Response form

Name	David Boath
Organisation / Company	AMEC
Organisation Size (no. of employees)	Approx 30,000
Organisation Type	Consultancy, Engineering and Project Management Services
Job Title	Vice President
Department	Europe
Address	
Email	
Telephone	
Fax	

Would you like to be kept informed of developments with the MRWS programme?	Yes
Would you like your response to be kept confidential? If yes please give a reason	No

This response is submitted on behalf of AMEC.

AMEC is a focused supplier of consultancy, engineering and project management services to its customers in the world's oil and gas, mining, clean energy, environment and infrastructure markets. With annual revenues of some £4 billion, AMEC designs, delivers and maintains strategic and complex assets and employs over 29,000 people in around 40 countries worldwide.

AMEC undertakes work on all forms of power generation internationally and is the largest UK-based private sector supplier of programme, asset management and technical engineering services to the nuclear sector. The business has had a leading position in the UK nuclear market for over 50 years and UK clients include the Health and Safety Executive, Environment Agency, Sellafield Sites Ltd, Magnox, EDF, Horizon, AWE Aldermaston and Rolls Royce. Half of our nuclear business is international with a wide client base covering nuclear utilities, vendors and regulators across Europe, the US, Canada, South Africa, UAE, Japan and Korea.

AMEC has undertaken work on the Hinkley Point C project, both for EDF and for the UK Nuclear Regulator, the ONR. AMEC is a member of the NIA and has also undertaken work in relation to the Horizon and NuGen proposals for new nuclear build and hence has an independent and broad understanding of the status of the new nuclear build market in the UK. As part of our support to

Horizon, AMEC contributed to the preparation of Chapter 5 of this Application to justify the UK ABWR.

1. **Do you agree with the Government's preliminary view that the class or type of practice set out in the application submitted by the Nuclear Industry Association:**

(a) qualifies as a new class or type of practice; and

(b) is a suitable class or type of practice for a decision by the Secretary of State?

If not, why not?

(a). Yes.

The introduction of the ABWR into the UK would be a new type of practice as it is a sufficiently different design compared with the nuclear plants currently operating in the UK and also compared with the other new build plants (PWRs) that have already received Justification under this process and now undergoing regulatory approval. There have been many developments in the nuclear industry since the 2008 Application, including the post-Fukushima countermeasures, which reinforce our view that this application qualifies as a new type of practice.

(b)Yes.

It is also a type of practice requiring a decision from the Secretary of State as the Justifying Authority for nuclear operations in the UK.

2. **Does the application contain sufficient information to enable the Justifying Authority to make an assessment of the class or type of practice in the application? If not, what further evidence is needed?**

a) Yes.

The NIA Justification Application Document (December 2013, updated 2014) gives a detailed coverage of the issues to be considered. It covers benefits and detriments which apply generally to nuclear plant operation in the UK and also more specifically on the anticipated ABWR compliance with UK safety legislation and regulatory principles. Subject to maintaining the current challenging timescales, the expected availability of Step 2 of the GDA is noted cf., Annex 1 Ch 1' **It is expected that the regulators' (ONR and EA) GDA Step 2 assessment reports will be available to inform the Secretary of State's decision on the ABWR Regulatory Justification application.'** Inevitably there are claims made that will need further substantiation if ABWR proceeds through the later steps of GDA and before the design can be granted a DAC (safety and security) and SoDA (environment) by the Regulators. However we consider that overall at this stage, the application does contain sufficient information to enable the Justifying Authority to make an assessment of the class or type of practice.

Detailed comments on the NIA assessment document are given in Section 3 below.

3) Do you have any comments on the arguments or evidence in the NIA's application? Are there any additional arguments or evidence which the Justifying Authority should consider?

a) General:

- There are technical design features of BWR reactors in general and ABWR in particular that make them substantially different from PWRs in various aspects. BWRs are generally simpler with favourable reduced capital cost implications compared with PWRs, but there are design features of the ABWR where they are different from PWRs and where safety related issues could arise which may require resolution. These issues are generally recognised in the NIA justification document. However, at this stage, AMEC considers there is no reason why any such issues should not be satisfactorily resolved.
- Some of the most obvious differences of the BWR compared with the PWR are the following. The BWR has a direct steam cycle, the PWR indirect, and this has radiological implications in the event of fuel rod failures. The BWR has upward control rod insertion, rapid rod insertion under abnormal conditions relying on compressed nitrogen gas. The PWR has downward control rod insertion which is an inherently safe feature on account of gravity. The above features are noted in the NIA document. However there are other differences not noted in the application such as the significant lower head penetrations in the BWR for the control rod drives that would be an issue in a severe accident core melt scenario and smaller pressure suppression containments compared with the large dry containment of the modern PWR which has implications for effective hydrogen management under severe accident conditions.

b) Regarding security of supply, in para 2.26, it is stated that: '**The data also shows that Japanese BWRs generally have lower load factors than US and European BWRs. A major reason for this is longer outages[30e, 30f] for inspections under Japanese regulations. A further factor is the shorter (13 month) fuel cycle of Japanese reactors compared to European and US plants which typically have fuel cycles of 18 months or longer[30g]. Since this regulatory approach is unique to Japan, the level of performance achieved by European and US BWRs is a more appropriate benchmark for a UK operator than Japanese ABWR performance, and is the operating experience that a UK ABWR operator would seek to emulate. This is supported by experience from the Sizewell B plant, which has a lifetime load factor of 82.9%, and so demonstrates that a UK operator can match world-wide performance benchmarks with an introduced technology in a UK operating context.**'

- It is recognised that there is a shortage of operating plants to provide comparative data in this field and it is considered that the comparisons with Sizewell B are not particularly relevant given the different technology, different operator and different site. However it is noted that, excluding plant specific issues, the indication from Japan is that ABWRs generally perform better than BWRs; that operating experience indicates that BWRs in Europe and US generally have higher load factors than in Japan, that BWRs in Europe and the US achieve similar levels of performance to other LWRs and that the limited LWR

experience in the UK indicates a similar load factor to that of the European and US LWRs. On this basis there is no evidence to support that the UK ABWR would not achieve similar load factors to those achieved by other LWRs.

- The conclusion above is based on an implicit assumption that the UK regulator would not impose a requirement for longer outages similar to the existing Japanese requirements. To support the conclusion, it would be useful to justify why it is considered that the Japanese regulatory requirements for inspections would not be applicable to a UK ABWR operating in the UK.

c) Chapter 4 starts with the statement, '**Government will ensure that an appropriate framework exists to ensure that its policy objectives can be delivered. This is expected to include measures to ensure that individual projects do not go forward unless they demonstrate an acceptable cost to the consumer. Currently, through the Government's electricity market reform policy and proposals, long-term contracts will be the key mechanism for encouraging investment in low-carbon generation. This new regime provides a mechanism for the Government to determine whether it considers that a project represents value for money and would be a cost-effective additions to the UK generation mix'**. Several paragraphs then expand on the impact of the government's proposed market reform and the Contract for Difference (CfD). A statement should be added noting that the proposed market reform/CfD mechanisms are currently being considered by the European Commission but the UK Government is very highly confident that the proposed mechanisms will be accepted

d) Regarding para 4.2, we agree with the statement and note that in our view the submission does demonstrate that the risk of significant detriment to the UK economy from the Proposed Practice is very low.

It should be noted that the section on nuclear levelised costs in Chapter 4, it is stated: 'DECC's July 2013 paper on electricity generation costs[46], which relies on studies undertaken by Parsons Brinckerhoff and was published around the same time[47], forecasts a range of between £83-£108/MWh for nuclear reactors commissioning in 2020, and £70-94/MWh for reactors commissioning in 2030.' It should be clarified whether the ranges cover both BWRs and PWRs which we assume they do and we anticipate that BWRs are at the lower ends of these ranges and PWRs at the upper. Similarly, the justification for no differences between the cost ranges for first of a kind (FOAK) and nth of a kind (NOAK) should be clarified.

e) Para 5.31 includes the statement: 'This Application considers the potential radiological health detriment of these activities on the assumption conversion, enrichment and manufacture take place in the UK.' However the NNL Position Paper ' Boiling Water Reactor Technology – International Status and UK Experience) states that 'fuel production lines specifically tailored to modern BWR requirements do not exist as yet in the UK'. The justification should note this fact, and add some comment on whether a future need to manufacture the fuel overseas and transport to the UK would significantly affect the economic arguments presented.

f) Chapter 7 discusses marine environment. For completeness, consideration

should be given to any potential cooling water abstraction from rivers.

5. Do you have any other comments on the Secretary of State's preliminary view of the class or type of practice, on the approach of the NIA, or any other options?

a) It would be useful to include some discussion on the following topics:

- the general scarcity of relevant experience in the UK in the development and Regulatory assessment of a Fit for Purpose Nuclear Safety Case for BWR technology. This could include discussion as to whether or not this is likely to be a significant detriment in terms of timescales to produce an adequate UK safety assessment.

- the potential need for Early Works to be carried out under the Town and Country Planning Act and to justify that this is not likely to be a significant detriment in terms of environmental impact.

- the potential scale of environmental impacts on groundwater, particularly during construction and the means by which they would be addressed and mitigated and the regulatory regime in place to control them.

6. **As part of the further consultation on the draft decision document, the Secretary of State proposes to run public engagement events. Do you have any suggestions about the format of such events?**

a) No comment