDA Issue.

Limits and Conditions: EDF and AREVA have provided a technical report to demonstrate how potential EPR operators can derive technical specifications, operating constraints and maintenance and inspection programmes from the key design limits and conditions and maintenance / inspection principles included in the GDA safety case. Although significant progress has been made in this area, further work will be required post June 2011 to update the Limits and Conditions technical report to be consistent with the Chemistry and Fuel topic areas.

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Internal Hazards

The assessment is progressing well. Our main observation is the lack of consistency and coherency of the claims, arguments and evidence presented by Westinghouse, which we saw evidence of again in the Pre-Construction Safety Report (PCSR) that was received at the end of December. We have raised specific observations in the areas of internal flooding, dropped loads, impacts, and internal missiles and these were discussed at the convergence meeting in October. There has been slippage with the programmes for the outstanding deliverables to address gaps in the safety case, which makes GDA Issues more likely in this topic area.

Currently, there are two Potential GDA Issues on:

- Identification and substantiation of barriers against potential internal hazard threats (e.g. fire, internal missiles, internal explosion, pipewhip, and internal flooding).
- Completion of the safety case for internal flooding, including the provision of the requisite arguments and evidence.

Civil Engineering

We raised a Regulatory Issue (RI) on this topic related to the proposed new steel-concrete-steel construction design for key structures within the “Nuclear Island” including the enhanced shield building and other civil structural modules. We were concerned there was a lack of evidence to demonstrate that the structures would be sufficiently robust. In response, Westinghouse has proposed some design changes and has undertaken further analysis and testing.

Westinghouse originally committed to provide the required information by October 2010, but major elements have been received as late as January 2011. This is currently under assessment by us, but it is proving problematic for us to complete within the time required. In addition, from the assessment completed so far, we have identified a number of areas where the information is unclear or incomplete. A convergence meeting was held in November where this work was discussed in detail with Westinghouse. We made it clear that, even if we are able to draw positive overall conclusions on the acceptability of Westinghouse’s proposals for civil structures, and close out the RI, there will still be some GDA Issues for remaining areas of confirmatory analysis on some of the key nuclear island buildings.

Finally, there are civil structure aspects to the cross cutting topic of metrication, and there are other assessment issues being pursued such as the impact of construction material differences between the USA and the UK. In response to our concerns, Westinghouse has proposed to import a significant amount of US materials, rebar, steel sections and bolts in support of AP1000 construction. We are not currently convinced with Westinghouse’s proposals and there is likely to be a GDA Issue on these aspects of the construction plans.

External Hazards

Despite earlier delays in our provision of some information to Westinghouse due to security considerations, reasonable progress is now being made on much of this topic (which is closely linked to civil engineering - see above) including assessment of load schedules, seismic design and aircraft impact. Work carried out recently has mainly been on Aircraft Impact Assessment. There is sufficient time for Westinghouse to complete the required analysis, but the results will not be available to HSE until January with the result that our assessment will need to be completed in a short timescale. Although we believe this could be completed by June 2011, it remains a significant challenge for us to manage and increases the risk that some confirmatory analysis could be required as a GDA Issue.

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Probabilistic Safety Analysis

This is a complex technical area that needs to take account of findings from many other topic areas. Our technical assessment work, and that of our TSCs, is close to completion and following the agreed plan. In particular, we are finalising the evaluation of the risk gap associated with the shortfalls we have identified, with a view to determining whether the overall risks are acceptable and ALARP, and to help us to confirm, by June 2011, our initial view that the AP1000 can be constructed and operated safely in the UK. This Risk Gap Analysis still requires significant effort, which is a challenge for us. Westinghouse is currently supporting us in the evaluation of some of the shortfalls by correcting a number of errors in the PSA model found during our assessment.

A convergence meeting was held in October and we provided information on our assessment work, what has been found and the perceived importance of the findings (pending completing the Risk Gap Analysis). These were useful discussions with Westinghouse on the technical findings and no areas of significant disagreement were identified.

We are working well with Westinghouse, but anticipate that it will not, by June 2011, be able to deliver a PSA that is fully sufficient for GDA. There are numerous reasons for this, primarily, that the PSA is not a complete, or up to date evaluation, and is overly reliant on analysis done some time ago for the AP600 design without sufficient evidence of applicability to AP1000.

Overall, we have confidence from our assessment to-date and from some of the work Westinghouse has done in GDA, that it will be able to deliver a high quality modern standards generic AP1000 PSA in the future. We will likely record the need for generic PSA improvements in two GDA Issues, as follows:

- The AP1000 PSA should be supported by AP1000 specific thermal-hydraulic analysis.
- AP1000 fire risk is not an up-to-date or complete evaluation and there is therefore uncertainty in the overall plant risk from fires. A modern standards Fire PSA should therefore be developed to close this gap.

Fault Studies, Transient Analysis and Severe Accidents

In the last report we commented that some of Westinghouse's technical responses had fallen short of the high standards we expect, and that Westinghouse had committed to deploying additional resource in a recovery programme. We are pleased to report that assessment has recently been progressing well, Westinghouse's performance has improved, and recent technical responses have been of improved quality. Nevertheless there is still a large volume of work to complete and the technical issues are particularly challenging. These were discussed with Westinghouse at the convergence meeting in December. Currently we are anticipating having a number of GDA Issues on the following topics:

- The fault studies aspects of the potential for spurious actuation of the protection system to cause a reactor depressurisation.
- The level of diversity to protect against some faults and the consequences of single failures, and whether some additional C&I functions e.g. additional automation or additional reactor flux trip protection, or some additional cooling system functions, may be required.

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- Connection of in-core detectors to reactor protection system might be required for diversity for flux protection.
- Additional information on the fuel pond safety case, together with provision of an extra diverse engineered cooling system and filters.
- Demonstration that all safety analysis is appropriate for the agreed GDA Design Reference point.

Included within the fault studies area is the topic of severe accident mitigation. Here we are looking at safety arguments for design features that are provided to cope with such things as a molten core. For the AP1000 one of the key features of the safety case is the claimed ability to retain the molten core within the reactor pressure vessel. One of our main lines of investigation is the examination of the key uncertainties with the modelling of these complex phenomena and how they are validated.

Control & Instrumentation

We raised significant concerns about the complex C&I systems proposed for the AP1000, including questions about design diversity for the equipment proposed and the potential consequences of faults within the C&I systems themselves (e.g. where spurious initiation could potentially lead to a loss of coolant accident). Westinghouse has responded well, with additional resource deployment and has delivered a considerable amount of work. Following recent meetings, we have taken additional confidence in the technical approach Westinghouse plans to take, which will include significant design changes.

However, there have been some shortfalls in quality and this has meant that further iterations of information have been required, thus delaying closure of issues. Also, there has been a lack of adequacy in the safety case links between arguments and evidence which has hampered our assessment. Our continuing progress is dependent upon good quality safety case documents and responses to technical queries being made available by Westinghouse in a timely manner and the need to ensure that it maintains a high level of resource on the GDA project. This message was reinforced during our convergence meeting in November.

The red metric for this topic area is to primarily highlight that we have had a resource problem, although this has now been overcome. Nevertheless, delivery of key elements of information late in Step 4 has been a challenge for us and the result is that we have a lot of information to assess. As a consequence we expect to have GDA Issues, including on the following aspects:

- Lack of design and safety case information for the Diverse Actuation System, including for the operating and maintenance philosophy, and substantiation for the significant changes Westinghouse has proposed to the architecture.
- Diversity between the primary and diverse protection systems. The modifications Westinghouse has proposed have provided a significant step forward. A detailed diversity analysis will be needed when further details of the modifications are available.
- The potential for spurious actuation to lead to reactor depressurisation. Westinghouse has proposed a modification to provide a 'blocker' to address this and further design substantiation is required.
- The approach to using SMART equipment (i.e. all the equipment that make use of built-in computer chips and software) needs further development and implementation.

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- The lack of evidence for design and development standards of significant elements of the safety and control systems. Additional safety case information will be required.
- A shortfall of evidence to justify the system/component safety classification used on the protection systems.
- Provision of Class 1 displays and controls in the Remote Shutdown Station.

Electrical Engineering

Assessment is generally on plan and the quality of recent interactions has been good. There are still significant issues under assessment such as the safety classification of electrical systems, the maintenance philosophy and the lack of links between claims, arguments and evidence in the safety case. We have also noted some inconsistencies between the safety documents submitted. Westinghouse has actions in hand to address these issues and any potential for GDA Issues will be dependent on its performance in delivering adequate responses to us. The potential GDA Issues currently include:

- Improvements to the presentation of the safety case and demonstration of adequacy for the electrical system.
- Production of an electrical maintenance philosophy.

Fuel Design

Assessment is progressing well with some good quality interactions. However, late arrival of safety justification documentation is challenging at this late stage in the assessment. A number of issues remain under assessment including on the computer modelling codes used for core physics and these were discussed at the convergence meeting in December. We should be able to complete a meaningful GDA assessment by June 2011, although GDA Issues are likely to relate to the following:

- Lack of information to justify some of the computer codes used.
- The forces on the fuel that could result from loss of cooling accidents.

Reactor Chemistry

This complex topic has many interactions with other assessment areas. Good progress has been made both by us and Westinghouse despite the back-loading of the delivery dates. Several of our queries have been resolved. A number of chemistry aspects remain under discussion (for example on how chemistry control affects radioactivity levels around the primary circuit, and on the chemistry aspects of the core melt in-vessel retention case) and these were discussed in the convergence meeting held in November.

Westinghouse has offered substantial design and safety case improvements for chemistry (for example on the sampling systems) and we will be aiming to examine these. Overall, the volume of work, detailed technical justification required, and back-loading of the assessment, raises the possibility that some matters will not be fully resolved by June 2011. Depending on the further evidence we are presented with, there may be some GDA Issues related to aspects such as severe accident mitigation (e.g. on fission product control without use of containment sprays); the case for loss of cooling to the spent fuel pond; and the design of the primary sampling and hydrogen dosing systems.

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Radiation protection

Our current view is that progress is sufficient to achieve a meaningful GDA by June 2011. Key work areas this last quarter have included criticality, shielding, high dose work activities and impacts of accidents on site. TSC reports are awaited but the work is generally progressing well, and interactions with Westinghouse are good. The convergence meeting was held in November. Although our assessment is nearing completion, several new technical questions have been raised, primarily to ensure clarification on information already submitted to us. It has been noted that dose rates close to certain components of the AP1000 are predicted to be higher than for some existing reactors, although predicted doses to workers are low, as not much maintenance is foreseen to be required within these higher dose areas. This remains an area of discussion with Westinghouse, and we note that it believes that the projected dose rates for the AP1000 are conservative, and that there may be opportunities to reduce dose rates by using additional shielding or by reducing cobalt impurities in some primary circuit components.

A further area of recent discussion has been the amount of space available for radioactive waste handling facilities and for health physics facilities, including changing rooms and monitoring facilities etc. Westinghouse has indicated that it intends to address any space constraints within the main nuclear island buildings by providing additional facilities on each site, external to the main reactor building.

One significant issue we continue to progress is the criticality safety case for storage of fuel in the spent fuel pool. We wrote to Westinghouse in November in response to their last submission on this topic and we asked for an amended fuel storage proposal that provides criticality safety through geometry and fixed poisons. This should be resolvable by June 2011.

Mechanical Engineering

Interactions with Westinghouse have been good and we have had effective and meaningful dialogue across a number of areas. Progress is generally consistent with achieving a meaningful GDA assessment by June 2011. There are a number of significant issues that are being considered within this topic and these were discussed at the convergence meeting in October, and at subsequent technical meetings. Progress has been made on several issues, including justification of nuclear lifting equipment, justification of fuel handling equipment; and the design and testing of Control Rod Drive Mechanisms. We now anticipate resolution of these by June 2011.

We considered it reasonably practicable to have additional filters on some parts of the building ventilation and Westinghouse has now agreed in principle to implement some design changes to address this. These now need to be introduced into the GDA design reference.

On the novel fast-acting squib valves there has been further progress, but much work is still required in this area, specifically focussing on maintenance and surveillance aspects, which also includes provision of adequate isolation and drainage arrangements. Significant further work is required by Westinghouse and we expect there to be a GDA Issue on this topic.

Finally, there are mechanical engineering aspects to the cross-cutting topic of metrication that remain under discussion (see below). We consider that further work is required in the area of pipe flanges, valves and bolting, where Westinghouse is currently proposing widespread use of imperial fasteners.

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Structural Integrity

The issues remaining relate to primary pressure circuit components where it is claimed that the likelihood of gross failure is so low that it can be discounted. Key to this is completion by Westinghouse of additional component fracture assessments in order to demonstrate an appropriate level of defect tolerance and the capability of the inspection techniques to confirm the absence of critical defects. Westinghouse has continued to produce good quality reports and usually on schedule. Whilst progress is being made on these matters, the volume of the work programme, with delivery dates late in our assessment, is challenging.

Westinghouse has devoted significant effort to develop an acceptable way forward and progress is being made on these matters. A large number of documents were delivered in December, but a number of the reports on the fracture assessment and manufacturing inspection have been delivered later than programmed, and some will not arrive until 2011. This is a major challenge for us to assess. We are prioritising key areas for a high-level early review, but given the volume of work and technical issues involved, it will not be possible to assess and resolve all matters by June 2011. There will therefore be matters that will need to be progressed after June 2011 as GDA Issues. The GDA Issues may include the following:

- The safety case for avoidance of fracture, including defect tolerance and evidence of absence of defects through appropriate non-destructive testing inspections during manufacturing.
- The safety case for the reactor coolant pump pressure boundary material and associated welds for the revised design (information will now not be available until January 2011).
- Evidence to demonstrate that components have the correct safety classification from a structural integrity perspective.
- Fatigue assessment including details of the fatigue usage factor calculation for the Pressuriser Surge line.

Human Factors

Our assessment is making good progress and recent interactions with Westinghouse have been good. However, Westinghouse only delivered a significant volume of work at the end of 2010 and, although this should improve the safety case, it makes assessment difficult by June 2011. Westinghouse continues to be responsive to our technical questions and has made a good effort to respond in accordance with the prioritisation agreed during the convergence meeting held in November. While there is much work still to be done, our judgement at this point is that key claims are likely to be able to be substantiated. Nevertheless, due to the volume of ongoing work, we expect that there will be outstanding issues in this topic that will require resolution as a GDA Issue.

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Management of Safety and Quality Assurance (MSQA)

Assessment and inspections during this last quarter continued to plan and convergence meetings were held in September and October. Westinghouse has continued to provide additional information that has allowed us to close-out some of our earlier queries. There were inspections in November and December on the topics of Design Change and Configuration Control, and product acceptance (for GDA support contracts) and these confirmed that there are still several issues related to the content and definition of the Design Reference, and design change control. A milestone was achieved with the agreement that the Design Reference Point (DRP) (ie the date at which the design was 'frozen' for GDA) has been declared as 16 September 2010. However, delivery of an adequate Design Reference (all the documents that should define the design on the DRP date) is still outstanding. Our principal concerns are that the current Design Reference provided by Westinghouse does not appropriately reflect the design of AP1000 proposed for the UK, there are inconsistencies with the Pre Construction Safety Report (draft version submitted in December 2010), and it is not consistent with some of the supporting documentation that has been submitted for our assessment in GDA. We have raised questions with Westinghouse on these matters and discussions are continuing, but these ongoing concerns are particularly problematic at this late stage in GDA, as the Design Reference is key to any Design Acceptance Confirmation we might issue.

In addition, there will be a GDA Issue to cover consolidation of the GDA submissions and control of design changes within the Design Reference.

Radioactive Waste and Spent Fuel Management

Progress on this topic is proceeding to plan, quality of information has been good, and recent interactions have continued to go fairly well. This last quarter our work has concentrated on decommissioning and the case to ensure that the spent fuel and Intermediate Level Waste can be stored, transported and disposed of safely. As part of this work we had a meeting with the Nuclear Decommissioning Authority's Radioactive Waste Management Division about their work programmes on waste packages and the future repository. To complement this, Westinghouse provided a response to our questions on this topic with sufficient information to demonstrate the credibility of its future plans for wastes and spent fuel, although this will still leave further detailed work to be completed as the site specific projects progress. On decommissioning, we have discussed Westinghouse's initial responses in technical meetings following which it agreed to provide some additional information. Based on the discussions, we are confident that Westinghouse has the information required and that this should be sufficient to clear our queries. We do not envisage any GDA Issues on this topic.

Environmental

Based on consultation responses and some additional information received from Westinghouse, we are largely content that there will be no significant unresolved environmental issues for the AP1000 remaining after June 2011. However, as ongoing assessment work by HSE after June could impact on the Environment Agency's conclusions (e.g. in the reactor chemistry and MSQA areas), our intention is that only an Interim SoDA would be issued until HSE is in a position to consider whether to issue a full DAC. This will also ensure that the final DAC and SoDA for the AP1000 will be based on the same Design Reference.

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Security

Assessment of physical security aspects is progressing to plan. Recent meetings have been constructive and the quality of submissions is satisfactory. Meetings have been held to provide comment and guidance, in addition to the written feedback, on the draft Conceptual Security Arrangements (CSA) documents. The updated CSAs are due to be submitted to us in February. We currently do not envisage any GDA Issues arising from our assessment.

Cross Cutting Topics

Safety Classification and Categorisation: This is an important element of the safety case as it allows a graded approach to safety, based on importance, and allows us to focus our assessment on those functions that are the most important. It also helps ensure that appropriate codes and standards are applied, according to the safety requirements for that system, structure or component. In some topic areas (e.g. C&I and electrical and mechanical engineering) the Westinghouse system of Categorisation and Classification is not in alignment with international good practice and we have asked Westinghouse to review the relevance and impact of this and whether any changes are required. Westinghouse has a programme of work to address this and it is now making reasonable progress. We do not currently expect a GDA Issue on this topic.

Limits and Conditions: The correct setting of plant operating limits is key to both the prevention of situations which might lead to accident conditions, and the mitigation of the consequences of such accident conditions should they arise. We are currently assessing Westinghouse's response on this topic, which it has biased towards US regulatory requirements. However, as the US approach is different to that of the UK (ie rule based as opposed to goal setting) our regulatory expectations are different and we are therefore likely to require further work.

Metrication: Our GDA guidance called for reactor designs submitted to us to be in metric units. The AP1000 was conceived as an imperial unit design. We have discussed Westinghouse's plans for metrication of the design for some time and, although significant progress has been made, we have not reached full agreement. Westinghouse's proposal is not to have a fully metric AP1000 design, but to make it substantially metric, with certain defined exceptions. This means that large parts of the design are metric, but some fixed elements and large components will remain in imperial units, including use of some imperial fasteners (nuts and bolts). As well as their manufacture being in imperial units, this could affect station safety cases and other safety documentation, which is undesirable. Wherever practicable, we are keen to ensure that the parts of the reactor that may have to be maintained, or dismantled for other reasons, are all metric. As well as plant operation and maintenance, metrication also affects construction, and part of Westinghouse's proposal includes importation of a significant amount of US materials, rebar, steel sections and bolts in support of AP1000 construction. Westinghouse's latest submission on this topic was on 31 December 2010 and is currently under consideration, but we are not currently convinced with the proposals and there is likely to be a GDA Issue on this topic.

Spent fuel pool: The safety case for spent fuel storage cuts across a number of topic areas such as criticality, fault studies, mechanical and electrical engineering, chemistry and PSA. Westinghouse will be improving the fuel pond safety case through modifications to the diversity of the engineered cooling system, and the provision of additional filters, and additional information on these modifications will be required. For criticality, we are not yet convinced that the proposals meet relevant good practice and this could impact on how much fuel can be stored in the pond. We have asked Westinghouse for an amended fuel

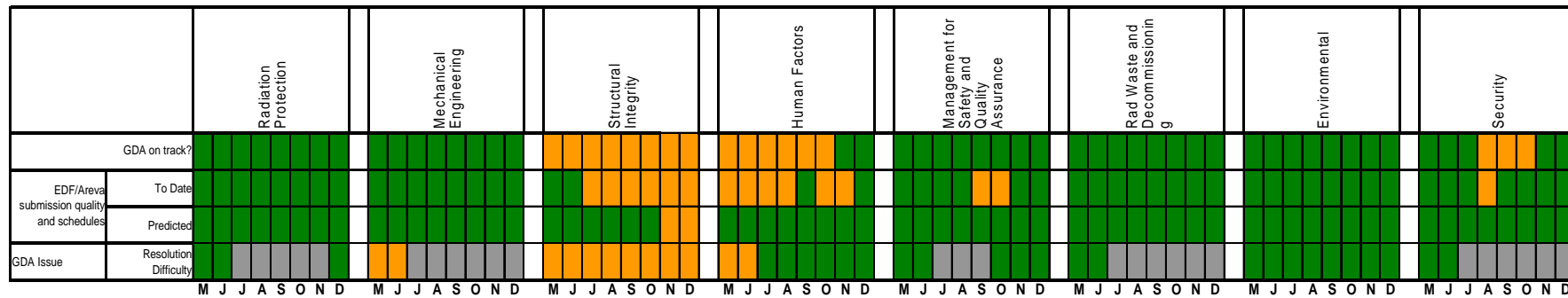
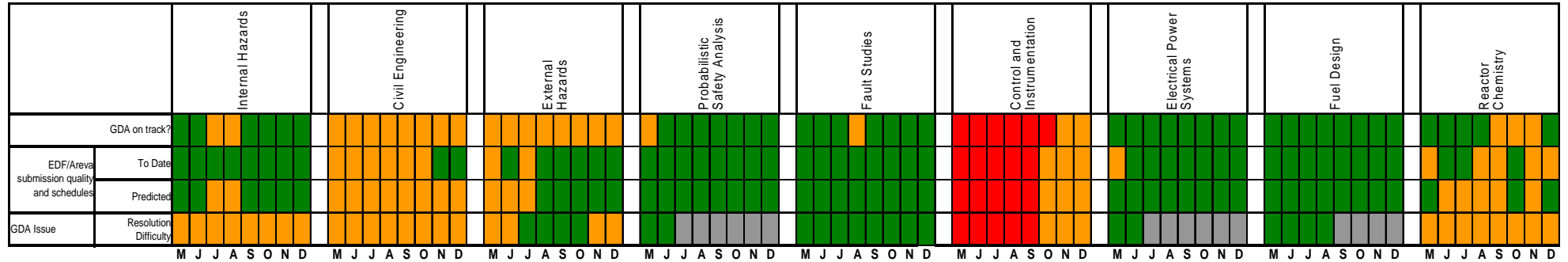
Annex 3
AP1000 Topic-by-Topic Summary

storage proposal that provides criticality safety through geometry and fixed poisons. We are continuing to discuss these matters with Westinghouse.

Annex 4 GDA Metrics Dashboard

EDF and AREVA Metrics

UK EPR Trending Summary May – December 2010



PROCESS & PROGRESS

■	- meets regulator expectations at this time
■	- shortfall against regulator expectations
■	- significant shortfall against regulator expectations

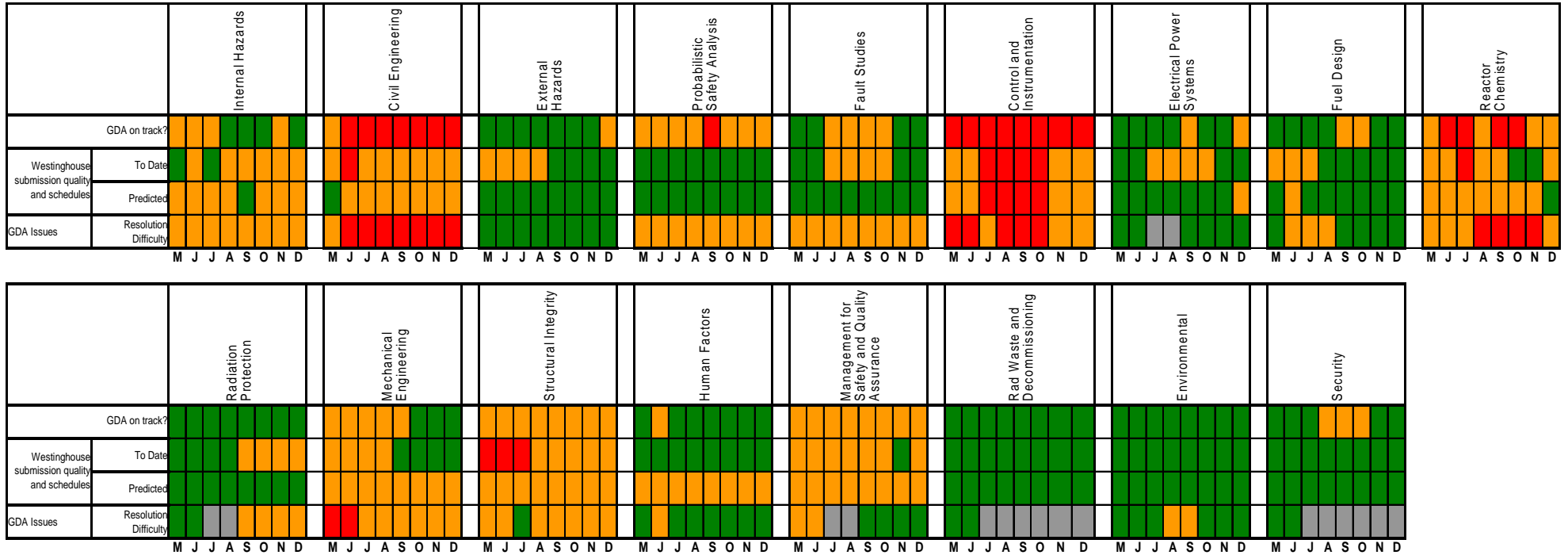
POTENTIAL GDA ISSUE

■	Does not require complex work; generally routine and straightforward techniques
■	Requires complex work; Increased risk of design changes
■	High risk, potential for significant changes to the design
■	N/A

Annex 4 GDA Metrics Dashboard

Westinghouse Metrics

AP1000 Trending Summary May – December 2010



PROCESS & PROGRESS

	- meets regulator expectations at this time
	- shortfall against regulator expectations
	- significant shortfall against regulator expectations

POTENTIAL GDA ISSUE

	Does not require complex work; generally routine and straightforward techniques
	Requires complex work; Increased risk of design changes
	High risk, potential for significant changes to the design
	N/A