Cyfoeth Naturiol Cymru
Natural Resources Wales

Environment Agency

Assessing new nuclear power station designs

Generic design assessment of Hitachi-GE Nuclear Energy Limited's UK Advanced Boiling Water Reactor

Responses to GDA consultation for the UK ABWR

July 2017

We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

We operate at the place where environmental change has its greatest impact on people's lives. We reduce the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water quality and apply the environmental standards within which industry can operate.

Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including government, business, local authorities, other agencies, civil society groups and the communities we serve.

Natural Resources Wales is the largest Welsh Government Sponsored Body. We were formed in April 2013, largely taking over the functions of the Countryside Council for Wales, Forestry Commission Wales and the Environment Agency in Wales, as well as certain Welsh Government functions.

Natural Resources Wales' purpose is to pursue sustainable management of natural resources in all of its work

Natural Resources Wales brings together the skills and expertise needed to ensure that we can operate effectively across our wide range of roles from adviser, facilitator, regulator and designator, to incident responder, partner and operator .

Published by:

Environment Agency
Horizon House, Deanery Road,
Bristol BS1 5AH
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Further copies of this report are available from our publications catalogue:
www.gov.uk/government/publications

or our National Customer Contact Centre:
T: 03708 506506

Email: enquiries@environment-agency.gov.uk.

Contents

1. Introduction **6**
1.1. Our consultation 6
1.2. Scope of this document 6
2. Generic design assessment **7**
2.1. Scope of our assessment 7
3. Next Steps **8**
4. Consultation responses **9**
4.1. ABWR-01 9
4.2. ABWR-02 10
4.3. ABWR-03 11
4.4. ABWR-04 11
4.5. ABWR-05 13
4.6. ABWR-06 15
4.7. ABWR-07 16
4.8. ABWR-08 17
4.9. ABWR-09 17
4.10. ABWR-10 20
4.11. ABWR-11 20
4.12. ABWR-12 21
4.13. ABWR-13 22
4.14. ABWR-14 23
4.15. ABWR-15 26
4.16. ABWR-16 26
4.17. ABWR-17 28
4.18. ABWR-18 28
4.19. ABWR-19 28
4.20. ABWR-20 29
4.21. ABWR-21 30
4.22. ABWR-22 31
4.23. ABWR-23 31
4.24. ABWR-24 32
4.25. ABWR-25 32
4.26. ABWR-26 33
4.27. ABWR-27 33
4.28. ABWR-28 34

4.29. ABWR-29 36
4.30. ABWR-30 38
4.31. ABWR-31 38
4.32. ABWR-32 39
4.33. ABWR-33 40
4.34. ABWR-34 41
4.35. ABWR-35 42
References 47
List of abbreviations 48
Appendix 1: Response from Nuclear Free Local Authorities 52
Appendix 2: Poster included in the response from People Against Wylfa B 75
Appendix 3: Response from STAND Against Oldbury 78
Appendix 4: Response from Anglesey County Council 82

1. Introduction

New nuclear power stations are an important part of the government's plans for generation of secure low carbon electricity.

Regulators are scrutinising new nuclear power station designs thoroughly, making sure people and the environment are properly protected.

As regulators of the nuclear industry, the Office for Nuclear Regulation (ONR), the Environment Agency and Natural Resources Wales are working together to make sure any new nuclear power stations built in the UK meet high standards of safety, security, environmental protection and waste management.

Hitachi-GE submitted its UK ABWR design to the regulators for generic design assessment (GDA) in April 2014. We completed our initial assessment and published our report in August 2014 (Environment Agency, 2014). Since then, we have been carrying out our detailed assessment.

1.1. Our consultation

As part of this assessment we (the Environment Agency and Natural Resources Wales) consulted on our preliminary conclusions for 12 weeks, from 12 December 2016 to 3 March 2017.

During consultation we held engagement events which were advertised to our stakeholder lists and in the local media.

- The Environment Agency and Natural Resources Wales hosted a national stakeholder event in Birmingham for invited local councils, non-governmental organisations (NGOs) and industry on the 24 January 2017.
- Natural Resources Wales hosted an afternoon and evening public drop-in session in Cemaes on the 30 January 2017.
- The Environment Agency, Natural Resources Wales and ONR presented to the Wylfa site stakeholder group (SSG) at the Wylfa site on the 30 January 2017.
- Natural Resources Wales hosted an afternoon and evening public drop-in session in Langefni on the 31 January 2017.
- The Environment Agency hosted both morning and evening stakeholder events in Thornbury on the 7 February 2017.
- The Environment Agency hosted an afternoon and evening public drop-in event in Thornbury on the 8 February 2017.

1.2. Scope of this document

This document is a collation of responses received to our consultation via :

- our online consultation hub
- email
- post
- the events listed above

This document does not contain our response to the points raised by individuals or organisations, as these will be included in our final decision document, see Section 3 on the next steps of GDA.

The Environment Agency consulted in England and Natural Resources Wales consulted in Wales, However, we have collated all the responses we received here. All will be carefully considered prior to making our final conclusions in our decision document.

2. Generic design assessment

GDA means that we (the environmmental regulators) begin assessing the acceptability of the environmental aspects of a design for the full plant life-cycle before an application is made to build the power station. We can get involved with designers and potential operators at the earliest stage when issues can be best addressed effectively and efficiently before construction begins.

There are a number of stages:

1. initial assessment: we may ask the Requesting Party for further information or design changes to be made
2. detailed assessment: we form our preliminary views to go to consultation
3. consultation: we ask for views following detailed assessment
4. post consultation review: we consider all responses to the consultation – this is the stage we are at now
5. decision and statement: we decide whether to issue a statement of design acceptability (SoDA), an interim statement of design acceptability (iSoDA) if there are any outstanding issues to be addressed or no statement of design acceptability

GDA is based on a generic site. When assessing applications for environmental permits we use the actual characteristics of the specific-site where it is proposed to be built. The site-specific characteristics may be different from those of the GDA generic site. More details of our GDA process can be found in our process and information document (P&ID) (Environment Agency, 2013).

There are 3 possible results for a GDA.

- We issue a statement of design acceptability if we are satisfied with the design (SoDA).
- If we are largely satisfied, we provide an interim statement of design acceptability (iSoDA) that identifies the issues that must be addressed before we could consider issuing a full statement of design acceptability.
- If we are not satisfied, we do not issue a statement of design acceptability or an interim statement of design acceptability.

Further details on the GDA process and regulatory requirements are available on the following GDA websites:

https://www.gov.uk/government/collections/assessing-new-nuclear-power-station-designs

http://www.onr.org.uk/new-reactors/index.htm

2.1. Scope of our assessment

The consultation was to seek views on our preliminary conclusions from our detailed assessment phase for the UK ABWR.

The scope of our assessment was to consider the environmental aspects of a single unit of the UK ABWR under normal operations at a generic site. This includes; waste avoidance, minimisation, treatment and disposal, application of best available techniques (BAT) and environmental impact on people and wildlife. The focus is predominantly on radioactive substances regulation (RSR), but other environmental regulations are considered.

Normal operations includes start-up, operation, shut-down, maintenance and testing phases of operation and also includes all foreseeable events that could reasonably be expected to occur during the life-time of the plant.

Security measures, the prevention of accidents, accident scenarios and the associated emergency plans and impact assessment, lie outside the legal responsibility of the environmental regulators and these aspects are being assessed by ONR.

The consultation is not about siting or the need for nuclear power, as that is defined through government policy.

3. Next Steps

Each response presented in this report will be considered consistent with our regulatory responsibilities and our preliminary conclusions. As a result of the points raised here our preliminary conclusions may be amended and we may also update our assessment reports.

Our written reply to each response will be included in our final decision document. We are targeting for the final decision document and updated assessment reports to be published towards the end of 2017, based on the current GDA programme.

Where the points raised lie outside our responsibilities, we will pass a copy of the consultation response to the appropriate organisation for consideration. Please note that, the Environment Agencies, in line with normal regulatory process have chosen to consult and respond to public comments in this matter, other organisations involved have also chosen to follow their normal public interaction processes which may not include consultation.

The final decision document, including our reply to each response, will be published on the GOV.UK website.

4. Consultation responses

The following sub-sections are a compilation of all the responses received. We have presented the text of each response as supplied, only personal details have been removed. We have adopted the following approach when presenting the consultation responses:

- Where a response was given to one of the specific questions asked in the consultation, we have included the question and response in the tables below.
- Where responses were not related to a specific question these have been presented as a general response in the tables below.
- Where responses were provided in both Welsh and English, both language versions have been presented.
- Where responses were provided in Welsh only, we have included a translation into English.
- Where responses included a separate document or were particularly long, these have been presented in full, but moved to an appendix and are referenced from the appropriate table.

4.1. ABWR-01

ABWR-01
Are you responding as individual or organisation?
Individual
Method of response?
By email
Response to consultation:
I am writing in response to the Consultation as above. I am very concerned at the safety of any site close to a large river. We know that there will be a very considerable rise in water levels with Climate Change, while there is no certainty how great they will be. The crises at Fukushima were caused by water flooding into the power station. The costs of raising a site of this size up to a safe height, while it needs to be next to the river, is very considerable, and I am concerned that there will be a continuing risk of flooding. We know there was a Tsunami on the river Severn in the Middle Ages, as no doubt on most other rivers, so it is very hard to see how a nuclear power station of this design could realistically be made safe. We know there are no evacuation plans in the area, around either Gloucester and Stroud, the Forest of Dean, or Bristol, all of which would need to be evacuated, possibly for many decades, should a nuclear incident take place in the area. The size of the new power station will be massive; it will totally dominate an area like the Severn estuary, and be totally unsightly. It seems totally unnecessary to take these massive risks when the costs of Photo-voltaics and wind turbines are dropping very fast, with tidal energy through lagoons on our major rivers also contributing to far cheaper sustainable energy, while advanced battery systems and management of electricity solve the problems of the intermittency of sustainable electricity.

I therefore strongly object to any assessment of the Hitachi-GE UK ABWR power station being assessed as safe or appropriate,

4.2. ABWR-02

ABWR-02

Are you responding as individual or organisation?
Organisation - South Gloucestershire Council
Method of response
By email
Response to consultation:
The response was provided addressing the individual questions asked in the consultation, these are given below:
Q5. Please tell us of you have any comments on our preliminary conclusions on management systems?
A high standard of protection for people and the environment should be ensured. It is important for communities in the locality of an ABWR that the scrutiny and maintenance of quality of management systems employed is ongoing to provide confidence in their effectiveness (for example during construction, operation and decommissioning).
Q6. Please tell us of you have any comments on our preliminary conclusions on strategic consideration for radioactive waste management?
Given slow progress with delivery of a national geological disposal facility, (GDF) concerns remain in local communities and for the local environment in hosting long-term storage and management of radioactive waste and spent fuel on site for a protracted period.
Further evidence is required on how decommissioning will be facilitated and how to minimise waste and impacts on local people and the environment.
Q7. Please tell us of you have any comments on our preliminary conclusions on the process for identifying best available techniques (BAT)
We support the use of BAT to prevent and minimise the creation of radioactive waste, minimise the discharges of radioactive waste to the environment and minimise the impact on people and adequately protect other species.
Q8. Please tell us of you have any comments on our preliminary conclusions on preventing and minimising the creation of radioactive waste?
We support the use of BAT to prevent and minimise the creation of radioactive waste, the principle of ‘concentrate and contain’ and to minimise the overall impact of discharges to the environment.
Q9. Please tell us of you have any comments on our preliminary conclusions on minimising discharges and impact of gaseous waste and our proposed limits?
The appropriate location and height of the main stack will need to be considered at a site-specific design stage and whilst this should minimise the impacts to members of the public and the environment acceptable visual impact should also be ensured.

Q11. Please tell us of you have any comments on our preliminary conclusions on the management and disposal of solid radioactive waste and spent fuel?
Given slow progress with delivery of a national geological disposal facility, (GDF) concerns remain in local communities and for the local environment in hosting long-term storage and management of radioactive waste and spent fuel on site for a protracted period.
Q13. Please tell us of you have any comments on our preliminary conclusions on the impact of radioactive discharges?
A high standard of protection for people and the environment should be ensured.
Q17. Please tell us of you have any comments on our preliminary conclusions on operation of installations?
An assessment of air quality, noise, odour and vibration should be undertaken on a site specific basis for the combustion plant (diesel and back-up generators).
Q19. Please tell us of you have any comments on our preliminary conclusions on the overall acceptability of the design?
The generic design should be capable of adaptation to ensure acceptable visual impacts on a local site specific basis reflecting the local environment (for example being capable of operation with shorter hybrid rather than conventional cooling towers). It is vital that the ABWR is capable of being sensitively adapted in terms of physical appearance, so that it can integrate with the surrounding landscape to an acceptable degree (for example low lying estuarine and levels landscape). The generic design assumes direct cooling (from seawater or other adjacent waters) however it is not clear whether the ABWR will operate with an alternative method (for example at an estuarial site). Irrespective of this the requirement for, and height of, any cooling towers remains unanswered at the GDA stage. Cooling towers (if required) will be determined at the detailed design stage and will be driven by the ability to take a generic design and make it work at any given site. Such an approach seems to suggest a major failing in the GDA principled approach i.e. there's generic and then there's generic!

4.3. ABWR-03

ABWR-03
Are you responding as individual or organisation?
Organisation - Nuclear Free Local Authorities (NFLA)
Method of response?
By email
Response to consultation:
NFLA have submitted their response as a 25 page report. We have reproduced this report in Appendix 1 of this document

4.4. ABWR-04

ABWR-04

Are you responding as individual or organisation?
Organisation - People Against Wylfa B (PAWB)
Method of response?
By email
Consultation response:

PAWB submitted the following email in Welsh and we have provided an English translation below it. PAWB also included leaflets in both Welsh and English. We have reproduced these in Appendix 2.

Atodaf i'ch sylw daflen a baratowyd gan PAWB, Pobl Atal Wylfa B mewn ymateb i ymgynhoriad Cyfoeth Naturiol Cymru ar broses asesu generig adweithydd niwclear ABWR Hitachi GE.

Gwyddoch yn barod am ein hanniddigrwydd gyda threfn eich ymgynghori yn y rhan hon o Gymru. Anfoddhaol iawn oedd cynnal cyfarfod gyda'r nos mewn lleoliad cwbl anaddas sef ar dir gorsaf niwclear y Wylfa. Fel y soniwyd yn barod, roedd yn lle anhygyrch gyda thrafnidiaeth gyhoeddus ac yn cadarnhau'r canfyddiad eich bod fel corff yn fodlon cynnal cyfarfod mewn lleoliad oedd ymhell o fod yn niwtral.

Aeth nifer o aelodau PAWB i'r sesiwn galw i mewn yng Nghanolfan Ebeneser, Llangefni. Cawsom sgyrsiau gyda swyddogion Cyfoeth Naturiol Cymru, ONR a Hitachi. Gofynnwyd i bob swyddog faint o wastraff ymbelydrol lefel uchel fyddai'n gorfod cael ei storio ar safle gerllaw dau adweithydd ABWR yn y Wylfa, a hynny mewn miliwn terabequaerel, o fewn 60 blynedd o ddechrau cynhyrchu trydan. Ni chafwyd ateb clir gan unrhyw swyddog o Gyfoeth Naturiol Cymru, ONR na Hitachi. Dylai fod yn fusnes i chi fel corff sydd â chyfrifoldeb dros warchod ein hamgylchedd wybod yn union beth fyddai natur y gwastraff ymbelydrol lefel uchel fyddai'n cael ei gynhyrchu o ddefnyddio tanwydd wraniwm dwysach yn yr adweithyddion ABWR Dylech wybod sut fyddai'r storfa wastraff hoono ar safle'r Wylfa yn cymharu â'r hyn sy'n cael ei gadw ar safle Sellafield.

Ni chafwyd unrhyw dystiolaeth chwaith o gyfeiriad eich swyddogion nac o gyfeiriad ONR a Hitachi o ran hynny, o ymwybyddiaeth o berfformiad pedwar adweithydd ABWR yn Japan. Does dim un ohonynt yn weithredol yn dilyn ffrwydriadau mewn tri adweithydd yn Fukushima. Hyd yn oedd pan oeddent yn weithredol, nid oedd eu 'load factor' yn uchel. Tynnwyd sylw at berfformiad gwael adweithydd Hamaoka 5, ond unwaith eto, nid oedd gan eich swyddogion wybodaeth am hynny. Dylech ymchwilio'n fanwl i hanes y math hwn o adweithydd yn Japan. Roedd bwriad i geisio adeiladu ABWR ar safle South Texas yn yr Unol Daleithiau, ond rhoddwyd y gorau i'r syniad ym Mawrth 2011 gan nad oedd diddordeb gan neb i fuddsoddi ynddo. Eto, roedd y wybodaeth hon yn ddieithr i'ch swyddogion.

Tanlinellwn mai eich cyfrifoldeb chi a'r rheswm dros eich bodolaeth fel corff yw i warchod amgylchedd Cymru. Apeliwn arnoch i sefyll yn gadarn yn erbyn rhoi cydsyniad i dechnoleg hen ffasiwn, budr, eithriadol ddrud a pheryglus iawn i'r amgylchedd a iechyd dynol.

Translation into English supplied by Natural Resources Wales:

I attach for your attention a leaflet produced by PAWB, People Against Wylfa B in response to NRW’s consultation on the generic assessment process for Hitachi GE’s ABWR nuclear reactor.

You are already aware of our dissatisfaction about your consultation processes in this part of Wales. It was unsatisfactory that you were holding a meeting in the evening in a wholly

inappropriate venue – on the Wylfa nuclear power station site. As mentioned already, it was a place that was inaccessible by public transport and it confirmed the perception that as an organisation you are willing to hold a meeting in a setting that was far from neutral.

A number of PAWB members visited the drop-in session at the Ebeneser Centre, Llangefni. We had conversations with officials from NRW, ONR and Hitachi. Every officer was asked how much high-level radioactive waste, in a million terabequaerel, would have to be stored on site nearby two ABWR reactors at Wylfa within 60 years from the beginning of the production of electricity. There was no clear answer from any officer from NRW, ONR or Hitachi. It should be the business for you as an organisation with responsibility for protecting our environment to know exactly what would be the nature of the high-level radioactive waste generated from the use of intensified uranium fuel in the ABWR reactors. You should know how the store on the Wylfa site compares with what is being kept at Sellafield site.

There was no evidence form neither your officials, nor from ONR and Hitachi officials for that matter, an awareness of the performance of four ABWR reactors in Japan. None of them are operating following blasts in three reactors at Fukushima. Even when they were operational, their ' load factor ' wasn't high. We highlighted the poor performance of the Hamaoka 5 reactor, but again, your officials did not have any information about that. You should investigate in depth the history of this type of reactor in Japan. There were plans to build an ABWR on a site in South Texas in the United States, but the idea was abandoned in March 2011 as there was no interest from anyone to invest. Again, this information was unknown to your officials.

We underline that it is your responsibility, and your purpose as an organisation is to protect the Welsh environment. We urge you to stand firm against giving consent to an outdated, dirty, expensive and dangerous technology, both to the environment and to human health.

4.5. ABWR-05

ABWR-05

Are you responding as individual or organisation?
Organisation - Berkeley Site Stakeholder Group (BSSG)
Method of response?
By email
Response to consultation:
The response was provided addressing the individual questions asked in the consultation, these are given below:
Q7. Please tell us of you have any comments on our preliminary conclusions on the process for identifying best available techniques (BAT)
BAT – presumably any proposal would only be accepted if it gave an acceptable outcome?
Q8. Please tell us of you have any comments on our preliminary conclusions on preventing and minimising the creation of radioactive waste?
Prevention and minimisation of waste - it is clear that the key issue on which most of the rest of the assessment depends is the size of the source term. So it is disappointing that this (GDA Issue 2) has not been finally resolved for this consultation. Our view is that most reactor vendors overstate the reliability of their fuel and that could be the case here. There is no comparative analysis of this ABWR fuel reliability. If the reliability of the fuel is lower than claimed then, due to

the single circuit nature of this design, the steam circuit including the turbines could become badly contaminated. Tritium is always an issue and arisings are difficult to predict in water reactors (cf. the need for doubling the liquid tritium discharge limit in the early life of Sizewell B). We feel that insufficient attention has been paid to the probability of tritium contamination and management of the turbines and condenser. This will also be relevant to the GDA finding on Decommissioning.

Q9. Please tell us of you have any comments on our preliminary conclusions on minimising discharges and impact of gaseous waste and our proposed limits?

Gaseous discharges - We would point out that there is an error in the first Table of Chapter 9, where the units should be Bq, not GBq (we hope). We note that Carbon-14 discharges are relatively high and is the major contributor to collective dose, so we support the proposed action to investigate removal techniques under Assessment finding 6 (Table 8.1).

We also note that for both Tritium and Carbon-14 proposed discharges are greater than the mean for other BWRs, which supports the need for further work on minimising the generation and/or abatement of these radionuclide's from this design.

Q10. Please tell us of you have any comments on our preliminary conclusions on minimising discharges and impact of aqueous waste and our proposed limits?

Liquid discharges - While the GDA findings for liquid discharges are reassuring, we point out that the conditions at Oldbury are particularly restrictive, with the tidal lagoon and the low flow in the River Severn for much of the time. This must be taken into account in any site specific proposals and assessments.

Q11. Please tell us of you have any comments on our preliminary conclusions on the management and disposal of solid radioactive waste and spent fuel?

Solid waste arisings - The statements in paragraphs 335-339 of the CD are not reassuring. The impression is given that Hitachi has not really got a strong grasp on solid RW issues and the regulatory response seems rather weak. We would have expected a specific assessment finding on this and we do not agree that it should be left to a site specific assessment.

Q13. Please tell us of you have any comments on our preliminary conclusions on the impact of radioactive discharges?

Radioactive discharges impact – We recognize that the radiological impact of discharges is low and well below the dose constraint. Nevertheless, it would be helpful if a layman’s interpretation of the proposed discharges were to be given, for instance the totality of these discharges would add n% to the natural background levels in the locality. This would give greater comfort to the local residents.

Q15. Please tell us of you have any comments on our preliminary conclusions on water abstraction?

Water abstraction – the assumption is that the cooling water will be taken from the sea, for Oldbury that will not be possible and cooling towers will be necessary. What fundamental impacts does this design change have on the generic design? In particular it is proposed to use forced cooling towers at Oldbury, does this result in any greater risk?

Additional comments:

General – We appreciate that this consultation is just about the environmental aspects of the ABWR design and does not cover emergency planning. However, the public will feel these wider safety issues do need transparent consideration. For example, for disaster planning scenarios, it is important that not just one possible disaster is considered but the possible impact of several at

the same time. An example is Fukushima, where the tsunami not only caused physical damage to the stations, but also disconnected the grid and rendered the back-up generation useless.

We would also not wish to see safety compromised by cost in any way.

We are disappointed that the Office of Nuclear Regulation do not appear to be carrying out a similar consultation on these safety and accident aspects, even if it is not a statutory requirement.

Editors Note - Answers to specific questions were provided here in the original text and have now been inserted above into the relevant box of this table

Our final point is that at what stage is the quality control of the build considered? I understand that some of the French stations have discovered a problem with the quality of the steel used for the pressure vessels; would the procedures proposed in the UK pick this up at an early stage?

4.6. ABWR-06

ABWR-06

Are you responding as individual or organisation?
Individual
Method of response?
By email
Response to consultation:
The response was provided addressing one of the individual questions asked in the consultation, this is given below:
Q15. Please tell us of you have any comments on our preliminary conclusions on water abstraction?
Water abstraction will come into the remit of Site Planning Application or Site Licence Application and is not itself in the scope of GDA, but assessing the application on the basis of all cooling water will be from the sea, as in the submission, is not correct. There are currently two potential sites in UK for Hitachi UKABWR and one (ie 50o/o) will not be able to obtain a fraction of the approx 400,000 cu m per hour required for two reactors and will have to use cooling towers (low level forced draft type promised in initial discussions)' this is Oldbury. Whether this will be approved by the authorities we do not know, but it must effect the consideration of the application. The Local Community needs to know if that level of cooling by cooling towers is practical and how many will be required to provide cooling equivalent to 400'000 cu m p h. I imagine water will still be required for the cooling towers and other purposes and will be returned to the estuary at an elevated temperature and so we will have to face hot air/ water vapour plumes from the river and the cooling towers. Cooling source may not be part of GDA but we would like to know that you have considered the effectiveness, performance and therefor suitability of the UKABWR using both methods of cooling. The existing Magnox station required and has a water extraction licence and Oldbury B would require on also.
Additional comments:

Thank you for your efforts with GDA and your activities in monitoring nuclear power generation, you consultations are very good even if the consultation document is rather long and heavy reading for a layman.

4.7. ABWR-07

ABWR-07

Are you responding as individual or organisation?
Individual
Method of response?
By email
Response to consultation:

I'm responding to the EA's request for public feedback about this new reactor design.

General comments: I accept that, at present, there may be a need for nuclear-generated power to remain part of the UK's electricity provision. However, this will always be an imperfect solution for as long as the safe disposal of nuclear waste remains an unsolved problem.

The information you provided: it is virtually impossible for someone not in the field to comment in detail on the technical aspects of the reactor design, given the uncompromising way in which the information is presented. Quite a bit of the general summary is hard to read and understand, even for someone like myself with a reasonably solid scientific background. We were also presented with a highly technical addendum, but without adequate reference to the specific questions or concerns that had led to the addendum, which again makes it very difficult for members of the public to respond.

Hitachi-GE’s UK ABWR: as far as we can tell, this would appear to do the job adequately as long as it can be cooled safely. At a site such as Wylfa, which has unlimited access to deep sea water, this would appear to be acceptable.

Potential siting of such reactors at Oldbury-on-Severn: this is a tidal site on a muddy estuary, where the available water has been able to cool the present nuclear power station, recently decommissioned. However, the new power station would have several times the capacity of the old (Horizon have still not told us their final specification, or how many reactors they would intend to put there) and therefore could not be safely cooled from the river. This would mean that, uniquely for a nuclear power station in the UK, cooling towers would be needed. The towers in question would either be passively cooled (estimated previously to be 600 feet high, which is the height of the British Telecom Tower in London or the piers on the Severn Bridge); or fan-assisted, which would be shorter (200 feet) but would consume several percent of the total power generated.

The number and design of the cooling towers is currently unknown. Horizon have omitted any mention of cooling towers in any of their recent communications with the local population around Oldbury/Thornbury, but when challenged, have admitted that they would be needed. They say that their 'preference' is for the shorter, fan-assisted design but have clearly not ruled out the taller ones. In the view of a large number of local people (who made clear their unhappiness when the previous plans for a new power station at Oldbury were rolled out some years ago), cooling towers would have a massive and unacceptable visual and environmental impact. There is no doubt whatsoever that these sentiments will surface again if Horizon move ahead to place a new nuclear power station at this unsuitable site. We presume that this is why Horizon have

deliberately avoided bringing the subject up in the context of the new reactor design, despite claiming to be firmly committed to keeping us fully informed and to working with the community.

In summary: even if the new design is suitable for a deep-water site such as Wylfa, it is totally unsuited to the particular locality and conditions of Oldbury-on-Severn.

4.8. ABWR-08

ABWR-08

Are you responding as individual or organisation?
Organisation - Severnside Together Against Nuclear Development (STAND) Against Oldbury
Method of response?
By email
Response to consultation:
STAND against Oldbury submitted a separate document in response to this consultation. We have reproduced the submission in Appendix 3 of this document.

4.9. ABWR-09

ABWR-09

Are you responding as individual or organisation?
Organisation - Oldbury-on-Severn Parish Council
Method of response?
By email
Response to consultation:
The response was provided addressing the individual questions asked in the consultation, these are given below:
Q5. Please tell us of you have any comments on our preliminary conclusions on management systems?
Article 126 of Consultation Document, 12/12/16. Does Hitachi-GE operate a “lessons learned register” including remedies to capture information from relevant operational incidents occurring at other nuclear power stations in Japan and worldwide? Article 128 of Consultation Document, 12/12/16. Does Hitachi-GE provide a formal technical service to operators during the operational life cycle of its existing BWR’s and, if so, are the operator(s) of the proposed UK ABWR’s committed to take up such a service?
Q6. Please tell us of you have any comments on our preliminary conclusions on strategic consideration for radioactive waste management?
Article 146 to 148 of Consultation Document, 12/12/16. The design integrity of the encapsulated and otherwise stored waste, the spent fuel pool, the solid and wet High Activity Waste storages on site should be regulated and inspected to ensure they remain consistent with the technical

and schedule planning for construction of the UK Geological Disposal Facility. In particular would it be practicable to transfer spent fuel and other high-activity waste to the GDF as soon as it is available and before decommissioning of the ABWR starts ?

Q7. Please tell us of you have any comments on our preliminary conclusions on the process for identifying best available techniques (BAT)

See Q8 and Q16 below

Q8. Please tell us of you have any comments on our preliminary conclusions on preventing and minimising the creation of radioactive waste?

Article 205 of Consultation Document, 12/12/16. It is stated that no abatement of Tritium or Carbon-14 is practicable at this time. It is noted that Hitachi-GE have been asked to undertake a BAT assessment of 14C abatement using alkaline scrubbing (Table 8.1). Is Hitachi-GE or any public organisation known to be actively researching or funding development work for abatement of both 3H and 14C?

Q9. Please tell us of you have any comments on our preliminary conclusions on minimising discharges and impact of gaseous waste and our proposed limits?

Article 243 of Consultation Document, 12/12/16. Estimates of radioactive noble gases (Kr & Xe) discharges from fuel pin failure appear to assume a single, infrequent failure at any one time and replacement within a short period of time. The discussion in Argument 1a of Appendix 5 of the Consultation document states that Hitachi-GE's evidence may not be fully transferrable to the UK BWR. Has all relevant data for similar BWR's in Japan been obtained and has every effort been made to test the assumptions of fuel pin failure for the UK ABWR? In particular, what is the likelihood of more than one fuel pin failing at any one time, say, due to a common mode failure?

Article 251 and Article 259 of Consultation Document, 12/12/16. The predictions of the UK ABWR's (mean ?) gaseous discharges of Tritium and Carbon-14 both exceed the mean discharges from some 15 other BWR's worldwide every year from 2005 to 2013 and are close to the maximum discharges from any plant in the data groups for the most-recent years of 2011, 2012 and 2013. Both these isotopes have significant half-lives, particularly 14C (approximately 7,000 years), would enter the environment quickly via gaseous discharges, and could build up. Is it clear from the historic discharge data whether or not the relatively higher levels are a particular feature of Hitachi-GE's existing operational BWR designs or, if sufficient data are not available, what steps are Hitachi-GE taking to obtain the data? In particular, is there likely to be any impact of the discharges of 14C on radiocarbon dating technology that may be used for relics from archaeological sites in the vicinity of the plant such as exist at Oldbury-on-Severn?

Q10. Please tell us of you have any comments on our preliminary conclusions on minimising discharges and impact of aqueous waste and our proposed limits?

Section 10 of Consultation Document, 12/12/16. The concentrations of estimated radioactive emissions in discharges to water are based on a once-though cooling water system specified in the generic site definition. A hybrid cooling water system, as is planned for the Oldbury-on-Severn new power station, would abstract and discharge much less water from the Severn Estuary which also has a large tidal range with inherently lower dispersion efficiency at low tide. Therefore the GDA will require review and amendment in this respect for Oldbury-on-Severn.

Q11. Please tell us of you have any comments on our preliminary conclusions on the management and disposal of solid radioactive waste and spent fuel?

Section 11 of Consultation Document, 12/12/16. Spent Fuel and Intermediate Level Waste Metallic containers for spent fuel and cement encapsulation for solid and wet-solid ILW is proposed by Hitachi-GE and appears to be acceptable in the GDA. However, it is not clear if these precise methodologies are yet approved for transport to, and disposal in, the planned UK Geological Disposal Facility. The potential for needing to re-process waste in order to put it in the

GDF should be avoided by ensuring compatibility before any new nuclear plants become operational.

Also see Q6 above.

Q12. Please tell us of you have any comments on our preliminary conclusions on the monitoring of discharges and disposals of radioactive waste?

Article 381 of Consultation Document, 12/12/16. The monitoring systems for aqueous wastes will need to be reviewed for Oldbury-on-Severn with a hybrid cooling water system, see Q10 above.

Q13. Please tell us of you have any comments on our preliminary conclusions on the impact of radioactive discharges?

Much of Section 13 is based on a generic site concept and, whilst estimated doses of radiation are encouragingly low at this stage, the estimates would seem to require considerable reworking for an actual site.

Q14. Please tell us of you have any comments on our preliminary conclusions on radioactive substances permitting?

Article 424 of Consultation Document, 12/12/16. The short-duration release of up to 0.02 µSv in Table 13.2 seems to be from a single fuel pin failure having effect for 24 hours. If this is the case and if more than one fuel pin fails and/or repair times are longer than 24 hours, which seems possible – See Q9, then this is an underestimate and, although highly unlikely to raise potential dosages to the public above HPA recommendations, should be replaced by a worst case estimate.

Q15. Please tell us of you have any comments on our preliminary conclusions on water abstraction?

Article 478 of Consultation Document, 12/12/16. A fire water reserve of 1,000 m3 seems small for such a large and complex site. Will it be backed-up by the main cooling water system?

Article 479 of Consultation Document, 12/12/16. Will a water abstraction licence be required at Oldbury-on-Severn?

Q16. Please tell us of you have any comments on our preliminary conclusions on discharges to surface water and groundwater?

Articles 470, 484 and 533 of Consultation Document, 12/12/16. A discharge water flow of approximately 200,000 m3/h, raised in temperature by 12ºC, has potential to impact marine life in the mixing zone and possibly beyond. Although outside of the GDA scope, the dispersion of warm water, biocide and other additives must be thoroughly modelled during the site-specific planning stage to define the mixing zone, the impacts on marine species assessed and suitable mitigation measures employed. Has any thought been given to recovering this huge amount of low-grade heat, particularly from a hybrid cooling system, and is BAT being employed here?

Article 485 of Consultation Document, 12/12/16. Has consideration been given to the use of electro-chlorinators to create biocidal cooling water as they are easily controllable and largely avoid HSSE issues associated with the storage and handling of sodium hypochlorite and is BAT being employed here?

Q17. Please tell us of you have any comments on our preliminary conclusions on operation of installations?

Section 17 of Consultation Document, 12/12/16 The title “Operation of installations” implies overall operation which should include the maintenance of items including those within the nuclear operating envelope such as reactors, steam turbines and multiple items of ancillary equipment. Maintenance activities and their resulting emissions are not excluded from the GDA

scope and therefore not automatically designated for site-specific permitting in Appendix 6 of the Consultation Document, so where will they be assessed?

Article 546 of Consultation Document, 12/12/16 Why is the use of Diesel fuel systems for boilers and emergency generators considered BAT when there are lower-emissions alternatives using natural gas (or liquefied natural gas in case of no nearby gas supply pipeline)?

Q18. Please tell us of you have any comments on our preliminary conclusions on the control of major accident hazards?

Article 575 of Consultation Document, 12/12/16 It seems likely that operators will seek site-specific permitting for two or more reactor units immediately and, if so, would the sites become lower tier COMAH establishments on permit award due to the quantities of Diesel fuel planned to be stored on site or only when the second reactor was built ?

Q19. Please tell us of you have any comments on our preliminary conclusions on the overall acceptability of the design?

Section 19 of Consultation Document, 12/12/16. Is it correct to understand that any SoDA issued under the GDA regime for a coastal site such as Wylfa Newydd would not automatically be considered valid for an estuarial site such as Oldbury-on-Severn as it would seem to require review and modification in this case – see also Q10?

4.10. ABWR-10

ABWR-10

Are you responding as individual or organisation?

Organisation - Forest of Dean Green Party

Method of response?

By email

Response to consultation:

I would like to register my very strong objections to the Hitachi nuclear power station development. As a resident of Tutshill, Gloucestershire, I live within five miles of the site, which I do not believe is suitable or safe. The proposed development is vulnerable to flooding and there is insufficient attention given to rising water levels. Nuclear power is expensive for tax payers and the already high costs fail to take account of the real costs and dangers of the extraction, transport and disposal of radio-active materials. We are storing up problems for current and future generations. The Severn Estuary is ideal for small tidal lagoon power stations and on-shore wind turbines. This is where the money should be going.

4.11. ABWR-11

ABWR-11

Are you responding as individual or organisation?

Organisation - Action Against Nuclear

Method of response?

By email

Response to consultation:

Design: From a landscape position there is no doubt this will be a massive intrusive structure six times the size of anything before, very ugly and out of place completely compared to the rest of the environment and the amazing Severn estuary.

Technically: Following the disaster in Japan and elsewhere who can say this is safe, historically there have been massive storm surges on the Severn along with severe safety and commercial issues and companies who are almost bankrupt. We consider the risk cannot be justified, it's also too expensive to the taxpayer and consumer.

Health Risks: Having lived in the area during the active periods of nuclear power on the Severn we are all very aware of the unexplained cancer clusters both sides of the river and do not want any more.

We are just a small group who at the last minute have become aware of your development plans and demand that senior management arrange a public meeting in Lydney to discuss further.

We await your advice regarding our comments and details of a public meeting which we anticipate at least 300 to attend.

4.12. ABWR-12

ABWR-12

Are you responding as individual or organisation?

Individual

Method of response?

By email

Response to consultation:

I believe that a new nuclear power station at Oldbury should not be built at all but particularly not the boiling water one proposed as the design is untested.

Nuclear power is too vulnerable to be used, it is open to attack by terrorists, natural phenomenon and cost cutting governments.

Nuclear power commits us and future generations to huge costs and responsibility of keeping the waste safe.

Oldbury is the wrong place for it, the last tsunami in the Severn was 400 years ago so its just about time for another.

It is the wrong site because of the fragility of the environment being between the valuable wetland sites of Slimbridge and New Passage.

It is the wrong site because of the centres of population close by.

The buildings will be a blot on the very lovely Severn Vale, out of scale with their surroundings and an eyesore for miles around.

The proposal shows a huge industrial complex but no sign of cooling towers. I have heard that this is because the number and size of cooling towers is not yet known which takes me back to

my first point that the design is untested or is it that the possible height of the cooling towers will too big and controversial to be published until it is too late to protest.

The actual building of the complex will make the lives of local people a misery for years and leave the countryside scarred by the construction process.

Please do not proceed with this abomination!

4.13. ABWR-13

ABWR-13

Are you responding as individual or organisation?
Individual
Method of response?
By email
Response to consultation:

Firstly, thank you for the opportunity to attend your consultation and evening meeting in Cemaes yesterday. I would like to point out that it was poorly advertised and that I only knew about it through a news item on line and a friend's Facebook post. I was also pleased that the meeting was conducted in Welsh, my native tongue.

The meeting was mainly to discover the public's views on the environmental aspects of the design. I will first clarify my position. I abhor the prospect of any future nuclear development in the whole of the U.K. and wish we shared Germany and other countries' enlightened approach. However, I do understand that this is a Government decision and therefore your body is tasked with considering the ramifications.

Some observations

Why does the illustration of the cross section of a box in a green field fail to show any chimney or outlet pipe for the steam containing tritium and other chemicals that will be discharged into the atmosphere? Also there is nothing to show that effluent will also be discharged into the sea? One of the points made by one of the bodies represented in the evening meeting was that these discharges were in sufficiently small doses to pose no threat to human life and unlikely to harm wildlife. Surely the project should not be allowed to continue without the certainty that the complete range of biodiversity is in no danger. I would also like to know how the toxicity of these emissions can be assessed when no such reactors are currently in operation, those in Japan remaining closed after Fukushima.

Whilst I, personally, have no scientific expertise I felt the fact that Horizon failed to provide a representative with technical knowledge able to answer some of the questions posed at the evening meeting unsatisfactory at a meeting designed to assess the design. I felt this reflected my long held belief that Horizon's consultations are merely box ticking exercises and no amount of objecting will stem their progress.

The arrangements for the disposal and long term storage of waste are totally unsatisfactory. No permanent solution has yet been agreed and while this is the case I fail to see how construction can even begin! The people of Anglesey should be made aware that there is a realistic prospect that the waste will remain on Anglesey forever.

May I thank your staff for their courtesy and patience in responding to all my queries yesterday I do wish, however, that it had been accessible to more people by more intensive advertising and a presentation at a more central location.

4.14. ABWR-14

ABWR-14

Are you responding as individual or organisation?
Individual
Method of Response?
By email
Response to consultation:

OBSERVATIONS ON

Preliminary Conclusions on Generic Environmental Permitting Assessing new nuclear power station designs:

Generic design assessment of Hitachi-GE Nuclear Energy Limited's UK Advanced Boiling Water Reactor

(Consultation on Preliminary Conclusions, NRW/EA, 12.12.2016)

Although addressed to Natural Resources Wales, the observations may apply to the Environment Agency in England.

1. Implication of Generic Environmental Permitting (GEP)

1.1 The Consultation on Preliminary Conclusions is plainly crafted to prepare the ground for NRW to issue a Statement of Design Acceptance (SoDA) on Hitachi-GE's proposed new reactor design, dubbed the UK ABWR. Separately, the Office of Nuclear Regulation (ONR) is similarly engaged in paving the way for a Design Acceptance Confirmation (DAC) on the UK ABWR. The DAC tells the vendor that from safety and security perspective, the ONR finds it acceptable for this type of reactor to be built and operated anywhere in the UK at nuclear suitable sites. The SoDA tells the vendor the UK ABWR can be operated anywhere in Wales at nuclear suitable sites, due to the radioactive discharges and waste management arrangements being acceptable to NRW.

1.2 The DAC and SoDA together create an open door for vendors to win Development Consent Orders from the Secretary of State (for Business, Innovation, Enterprise and Science), for construction and operation of new nuclear power stations, based on the UK ABWR generic reactor design, potentially at any nuclear suitable site in Wales. That includes existing nuclear licensed sites, sites listed in the UK Government's 2011 National Policy Statement on Nuclear Power (EN-6), as well as potential nuclear suitable sites that are currently classed brown or green field sites.

1.3 Thus, the UK ABWR Generic Environmental Permitting marks a landmark development in nuclear regulatory framework in Wales. The question is: does the public know? How much does the public know? How proactive is NRW in engaging directly with members of public, in scores of settlements likely to lie under varying dispersion footprints of radioactive discharges, from routine operation and fault conditions alike?

2. Engaging with a stakeholder group trumps engaging with the public

2.1 Given the actual practice to date, NRW need reminding that engaging with Stakeholder Groups does not equate to engaging with the public. Likewise, neither does an internet website based consultation equate to engaging directly with the public at community based consultation meetings. Drop-in events do not equate to holding open public meetings.

2.2 For vendors, the GDA is a voluntary appraisal mechanism for their pet technology. Although invoked electively by a vendor, it is actioned by the Secretary of State. It is rooted in UK Government's National Policy Statements on Energy, which in turn are rooted in statute. Apparent public interest deficit under this domain could not be brushed off as some minor inconvenience. Government policy has woven the GDA mechanism into environmental decision making. The NRW is in the business of environmental decision making. Public participation in environmental decision making does not begin and end with stakeholder engagement. Proactive approaches to engaging directly with the public are surely critical to facilitating public participation in environmental decision making. So, how has the NRW set about the current "consultation"?

2.2 Regrettably, the NRW has demonstrated scant interest in proactively facilitating effective public participation. The NRW is clearly on the verge of sanctioning deployability of a new reactor design at Wylfa, in Anglesey (in the first instance). The operation of the UK ABWR carries the potential for significant effects on the environment, human health and non-human species across significant tracts in North Wales.

2.3 The NRW convened one Workshop for invited stakeholders on 30 January 2017. The event was not publicised. It was not even listed on the fabled events page of the NRW website. Moreover, the NRW insisted on holding the Workshop at the Wylfa Magnox Nuclear Power Station. That underscores the level of institutional awareness of public perception of NRW's independence from the nuclear industry in North Wales it supposedly regulates. Only a regulator in Wales could boast that a remote nuclear site in Anglesey comprised the only good location in the entire North Wales area, possessing the facilities necessary for a workshop on Preliminary GEP Conclusions on the UK ABWR in Wales. Is the notion of neutral venues so institutionally an anathema for NRW?

2.4 The NRW also "held" two drop-in sessions for the public on 30th and 31st January 2017, in Llangefni (Anglesey). The NRW chose a venue located well away from Llangefni town center. Not only were the drop-in sessions not widely advertised beforehand, the neighbourhood areas apparently were not signposted either on the days in question. NRW's practice highlights seeming institutional disdain for public space. It does not bode well for NRW's institutional comprehension of, and commitment to, proactive public participation in environmental decision making.

3. Other flaws in consultations on GEP

3.1 Take, for example, the EA's GEP Workshop for invited Stakeholders, convened in Birmingham (24 January 2017). Stakeholders received informed presentations exclusively from the regulators (the NRW, the EA and the ONR, respectively) and the reactor vendor (Hitachi-GE). As a result, Workshop participants received no formal presentation to stimulate minds with informed observations, for example, on methodology, data integrity or aspects in environmental or regulatory contention. Nor was there a presentation from non-regulatory non-industry perspective.

3.2 Plainly, not all Stakeholder participants in every Workshop could be assumed to be fully appraised of a suite of fields including aquatic/marine processes, atmospheric dynamics,

dispersion/bioaccumulation/environmental amplification, ecological pathways, environmental chemistry, fault analysis, fluid dynamics, modelling assumptions, niche biodiversity, operator behaviour, radiobiology, reactor physics, statistics, systems analysis, thermodynamics, etc, to name but a handful of specialisms.

3.3 In other words, the Workshop appeared consciously structured to be one sided. In terms of facilitating meaningful public discourse on deliberations under the policy tool the GDA has become, the regulators appear infected with critical commissioning lacuna or phobia. For instance, it does not follow automatically that commissioning an independent report is necessarily equivalent to commissioning a critical report. To that extent, regulators manifestly fail to serve adequately public interest in a modern democracy. After all, GDA costs are charged to reactor vendors.

4. Asymmetrical resources

4.1 A response based on considered evaluation of data, data sources and assumptions informing NRW's Preliminary GEP Conclusions is contingent on appropriate access to resources and capacity beyond the reach of members of public and non-governmental organisations. The asymmetry in available resource capacity between the public on the one hand, and the vendor and regulators on the other, places the public at decisive disadvantage.

4.2 Absent access to specialisms, the asymmetry manifestly frustrates consideration of appropriate as well as meaningful response to the fifteen consultation questions identified by regulators.

5. Conclusions

A number of conclusions warrant mention.

5.1 The manner in which the NRW has set about "consulting the public" on the Generic Environmental Permitting assessment of the UK ABWR seems flawed. The NRW has failed in practice to facilitate meaningful public participation in environmental decision making. This potentially risks weakening consultation legitimacy. The NRW approach in this instance seemingly collides with paragraph 7.22 of the 21st Report of the Royal Commission on Environmental Pollution (CM4053, 1998), bearing on public involvement, and socially intelligent scientific and technical assessment.

5.2 The NRW should promptly launch a fresh round of express engagements directly with the public in Wales, initially under a supplementary period of consultations on Preliminary GEP Conclusions, and subsequently on a draft of any proposed SoDA. This should, at the least, involve a combination of public meetings and separate seminars for elected members in each local authority in Wales. Open public meetings should be convened in North Wales at Mold, Rhyl, Colwyn Bay, Llandudno, Bangor, Caernarfon, Porthmadog, Dolgellau, Llangefni and Holyhead. It is only proper NRW should also convene open public meetings in South West Wales, South East Wales and Mid Wales. NRW's SoDA affects the rest of Wales no less, in principle. The NRW is duty bound to make the public cognisant of the fact. NRW's generic approval opens the door for the reactor vendor to operate the UK ABWR anywhere in Wales at nuclear suitable sites.

5.3 There is nothing stopping the NRW from promptly commencing a supplementary period of direct consultations with the public on Preliminary Conclusions, in view of manifest public interest failure during the current "consultation" period from December 2016 to March 2017. The NRW's environmental decision making on GEP for the UK ABWR is capable of having significant

effect on the environment, human health and non-human species. Public participation in environmental decision making actually has to be seen to be done.

5.4 Acknowledging the fact that Wylfa in Anglesey currently comprises the sole site for new nuclear build in Wales, the NRW should engage directly with all potentially affected communities in towns and villages across North Wales. Communities likely to be affected include those under varying dispersion footprints of routine radioactive discharges, and those under fallout footprints in the event of accident or containment breach involving the proposed new reactors, or the on-site spent nuclear fuel stores, at Wylfa.

5.5 The NRW needs to identify as well a generic site for the Generic Environmental Permitting Assessment of the UK ABWR that more appropriately reflects environmental conditions in Wales. In that regard, the NRW should prepare and present dose estimates for the population in Wales from a UK ABWR based on a Welsh generic site, as well as dispersion charts for routine and abnormal radioactive discharges. The public should be provided this data directly, during all future permitting determinations and consultations, including the recommended supplementary community consultations on Preliminary GEP Conclusions, and subsequent consultations on draft SoDA.

5.6 Wales is proud of a legal duty on sustainable development. In order to facilitate effective public participation in environmental decision making, the NRW should establish a ring fenced community fund for the public in affected local communities across North Wales in particular. The ring fenced fund, although administered solely by NRW, should be deployable wholly at the discretion of affected local communities without any filtering by NRW or any other party. Communities should be able to access the fund for commissioning such independent experts of their choice as they see fit, to critically evaluate and prepare appropriate representations for communities to take up directly with NRW on: the Preliminary Conclusions on Generic Environmental Permitting of the UK ABWR, and the subsequent draft of proposed SoDA on the UK ABWR in Wales. The ring fenced fund should be topped up on full cost recovery basis by expressly charging the reactor vendor, ensuring the fund keeps in step with draw down by communities. This funding mechanism would be in keeping with the vendor's financing of NRW's extra work load in relation to the Wylfa Newydd project.

5.7 In addition, NRW should convene public hearings in all the regions in Wales to review the entire community feedback on the draft proposed SoDA, prior to finalising the SoDA.

4.15. ABWR-15

ABWR-15

Are you responding as individual or organisation?
Organisation - Anglesey County Council
Method of response?
By email
Response to consultation:
Anglesey County Council provided their response as a separate submission in both Welsh and English. Both language versions are reproduced in Appendix 4 of this document.

4.16. ABWR-16

ABWR-16

Are you responding as individual or organisation?

Organisation - Lissajous Nucleonics Ltd.

Method of response?

Via Natural Resources Wales

Response to consultation:

UK ABWR GDA consultation, 12 December 2016 - 03 March 2017

Submission on Fuel Disposal

My background

I am a physicist who worked for BNFL for about 30 years before becoming an independent consultant. In this capacity I was contracted at various times by a number of government departments to provide advice on matters mostly relating to nuclear materials. More recently, I have assisted IAEA Safeguards in Vienna.

The Issue

My concern is that the GDA position on fuel storage and disposal as described to me at the Birmingham GDA consultation event on the 24 January does not accurately reflect the conclusion given in the reprocessing section (page 116) of the Government White Paper on nuclear power published in 2008. I agree that the deep geological disposal should be assumed in the immediate drawing up of plans for, and financing of, waste management of the UK ABWR. However, the GDA appears to be ignoring any consideration of possible reprocessing of the spent fuel at a much later date, an option which was retained in the White Paper. In doing so GDA is placing an unnecessary restriction on any future Government's response to reprocessing proposals, which might be made at some time during the period of interim onsite storage of the spent fuel which, as I understand it, could last for up to 140 years.

The White paper

The Government White Paper in 2008 clearly states "…that any nuclear power stations that might be built in the UK should proceed on the basis that spent fuel will not be reprocessed and that accordingly waste management plans and financing should proceed on this basis". However in response to the public consultation process the paper qualified this position by adding the statement "We are not currently expecting any proposals to reprocess spent fuel from new nuclear power stations. Should such proposals come forward in the future, they would need to be considered on their merits at the time and the Government would expect to consult on them".

Possible Future Scenarios

According to Hitachi-GE submissions interim storage of spent fuel on site could extend for a period of up to 140 years. It is surely reasonable that GDA takes into account the possibility that during this period proposals may be made by nuclear consortia or indeed a government of the day to reprocess the onsite fuel. These proposals might be prompted by technological / economic / environmental / strategic factors such as new reporocessing technology, the

availablility of fast reactors, waste minimisation for deep disposal, destruction of long lived actinides or pressure to secure the UK an indigenous energy supply largely based on electricity generation.

My Question

In considering interim storage of spent fuel should not the GDA ensure that all spent fuel discharged from a UK ABWR be packaged in a form and maintained in a condition suitable for reprocessing if, as the White Paper says, "…such proposals come forward in the future"?

4.17. ABWR-17

ABWR-17

Are you responding as individual or organisation?
Individual
Method of response?
Via Natural Resources Wales
Response to consultation:
No matter how many safe guards are put in place, the fact remains that this industry results in toxic waste that contaminates and poisons the planet for future generations. I cannot condone this practise, I do not agree with it, it is completely unnecessary. Use your resources to fund clean energy, your practises are contributing towards the death of the planet. Stop now. The planet needs to be here for future generations, in a clean and sustainable state. Think of your grandchildren.

4.18. ABWR-18

ABWR-18

Are you responding as individual or organisation?
Individual
Method of response?
Via Natural Resources Wales
Response to consultation:
Discharge limits.

4.19. ABWR-19

ABWR-19

Are you responding as individual or organisation?

Individual

Method of response?

Via Natural Resources Wales

Response to consultation:

Cwestiwn am Wylfa

Sawl milliwn terabecquerels mTBq o danwydd wedi ei ddefnyddio, fyddai yn y storfa dros dro yn Wylfa ar ôl 60 mlynedd? A fedrwch chi roi'r ffigwr yma hefyd fel canran o'r mwyafswm a fu yn Sellafield os gwelwch yn dda?

Ydi o tua 40 mTBq? Ydi hyn bron yn 50% o'r tanwydd wedi ei ddefnyddio a'r gwatraff a gedwir yn Sellafield? Neu oes ganddoch chi ffigyrau cywir wrth law os gwelwch yn dda?

How may million terabecquerels mTBq of spent fuel, i.e. nuclear waste, would have accumulated in the interim store at Wylfa after 60 years? Could you also please give me this figure as a percentage of the maximum ever at Sellafield?

Is it around 40 mTBq? Is this nearly 50% of the legacy spent fuel and wastes stored at Sellafield? Or have you accurate figures at hand?

4.20. ABWR-20

ABWR-20

Are you responding as individual or organisation?

11 named individuals, no organisation name given

Method of response?

Via Natural Resources Wales

Response to consultation:

N.R.W. A.B.W.R. generic assessment "drop in" meetings.

Wylfa Newydd, Anglesey, 30/01/2017.

6. As nuclear is not compatible with life on this planet, there is no debate.
7. The nuclear industry is founded on lies and corruption, the first being that it would generate electricity "to cheap to meter"!
8. Horizon nuclear have continued with "the lies" at their consultation meetings assuring safety and well proven history of the a.b.w.r. design (the only similar stopped at Fukushima six years ago.)
9. If they need they need to be addressed by N.R.W. why were Horizon allowed to lie.?
10. As Nuclear reactor design presumably is a very specialist subject, and the N.R.W. is a underfunded and understaffed Quango made up of agencies not related in any way to Nuclear, are we to assume that these "generic assessment" workshops are "box ticking" exercises which will hand over submissions to government appointed experts.?

11. Will these experts be from establishments with "conflicts of interests"? or will the opinion of independent experts who do not agree with the Pro establishment narrative view be heard.?
12. Development's in the world around us are moving very quickly, there are questions being asked about the legality of the acceptable levels of radio active pollution emitted from nuclear reactors. It may well be that miscalculations have been made and court proceedings are being planned. Is this not the "death knell" for using nuclear to boil a kettle ???.
13. Finally, the very fact that the nuclear industry is unable to afford liability insurance without finance from the public purse is surely evidence that Uranium and nuclear fusion is the most dangerous way of generating electricity. Commercially it is "dead in the water" and is only an excuse to produce by-products for Weapons of mass destruction. !!
14. Conclusion. The complete exercise of the "generic assessment" meetings have been shamefully non democratic in the way they have been organised. Public notices have not been carried out correctly. Some are carried out behind closed doors to a invited list. This type of unacceptable attitude has been experienced in the past by other Gov. departments dealing with the proposed Wylfa Newydd project. It is undesirable, unaffordable, and with the dawn of the Renewable Revolution, unnecessary. It will be opposed by all the undersigned.

4.21. ABWR-21

ABWR-21

Are you responding as individual or organisation?
Individual
Method of response?
Letter
Response to consultation:
Hitachi ABWR Oldbury consultation
I did attend a drop in event for Oldbury and found the information given to be by a representative of the ONR to be helpful and clear. She mentioned that my feedback would be read by the ONR. Would you confirm that both the Environment Agency and ONR will receive this letter and process these comments?
Management arrangements
What are the cost benefits of allowing different operating companies to the taxpayer for the lifetime of the project? If different companies are used, joint cost-saving opportunities are eliminated.
Has a feasibility study being carried out on the total lifetime costs including decommissioning costs of the project? What is the total cost?
What is the standard required for the elimination of mistakes and lack of blame culture? Many organisations are copying the way that airline pilots and engineers record errors and rectify them as it improved safety. Is this being used for the ABWR project? If not, why not?
Many Japanese engineers use WE Deming "systems thinking" in design and maintenance systems - is this being used as it helps improve overall efficiencies and safety?

4.22. ABWR-22

ABWR-22

Are you responding as individual or organisation?
Individual
Method of response?
Letter
Response to consultation:
UKABWR DESIGN REVIEW I am responding to the Generic Design Assessment (GDA) for The ABWR proposed by hitachi-Ge for Oldbury. I write as a retired Principal Engineer and senior lecturer at the Nuclear Power Training Centre (NPTC) of the CEGB at Oldbury. In the run up to the decision to build a Pressurised Water Reactor (PWR) at Sizewell the CEGB carried out a design review of all candidate technologies. One the their conclusions was that the BWR did not have sufficient barriers to prevent radioactive fission products from failed fuel cladding from being transported in steam, through the turbine and release to the atmosphere via the condenser off gas system. I believe that the lack of a physical barrier to prevent fission products passing through the turbine is a reason why the ABWR should be refused GDA approval.

4.23. ABWR-23

ABWR-23

Are you responding as individual or organisation?
Individual
Method of response?
Online consultation tool
Response to consultation:
Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design. Thank you for the opportunity, but I am totally against Nuclear power Full Stop. It was based on the lie that it would produce energy " to cheap to meter." when in fact it was a cover for Nuclear armaments. Nothing has changed and with the arrival of the unstoppable Renewable Revolution it is now a lie which is also illegal. In my view anyone who promotes it is an accessory to crime as per the U.N. non proliferation etc. To even be thinking of continuing down the Nuclear path and not learning the lessons of Chernobyl, Fukushima and all the other disasters is "Insanity" . Until now all other technologies that have become redundant have just been consigned to history. With Nuclear the legacy is here for ever,? our future generations will (are already doing) find greener alternatives but the problem of Nuclear waste will have been created when they had no say in the matter. In other words we are taking away their democratic human right away even

before they are born. ! I am a member of PAWB people against Wylfa B. and totally agree with the Welsh submission they have made as a group.

4.24. ABWR-24

ABWR-24

Are you responding as individual or organisation?
Individual
Method of response?
Online consultation tool
Response to consultation:
The response was provided addressing the individual questions asked in the consultation, these are given below:
Q6. Please tell us if you have any comments on our preliminary conclusions on strategic considerations for radioactive waste management.
No new nuclear power stations should be built in the UK
Q7. Please tell us if you have any comments on our preliminary conclusions on the process for identifying best available techniques (BAT).
See reply to 6, above.
Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.
See reply to 6, above.

4.25. ABWR-25

ABWR-25

Are you responding as individual or organisation?
Individual
Method of response?
Online consultation tool
Response to consultation:
The response was provided addressing the individual questions asked in the consultation, these are given below:
Q5. Please tell us if you have any comments on our preliminary conclusions on management systems.
All good points.

Q6. Please tell us if you have any comments on our preliminary conclusions on strategic considerations for radioactive waste management.
A long term deep underground storage facility is needed to store radioactive waste.
Q7. Please tell us if you have any comments on our preliminary conclusions on the process for identifying best available techniques (BAT).
ALARP should also be used for keeping worker exposure rates low.
Q11. Please tell us if you have any comments on our preliminary conclusions on the management and disposal of solid radioactive waste and spent fuel.
GDF needs to be built before/during construction.
Q12. Please tell us if you have any comments on our preliminary conclusions on the monitoring of discharges and disposals of radioactive waste.
All discharge routes should be monitored.
Q14. Please tell us if you have any comments on our preliminary conclusions on radioactive substances permitting
As long as environmental monitoring is carried out.
Q18. Please tell us if you have any comments on our preliminary conclusions on the control of major accident hazards
Adequate emergency teams should be available on site at all times.
Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.
I think it is a good design.

4.26. ABWR-26

ABWR-26
Are you responding as individual or organisation?
Individual
Method of response?
Online consultation tool
Response to consultation:
No response included

4.27. ABWR-27

ABWR-27
Are you responding as individual or organisation?
Individual

Method of response?

Online consultation tool

Response to consultation:

My Background

I am a physicist who worked for BNFL for about 30 years before becoming an independent consultant. In this capacity I was contracted at various times by a number of government departments to provide advice on matters mostly relating to nuclear materials. More recently I have assisted IAEA Safeguards in Vienna.

The Issue

My concern is that the GDA position on fuel storage and disposal as described to me at the Birmingham GDA consultation event on 24 January does not accurately reflect the conclusion given in the reprocessing section (page 116) of the Government White Paper on Nuclear Power published in 2008. I agree that deep geological disposal should be assumed in the immediate drawing up of plans for, and financing of, waste management for UK ABWR. However the GDA appears to be ignoring any consideration of possible reprocessing of the spent fuel at a much later date, an option which was retained in the White Paper. In doing so GDA is placing an unnecessary restriction on any future Government's response to reprocessing proposals which might be made at some time during the period of interim onsite storage of the spent fuel which, as I understand it, could last for up to 140 years.

The White Paper

The Government White Paper in 2008 clearly states "…that any nuclear power stations that might be built in the UK should proceed on the basis that spent fuel will not be reprocessed and that accordingly waste management plans and financing should proceed on this basis". However in response to the public consultation process the paper qualified this position by adding the statement "We are not currently expecting any proposals to reprocess spent fuel from new nuclear power stations. Should such proposals come forward in the future, they would need to be considered on their merits at the time and the Government would expect to consult on them".

Possible Future Scenarios

According to Hitachi-GE submissions interim storage of spent fuel on site could extend for a period of up to 140 years. It is surely reasonable that GDA takes into account the possibility that during this period proposals may be made by nuclear consortia or indeed a government of the day to reprocess the onsite fuel. These proposals might be prompted by technological / economic / environmental / strategic factors such as new reprocessing technology, the availability of fast reactors, waste minimisation for deep disposal, destruction of long lived actinides or pressure to secure the UK an indigenous energy supply largely based on electricity generation.

My Question

In considering interim storage of spent fuel should not the GDA ensure that all spent fuel discharged from a UK ABWR be packaged in a form and maintained in a condition suitable for reprocessing if, as the White Paper says, "…such proposals come forward in the future"?

4.28. ABWR-28

ABWR-28

Are you responding as individual or organisation?

Individual

Method of response?

Online consultation tool

Response to consultation:

The response was provided addressing the individual questions asked in the consultation, these are given below:

Q5. Please tell us if you have any comments on our preliminary conclusions on management systems.

The design is fundamentally flawed with a number of long term issues inadequately addressed.

Q6. Please tell us if you have any comments on our preliminary conclusions on strategic considerations for radioactive waste management.

There is no long term strategy for waste generated by the site, or the hazardous waste which will comprise part of the plant on de-commissioning. The financial provision for decommissioning, management and storage/security of high and medium level radioactive waste is entirely inadequate and unsustainable as the half-lives of the elements involved extend far beyond any time for which financial projections can be made. This fundamental strategic flaw seriously endangers future generations and the environment of the immediate area and well beyond.

Q7. Please tell us if you have any comments on our preliminary conclusions on the process for identifying best available techniques (BAT).

Far too many compromises. In most cases, truly safe technology and/or systems are not yet available, (if they ever will be) or would render the project even more uneconomic.

Q8. Please tell us if you have any comments on our preliminary conclusions on preventing and minimising the creation of radioactive waste.

Whilst there have been efforts to reduce the quantity of radioactive produced, in comparison to some older designs, this project would, by it's very nature, add considerably to the stocks of waste of all levels for which there is no long term solution, and which inevitably involves the UK Government in a responsibility to which it is not properly able to make a commitment, owing to the very considerable time involved.

Q9. Please tell us if you have any comments on our preliminary conclusions on minimising the discharges and impact of gaseous radioactive waste, and our proposed limits and levels.

Estimated discharges do not appear to include discharges as a result of failures or accidents during the lifetime of the project - which every other nuclear project of this type experiences.

Q10. Please tell us if you have any comments on our preliminary conclusions on minimising the discharges and impact of aqueous radioactive waste, and our proposed limits and levels.

Estimated discharges do not appear to include discharges as a result of failures or accidents during the lifetime of the project - which every other nuclear project of this type experiences.

Q11. Please tell us if you have any comments on our preliminary conclusions on the management and disposal of solid radioactive waste and spent fuel.

There is no long term solution for high level waste and the very questionable "expected" GDF solution is not sustainable either financially or logistically due to the duration of the management and security commitment required. Adding to an already apparently insoluble problem which places UK citizens and our environment in serious danger for millennia is grossly irresponsible.

Q12. Please tell us if you have any comments on our preliminary conclusions on the monitoring of discharges and disposals of radioactive waste.

Measuring a cancer does not cure it.

Q13. Please tell us if you have any comments on our preliminary conclusions on the impact of radioactive discharges.

This does not include the impact of probable failures or accidents during the lifetime of the project, it's decommissioning and storage of wastes. A spread of probable scenarios - both short and long term - should be researched and likely results published.

Q14. Please tell us if you have any comments on our preliminary conclusions on radioactive substances permitting.

The fundamental nature of this project makes it entirely unsatisfactory and approval would be negligent.

Q16. Please tell us if you have any comments on our preliminary conclusions on discharges to surface waters and groundwater.

Almost every other plant of this type worldwide has caused contamination of groundwater and, in some cases, watercourses due to accidents. A realistic assessment of how often during the life and decommissioning of the project this will happen, and the extent of such probable contamination and it's duration should be prepared and published.

Q18. Please tell us if you have any comments on our preliminary conclusions on the control of major accident hazards.

The main major accident hazard present in this project is the nuclear fuel and its other radioactive products

19 Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.

By its very nature, I find this design entirely unacceptable - and it will remain so until a secure, sustainable, fully-financed solution is found for the radioactive waste generated. Given the extreme duration of the management and security required, this remains very unlikely, and therefore approval for any project which significantly adds to the existing and future burden of radioactive waste would be grossly irresponsible.

4.29. ABWR-29

ABWR-29

Are you responding as individual or organisation?

Individual

Method of response?

Online consultation tool

Response to consultation:

The response was provided addressing the individual questions asked in the consultation, these are given below:

Q18. Please tell us if you have any comments on our preliminary conclusions on the control of major accident hazards.

Comments On The ABWR General Design Assessment

Because it is very harmful to human beings, containment of the nuclear fuel is one of the most important aspects of nuclear reactor design. The most critical circumstances which require consideration are not normal operation, but fault conditions, after equipment failures have occurred. The modern design standard is now to provide four permanent barriers to prevent escape of the fuel to the environment. Two of these are in the flow of fluid carrying heat from the reactor to the steam turbine, which is connected to the environment. The ABWR relies only on one permanent barrier, the nuclear fuel cladding. This is the least reliable barrier, because it is subjected to intense neutron radiation, which causes distortion of the thin wall of the fuel cladding, which often leads to cracks and leaks of the fuel in normal service as a frequent fault. Since the ABWR reactor delivers steam directly to the steam turbine, which is outside the containment building, any leaking fuel is delivered directly to the environment. The only way to prevent this is to quickly shut the turbine steam stop valves, shut the nuclear reaction down by pushing in the control rods upwards from the bottom of the reactor and to condense the steam, which the reactor continues to produce after it is shut down. This is a very onerous task, because of the very large heat flow from the reactor at full power. If it fails to complete successfully under fault conditions, radioactive fuel will be discharged to the environment in the steam flow discharged through the reactor pressure relief valves.

The risk of any fuel leak not being detected, the risk of the failure of the steam stop valves to close, the risk of not pumping enough cold water spray at high pressure to completely condense the reactor steam flow has not been reported in the conclusions of the ABWR General Design Assessment and therefore it is not known whether this issue has been assessed.

In the case of multiple fuel element failure, due to for instance blockage of fuel cooling flow, or a criticality fault in the reactor, debris from failed fuel would be released into the steam flow to the turbine and hence the environment. The moisture separation vanes at the outlet of the reactor are not designed to capture this debris and it may lodge in the turbine steam stop valve seat as it closes, preventing sealing of the steam flow. In this case, nuclear fuel would pass directly into the environment. Consideration of this issue by the ABWR General Design Assessment has not been reported in its results and therefore it is not known whether this issue has been assessed.

No overall probability risk assessment has been reported in the results of the ABWR General Design Assessment for comparison with other modern reactor designs. It is therefore not known whether this has been included in the assessment. This needs to be completed and the risk of a nuclear release from the ABWR needs to be compared with that of other more modern reactor designs, before approval for construction in the UK is given.

In view of the uncertainty remaining in the assessment of the ABWR design, safety improvements should not be ruled out before consent for construction is given.

From the technical issues described above, it is clear that one of these is that the turbine hall also needs to be redesigned as a nuclear containment building, with all effluent from it being filtered to remove radioactive fuel before discharge to the environment. This should be a firm recommendation of the ABWR General Design Assessment.

I have previously put these issues in a letter to my previous member of parliament for Northavon, Sir Steven Webb. He forwarded my letter to the then Minister of Power, Malcolm Wicks. Two weeks later Hitachi withdrew their ABWR design from the General Design Assessment, saying that it was unsuitable for the British market. They have subsequently reversed their decision, although no substantial change in the ABWR design has been made in the intervening period.

The EU reviewed reactor designs and concluded that the Pressure Water Reactor was acceptable for construction in any EU member. The Boiling Water Reactor was not included in

this statement of acceptance. Consent for construction of the ABWR in the UK therefore conflicts with the EU's decision

Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.

The preliminary conclusions are profoundly flawed, because they only concern normal operation and do not consider fault conditions after equipment failure.

4.30. ABWR-30

ABWR-30

Are you responding as individual or organisation?

Organisation - North Wales Fire and Rescue Service (NWFRS)

Method of response?

Online consultation tool

Response to consultation:

The response was provided addressing the individual questions asked in the consultation, these are given below:

Q16. Please tell us if you have any comments on our preliminary conclusions on discharges to surface waters and groundwater.

NWFRS note that consideration has been given in the Hitachi-GE submission to prevent and minimise unintentional discharge to groundwater which includes fire water run-off.

Q18. Please tell us if you have any comments on our preliminary conclusions on the control of major accident hazards.

NWFRS note the EA/NWR opinion with regards to COMAH and that the GDA is based upon a generic site with only one reactor. NWFRS will make observations should a site specific application be made in relation to a site situated within NWFRS area as identified in 'National policy statement for nuclear power generation EN-6' ('NPS EN-6').

Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.

The content of the GDA consultation is noted and that it deals with the environmental aspects of the design. NWFRS will make observations in relation to safety and security when consultation is undertaken with the developers ahead of the submission of an application for a Development Consent Order.

4.31. ABWR-31

ABWR-31

Are you responding as individual or organisation?

Individual

Method of response?

Online consultation tool

Response to consultation:

The response was provided addressing the individual questions asked in the consultation, these are given below:

Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.

I believe that a new nuclear power station at Oldbury should not be built at all but particularly not the boiling water one proposed as the design is untested.

Nuclear power is too vulnerable to be used, it is open to attack by terrorists, natural phenomenon and cost cutting governments.

Nuclear power commits us and future generations to huge costs and responsibility of keeping the waste safe.

Oldbury is the wrong place for it, the last tsunami in the Severn was 400 years ago so its just about time for another.

It is the wrong site because of the fragility of the environment being between the valuable wetland sites of Slimbridge and New Passage.

It is the wrong site because of the centres of population close by.

The buildings will be a blot on the very lovely Severn Vale, out of scale with their surroundings and an eyesore for miles around.

The proposal shows a huge industrial complex but no sign of cooling towers. I have heard that this is because the number and size of cooling towers is not yet known which takes me back to my first point that the design is untested or is it that the possible height of the cooling towers will too big and controversial to be published.

The actual building of the complex will make the lives of local people a misery for years and leave the countryside scarred by the construction process.

Please do not proceed with this abomination!

4.32. ABWR-32

ABWR-32

Are you responding as individual or organisation?

Individual

Method of response?

Online consultation tool

Response to consultation:

The response was provided addressing the individual questions asked in the consultation, these are given below:

Q6. Please tell us if you have any comments on our preliminary conclusions on strategic considerations for radioactive waste management.

Quote "The spent fuel management strategy that has been adopted is not to reprocess but to store, package and appropriately dispose of WHEN A DISPOSAL ROUTE BECOMES AVAILABLE which is consistent with the UK government 'base case' (DECC, 2011). Unquote.

In my opinion it is short sighted in the extreme for the EA & EAWales to accept the conclusion, made by other departments, that it is "safe" to carry on producing more and more nuclear waste, before a suitable final disposal route has been identified. There should be an immediate and concerted effort to identify a suitable geological disposal route. Only once a final geological disposal site been identified, and its construction programme finalised, should the construction of additional nuclear power stations be permitted.

4.33. ABWR-33

ABWR-33

Are you responding as individual or organisation?
Organisation - Food Standards Agency (FSA)
Method of response?
Online consultation tool
Response to consultation:
The response was provided addressing the individual questions asked in the consultation, these are given below:
Q9. Please tell us if you have any comments on our preliminary conclusions on minimising the discharges and impact of gaseous radioactive waste, and our proposed limits and levels.
Clarification sought about information in the documents:
When quoting the annual limit, the gaseous discharge report (AR04) does not quote any application for the discharge of iodine-131 although iodine-131 is identified in the document as being produced - for example listed on page 21 but not listed in table 1.
Q10. Please tell us if you have any comments on our preliminary conclusions on minimising the discharges and impact of aqueous radioactive waste, and our proposed limits and levels.
Clarification sought about information in the documents
It is unclear why carbon 14 is not included in the aquatic discharges Impact of radioactive discharges
Q13 Please tell us if you have any comments on our preliminary conclusions on the impact of radioactive discharges.
Consumption data used in the GDA does not reflect the current national published data. The FSA would consider using the following data on consumption for generic assessments:
National Diet and Nutrition Survey: results from Years 1 to 4 (combined) of the rolling programme for 2008 and 2009 to 2011 and 2012. Available online:
https://www.gov.uk/government/statistics/national-diet-and-nutrition-survey-results-from-years-1-to-4-combined-of-the-rolling-programme-for-2008-and-2009-to-2011-and-2012

Bates B, Cox L, Nicholson S, Page P, Prentice A, Steer T, Swan G (2016). National Diet and Nutrition Survey Results from Years 5 and 6 (combined) of the Rolling Programme (2012/2013 – 2013/2014):

https://www.gov.uk/government/statistics/ndns-results-from-years-5-and-6-combined

The documents do not include any consideration of the doses to houseboat dwellers. One of the possible sites for building a reactor is Oldbury where there is known to be a significant dose pathway to houseboat dwellers based on published habits survey data. This is also true at other sites around UK.

In considering the distance from the site of the representative groups, the assessment has used arrange of distances and the choice of these locations is unclear? The assessment of the food pathway considered that food production is at 500m, when a more pessimistic assumption and in some cases more realistic is 100m, for example there is food production within 100m of one of the proposed sites, Wylfa.

It is unclear whether the assessment has considered the maximum deposition and air concentration locations to work out the activity concentration in food and other pathways. The FSA would recommend that for a generic assessment the maximum deposition and air concentration outside the expected site perimeter would provide the most conservative approach. This could be as close in as 100m that was suggested in the IRAT assessment tool or further out.

When considering the modeling of the gaseous discharges, the document is unclear on the reasons for the assumptions used and the weather patterns for the generic site.

Is there a national representative windrose for the ‘annual wind information’ to do a generic design assessment

Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.
The Food Standards Agency recognises that the predicted levels in the dose assessment in the GDA consultation are well within acceptable levels and as such are generally content with the proposed reactor design. However, the FSA is unable to fully replicate these calculations with the information provided. The FSA would appreciate further information and consultation with the EA, NRW and Horizon in order to carry out a more thorough validation of the assessment. Though this is a GDA assessment when considering a site environmental permit the FSA would use site specific information to carry out a more precise assessment of the impact on the food chain.

4.34. ABWR-34

ABWR-34

Are you responding as individual or organisation?
Individual
Method of response?
Online consultation tool
Response to consultation:

The response was provided addressing the individual questions asked in the consultation, these are given below:

Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.

I live 10 miles from Oldbury in Soudley Forest of Dean .If this goes ahead, I will have to sell my home and move away. These Japanese companies are the same people that said Fukeshima was Safe! The governments own regulatory body Nirex reported that the Oldbury site was not suitable for further development in view of possible Tsunamis or Tidel Surges likely in the next 100 years.

Renewables if supported by government would provide suffiecent and more than enough energy, along with energy efficentcy. Please refer to a report entitled The Power To Transform, by Andrew Clarke director of The Resilliance Centre forest of dean. Please do not allow this power station to go ahead.

Thank you.

4.35. ABWR-35

ABWR-35

Are you responding as individual or organisation?

Organisation - Public Health England (PHE)

Method of response?

Online consultation tool

Response to consultation:

The response was provided addressing some of the individual questions asked in the consultation, these are given below:

Q8. Please tell us if you have any comments on our preliminary conclusions on preventing and minimising the creation of radioactive waste.

PHE has no comments other than those made in reference to Q9

Q9. Please tell us if you have any comments on our preliminary conclusions on minimising the discharges and impact of gaseous radioactive waste, and our proposed limits and levels.

PHE notes that estimated annual gaseous discharges of carbon-14 and tritium from the UK ABWR are higher than the mean annual discharges from other operating BWRs, but still sit within the range of data values obtained for operating BWRs across the world. PHE notes the explanation for the tritium discharges given in para 252 and the request by the Environment Agency for further information related to carbon-14 in para 260. PHE is confident that the Environment Agency will follow-up and review these matters and will make the information publicly available.

The units in the first table of Section 9 are incorrect. The annual limits should be given as Bq rather than GBq.

Minor comments

Para 253: the upper limit of the range of discharges is 1.6E+01 GBq/GWeh as in Table 9.4.

Para 257: the lower limit of the range of particulate discharges should be 1.3E-13 GBq/GWeh as in Table 9.6.

Consultation document, paragraph 259: the lower limit of carbon-14 discharges should be 4.1E-03 GBq/GWeh as in Table 9.7.

Q10. Please tell us if you have any comments on our preliminary conclusions on minimising the discharges and impact of aqueous radioactive waste, and our proposed limits and levels.

PHE agrees with the preliminary conclusions

Minor comments

Table 8 of the Assessment report AR05 gives a value of .7.6e+11 - should be corrected to 7.6e+11

Consultation document, Table 10.1: the mean of liquid tritium discharges in 2006 should be 9.9E 02 GBq/GWeh and in 2010 should be 9.7E 02 GBq/GWeh. The minimum in 2005 should be 2.6E 04 GBq/GWeh and in 2007 should be 5.3E 04 GBq/GWeh; the minimum in 2012 carries an extra significant figure. These figures are given in the report 'Discharges from boiling water reactors'

Q13. Please tell us if you have any comments on our preliminary conclusions on the impact of radioactive discharges.

PHE believes that the general approach and the methodology adopted by the Environment Agency in assessing the radiological impact of radioactive discharges are reasonable. PHE is therefore confident that the results of this assessment are sound and robust; PHE agrees with the preliminary conclusions reached by the EA.

A review has been carried out of Chapter 13 of the Environment Agency: GDA Consultation Document for UK ABWR. In addition, the supporting documents AR09 – Assessment of radiological impacts on members of the public and AR10 - Assessment of radiological impacts on non-human species have been considered.

Chapter 13 of the Environment Agency: GDA Consultation Document for UK ABWR is clearly laid out with the aims of the assessment identified and the generic site concept explained. Radiological impact assessments have been carried out to verify and validate the dose calculations submitted by Hitachi-GE and in addition independent assessments have been performed for comparison. Individual and collective doses have been calculated to humans and dose rates calculated for non-human biota. The results of the various assessments are in general agreement and lead to the conclusion that the impact of gaseous and liquid discharges at the proposed discharge limits will not give rise to doses that exceed the dose constraint or limit for humans or the dose rate criterion for non-human biota.

General comments

Full details of the input data used in the dose assessment calculations are not provided in these three reports. For example, meteorological data, assumptions about food production areas and a full description of habit data for the local population are not available. It has therefore not been possible to comment on the suitability of assumptions and data that have gone into the dose assessments. It is also not clear, from Chapter 13 alone, whether the doses calculated are to a particular age group or an amalgamation of doses to different age groups. There appear to be some inconsistencies between Chapter 3 and AR09.

Specific comments

Table 13.1 in Chapter 13 in the table header should dosea should be dose(a)?

Table 13.1 in Chapter 13 gives stage 1 Hitachi-GE dose as 143 μSv/y – if this includes direct radiation I think it should be 144 as in AR09.

Table 13.1 in Chapter 13 Table footer could clarify that “Doses to those most exposed to aqueous liquid discharges were very low in the range 0.000005-0.0002 μSv/y”

Table 13.2 in Chapter 13 Total dose from stage 1 given as 139 μSv/y which does not seem to be consistent with Table 13.1 or Table 6 in AR09

Table 13.2 in Chapter 13 doses from stage 2 do not seem to be consistent with Table 6 of AR09

Table 13.2 in Chapter 13 doses from aqueous discharges for stage 3 do not seem to be consistent with Table 7b of AR09

Table 13.2 in Chapter 13 is the dose from a short duration release due entirely to cloud beta and cloud gamma exposures because source term is only noble gases? There is no note of what the + under the short duration release refers to.

Table 13.3 It is noted that these doses are to the representative person and yet the doses given for Stage 3 are for different age groups (see Table 9 of AR09)

Para 418 doses to fetus are calculated but are not mentioned in note (c) of Table 13.1.

Para 428 refers to the Health Protection Agency but should now refer to Public Health England

Para 444 A stack height of 57 m is assumed for non-human biota and yet for humans a stack height of 20 m.

If human and non-human assessments are to be integrated they need to be consistent.

Para 445 What was the realistic stack height used 57 m or 20 m.

Para 458 Are the results from the independent assessment of short duration releases (Table 9c of AR09) consistent the Hitachi-GE assessment?

Para 461 It is not clear how probability that screening dose will be exceeded is calculated. Can this be done without using ERICA Tier 3?

Q14. Please tell us if you have any comments on our preliminary conclusions on radioactive substances permitting.

PHE agrees with the preliminary conclusions.

Q15. Please tell us if you have any comments on our preliminary conclusions on water abstraction.

PHE notes that potential public health implications relating to water abstraction were not considered in the submitted report.

Q16. Please tell us if you have any comments on our preliminary conclusions on discharges to surface waters and groundwater.

Section 4.2 of the Assessment report AR11 (12th December 2016) considers discharges to Surface Water.

PHE notes that that discharges to waters will be controlled by a permit issued under the provisions of the Environmental Permitting (England and Wales)

Regulations 2010 and the Environment Agency’s conclusions contained in paragraph 4.4 of the Assessment report AR11 (12th December 2016).

• the UK ABWR will have non-radioactive discharges to surface water and will require an environmental permit for a water discharge activity

• the UK ABWR is likely to be granted a permit for under The Environmental Permitting (England and Wales) Regulations 2010 for discharges to surface water.

However, any future operator will need to provide more detailed information on the volumes and composition of the various aqueous waste streams and demonstrate that the environmental impact from the discharges is acceptable

Having reviewed the submitted documentation PHE notes that there are number of uncertainties in the chemical composition of the various waste water streams.

However, in light of the EA conclusions PHE is satisfied that the GDA has not identified any significant risk to public health associated with the handling or disposal of waste water to surface waters. PHE would however request the ability to comment further at such time that an application for the environmental permit is made.

In terms of groundwater discharges PHE notes that there are no plans for any routine discharges to waste ground water and that an environmental permit is unlikely to be required. We note that Hitachi-GE is proposing to implement BAT for the control of accidental spills and releases but that the details of these schemes can only be provided as part of a site specific application.

We note the EA conclusions in paragraph 4.4 and on this basis have not identified any significant risks to public health as a result of discharges to ground water.

Q17. Please tell us if you have any comments on our preliminary conclusions on the operation of installations

PHE notes that the GDA that states that combustion plant will be present (in the form of emergency generators, fire protection pumps and diesel fired boilers).

We note that the UK ABWR combustion plant will be a Part A(1) installation and require an environmental permit from the Environment Agency. We also note the EA conclusion (paragraph 6.4) that in principle a permit should be able to be issued.

As the emissions from these installations will be controlled by the conditions of the aforementioned permit PHE does not wish to make any further comment at this time.

Q18. Please tell us if you have any comments on our preliminary conclusions on the control of major accident hazards.

PHE notes the conclusions re the COMAH stats of the site contained in paragraph 7.4 of the EA Assessment report - AR11 Other Environmental Regulations (12 December 2016).

• the UK ABWR will be a COMAH upper tier establishment during decommissioning due to the amount of hydrazine stored on-site

• the UK ABWR will not be a COMAH establishment during operations although the level of diesel oil stored on-site is only just below the lower tier threshold

• the generic site used for GDA is based on one reactor unit and the likelihood is that most operational sites will have 2 reactor units and will therefore be a lower tier COMAH establishment during the operational phase

• the pollution prevention measures to be implemented on the UK ABWR along with the high cooling water dilution levels means a MATTE is highly unlikely from an accident involving hydrazine

• a future operator should be able to demonstrate that all measures necessary to prevent major accidents and limit

PHE accepts with the conclusions reached by the EA and has no further comments to make at this time

Q19. Please tell us if you have any comments on our preliminary conclusions on the overall acceptability of the design.

PHE agrees with the Environment Agency preliminary conclusion that they could issue an interim statement of design acceptability for a generic site subject to no outstanding GDA issues. Detailed site-specific assessments of the potential impacts of discharges to the environment will be required at the permit application stage. PHE is a consultee to bespoke environmental permit applications and will provide further comment regarding all aspects of the impact of these discharges to environment on a case-by-case basis.

References

Environment Agency 2014	Generic Design Assessment of Nuclear Power Stations - Report on initial assessment of Hitachi-GE Nuclear Energy Ltd's UK Advanced Boiling Water Reactor. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/348173/LIT_10001_GDA_Initial_Assessment_UK_ABWR_full_report.pdf
Environment Agency, 2013	Environment Agency, 2013. Process and information document for generic assessment of candidate nuclear power plant designs (version 2). Bristol: Environment Agency. http://webarchive.nationalarchives.gov.uk/20151009003754/https://www.gov.uk/government/publications/assessment-of-candidate-nuclear-power-plant-designs

List of abbreviations

Abbreviation	Details
ABWR	Advance Boiling Water Reactor
AEMR	Aquatic Environment Monitoring reports
ALARA	As low as reasonably achievable
ALARP	As low as reasonably practicable
AOD	Above ordnance datum
BAT	Best available techniques
BEIS	Business Energy and Industrial Strategy
BNF	British Nuclear Fuels
BNFL	British Nuclear Fuels Ltd
BSSG	Berkeley Site Stakeholder Group
BWR	Boiling water reactor
CD	Consultation document
CEGB	Central Electricity Generating Board
COMAH	Control of Major Accident Hazards
DAC	Design Acceptance Confirmation
DECC	Department for Energy and Climate Change (now BEIS)
EA	Environment Agency
ECW	Emergency cooling water
ERICA	Environmental Risk from Ionising Contaminants: Assessment and Management
EU	European Union

Abbreviation	Details
FCP	Fuel Pool Circulation and Clean-up
FSA	Food Standards Agency
GD	Generic design
GDA	Generic design assessment
GDF	Geological disposal facility
GEP	Generic environmental permit
Gov	Government
HMSO	Her Majesty's Stationery Office
HOM	Hydrophobic organic matter
HPA	Health Protection Agency (now Public Health England)
IAEA	International Atomic Energy Agency
INES	International Nuclear Event Scale
IRAT	Initial Radiological Assessment Tool
IRSN	Institut de radioprotection et de sûreté nucléaire (France)
JPY	Japanese Yen (currency)
JST	Japan Standard Time
LOCA	Loss of cooling accident
MAFF	Ministry of agriculture fisheries and Food (now Defra)
MATTE	Major accident to the environment
MOX	Mixed oxide
MW	Mega watt

Abbreviation	Details
NFLA	Nuclear Free Local Authorities
NGO	Non-governmental organisation
NISA	Nuclear and Industrial Safety Agency (Japan)
NNB	Nuclear new build
NPS	Nuclear power station
NPTC	Nuclear power training Centre
NRC	Nuclear Regulatory Commission (US Regulator)
NRW	Natural Resources Wales
NWFRS	North Wales Fire and Rescue Service
OBT	Organically bound tritium
OEF	Operating efficiency factors
ONR	Office for Nuclear Regulation
PAWB	People Against Wylfa B
PHE	Public Health England
PWR	Pressurised Water Reactor
RIFE	Radioactivity In Food and Environment
RP	Requesting Party
RPG	Rocket propelled grenade
RSR	Radioactive substances regulation
SDF	Self-Defence Forces (Japan)
SFCP	Spent fuel cooling pond

Abbreviation	Details
SFP	Spent fuel pool
SoDA	Statement of Design Acceptability
SSG	Site stakeholder group
STAND	Severnside Together Against Nuclear Development
TEPCO	Tokyo Electric Power Company
UK	United Kingdom
UN	United Nations
UTC	Coordinated Universal Time

Appendix 1: Response from Nuclear Free Local Authorities

UK Nuclear Free Local Authorities

Consultation response to

Generic Design Assessment of Hitachi-GE's UK Advanced Boiling Waters Reactor (UK ABWR)

(Assessment report-AR05 Aqueous Waste. 12th Dec': 2016)

Submitted March 2017

'Author's name removed for EA publication'
Marine Radioactivity Research & Consultancy

Contents:

1: Spent Fuel Cooling Pond issues…….p: 3
1:4 Spent Fuel Cooling Ponds (Science Magazine)…….p: 4
1:5 Spent Fuel Cooling Ponds (Wikipedia)……..……..p: 5
1:6 Spent Fuel Cooling Ponds (World Nuclear Assoc')…….……..…p: 7

2: NFLA RESPONSE to Spent Fuel Cooling Pond Issues……..…… … ….....p:11

3: UK ABWRs and issues related to discharges of aqueous rad' waste to sea…… …...p:12
3:2 Incomplete ID of sources of aqueous rad' wastes (Leaks)……..…….p:12
3:3 NFLA response to "LEAK" issues……..……p:13

4: Incomplete ID of sources of aqueous rad' wastes (Washout/Fallout of atmospheric discharge)…….……p:14
4:10 NFLA response to fallout/washout issues…….…….……p:15

5: Failure to ID all "significant" radio-nuclides in liquid discharges…… …..…..p:16
5:3 Pu 241 discharges & inputs of the decay product Am 241……..……..…..p:16
5:9 NFLA response to the Pu 241 issue……...….p:17

6: Failure to ID all significant radio nuclides: the TRITIUM issue…….....p:18
6:3 Review of recent TRITIUM studies…….……..….p:18

9: NFLA response to the TRITIUM issue……..……..…..…….p:23

10: Incomplete listing of total constituents of UK ABWR liquid discharges……..…..…….p:24

10:4 NFLA response to incomplete listing of radio nuclide contents……..p:25

NFLA: WYLFA NEWYDD CONSULTATION: MARINE ISSUES

1:1 Issue 1:Spent fuel cooling ponds located right next to and above the reactors:

As was seen with the Fukushima BWRs, the initial marine environmental impact of reactor LOCAs was doubly multiplied by SFCP LOCAs

1:2 The UK ABWR Spent Fuel Cooling Ponds: In a number of reports issued by the IAEA, World Nuclear Association, various other nuclear industry bodies and a range of independent academics and environmental NGOs there is a broad consensus that Spent Fuel Cooling Pond (SFCP) integrity was severely compromised, at the Fukushima reactors, following the 2011 tsunami. It is reported that this occurred as a result of the failure of cooling water circulation and replenishment technology, and also as a result of physical, structural damage to the upper stories of reactor buildings where the BWR SFCPs were located (as they are in the case of the proposed UK ABWRs).

1:3 Although SFCP issues have been consistently overshadowed by the crisis attempts to restore cooling water to the damaged multiple reactors (1,2 & 3) and to control and mitigate the effects of the triple reactor fuel meltdowns, there is none the less sufficient evidence to justify a major concern about the safety and integrity of UK ABWR building design with SFCPs situated in an elevated position on the top floor of the reactor buildings and outside the major, primary containment systems.

The following 3 items summarise some of these concerns

1:4 Extract from “Science” Magazine

Spent Fuel Cooling Pond Near miss at Fukushima is a warning for U.S., panel says Japan’s chief cabinet secretary called it “the devil’s scenario.” Two weeks after the 11 March 2011 earthquake and tsunami devastated the Fukushima Daiichi Nuclear Power Plant, causing three nuclear reactors to melt down and release radioactive plumes, officials were bracing for even worse. They feared that spent fuel stored in the reactor halls would catch fire and send radioactive smoke across a much wider swath of eastern Japan, including Tokyo.

Thanks to a lucky break detailed in a report released today by the U.S. National Academies, Japan dodged that bullet. The near calamity “should serve as a wake-up call for the industry,” says Joseph Shepherd, a mechanical engineer at the California Institute of Technology in Pasadena who chaired the academy committee that produced the report. Spent fuel accumulating at U.S. nuclear reactor plants is also vulnerable, the report warns. A major spent fuel fire at a U.S. nuclear plant “could dwarf the horrific consequences of the Fukushima accident,” says Edwin Lyman, a physicist at the Union of Concerned Scientists, a nonprofit in Washington, D.C., who was not on the panel.

After spent fuel is removed from a reactor core, the fission products continue to decay radioactively, generating heat. Many nuclear plants, like Fukushima, store the fuel onsite at the bottom of deep pools for at least 5 years while it slowly cools. It is seriously vulnerable there, as the Fukushima accident demonstrated, and so the academy panel recommends that the U.S. Nuclear Regulatory Commission (NRC) and nuclear plant operators beef up systems for monitoring the pools and topping up water levels in case a facility is damaged. It also calls for more robust security measures after a disaster. “Disruptions create opportunities for malevolent acts,” Shepherd says.

At Fukushima, the earthquake and tsunami cut power to pumps that circulated coolant through the reactor cores and cooled water in the spent fuel pools. The pump failure led to the core meltdowns. In the pools, found in all six of Fukushima's reactor halls, radioactive decay gradually heated the water. Of preeminent concern were the pools in reactor Units 1 through 4: Those buildings had sustained heavy damage on 11 March and in subsequent days, when explosions occurred in Units 1, 3, and 4.

The "devil's scenario" nearly played out in Unit 4, where the reactor was shut down for maintenance. The entire reactor core—all 548 assemblies—was in the spent fuel pool, and was hotter than fuel in the other pools. When an explosion blew off Unit 4's roof on 15 March, plant operators assumed the cause was hydrogen—and they feared it had come from fuel in the pool that had been exposed to air. They could not confirm that, because the blast had destroyed instrumentation for monitoring the pool. (Tokyo Electric Power Company, the plant operator, later suggested that the hydrogen that had exploded had come not from exposed spent fuel but from the melted reactor core in the adjacent Unit 3.) But the possibility that the fuel had been exposed was plausible and alarming enough for then-NRC Chairman Gregory Jaczko on 16 March to urge more extensive evacuations than the Japanese government had advised—beyond a 20-kilometer radius from the plant.

Later that day, however, concerns abated after a helicopter overflight captured video of sunlight glinting off water in the spent fuel pool. In fact, the crisis was worsening: The pool's water was boiling away because of the hot fuel. As the level fell perilously close to the top of the fuel assemblies, something "fortuitous" happened, Shepherd says. As part of routine maintenance, workers had flooded Unit 4's reactor well, where the core normally sits. Separating the well and the spent fuel pool is a gate through which fuel assemblies are transferred. The gate allowed water from the reactor well to leak into the spent fuel pool, partially refilling it. Without that leakage, the academy panel's own modeling predicted that the tops of the fuel assemblies would have been exposed by early April; as the water continued to evaporate, the odds of the assemblies' zirconium cladding catching fire would have skyrocketed. Only good fortune and makeshift measures to pump or spray water into all the spent fuel pools averted that disaster, the academy panel notes.

At U.S. nuclear plants, spent fuel is equally vulnerable. It is for the most part densely packed in pools, heightening the fire risk if cooling systems were to fail. NRC has estimated that a major fire in a U.S. spent fuel pool would displace, on average, 3.4 million people from an area larger than New Jersey. "We're talking about trillion-dollar consequences," says panelist Frank von Hippel, a nuclear security expert at Princeton University.

Besides developing better systems for monitoring the pools, the panel recommends that NRC take another look at the benefits of moving spent fuel to other storage as quickly as possible. Spent fuel can be shifted to concrete containers called dry casks as soon as it cools sufficiently, and the academy panel recommends that NRC "assess the risks and potential benefits of expedited transfer." A wholesale transfer to dry casks at U.S. plants would cost roughly $4 billion.

(Science: May 20: 2016

http://www.sciencemag.org/news/2016/05/burning-reactor-fuel-could-have-worsened-fukushima-disaster)

1:5 Case Study: SFCP at Reactor 4 (from Wikipedia: heavily referenced):

Following a hydrogen explosion in reactor no 4 building (March 2011) the reactor building had been severely damaged and there was evidence that the twin SFCPs located on the top floor, at both sides of the top of the reactor, were loosing cooling water and or that the temperature of the coolant was rising, causing the risk of overheating of the stored fuel elements stored in the SFCPs.

At approximately 14:30 on 16 March 2011, TEPCO announced that the storage pool, located outside the Unit 4 containment area, might be boiling. Around 20:00 JST, it was then planned to use a police water cannon to spray water on Unit 4.

On 18 March 2011, it was reported that water sprayed into the spent fuel pool was disappearing faster than evaporation could explain, suggesting leakage. SDF military trucks sprayed water onto the building to try to replenish the pool on 20 March. On 22 March, the Australian military flew in robotic equipment for remote spraying and viewing of the pool.

The IAEA reported, “From 22 March to 25 March 130 to 150 tonnes of seawater were poured into the spent fuel pool each day using a pump equipped with a long articulated arm. Seawater was also poured in through spent fuel cooling system from 21:05 UTC 24 March to 01:20 25 March. White smoke was still being observed coming from the reactor building as of 23:00 UTC 25 March” On 29 March, the seawater was changed to fresh water.

Analysis of spent fuel pool water collected on 12 April suggests that while some of the 1535 fuel assemblies stored there may have been damaged, the majority of the stored fuel assemblies are intact based on measured radiation levels.

TEPCO further stated that “the fuel rods in the Unit 4 pool had released caesium-134 and −137 in the process of being damaged”, and that TEPCO would “need to continue monitoring it”. On 13 April, TEPCO reported that the temperature of the spent fuel pool had increased to 90 °C, and that the radiation level 6 meters above the pool had reached 84 mSv/h. The spike was later attributed to a failure to properly keep the SFP covered in water. As of 25 April, TEPCO was still pumping between 70 and 210 tons of water into the pool, varying the amounts depending on the temperature in the pool. TEPCO also reported that it was attempting to minimize the amount of water added to the pool for fear “the weight of the water could weaken the reactor building”. On 28 April, TEPCO announced it believed that water was not leaking from the pool but only evaporating. TEPCO based its belief on calculations that the heat generated by the spent fuel stored in the pool would be expected to evaporate 140 to 210 tons of water daily, in line with the amount of replacement water it adds. On 9 May 2011, TEPCO began work to install a supporting structure for the Unit 4 spent fuel pool, due to the concerns that explosions could have weakened the structure.

On 11 June, it was discovered that the water level in the spent fuel pool was only one third of normal, and only part of the fuel rods were covered with water. This was probably the cause of the high radiation levels measured. This pool has also been used to dump equipment. On Sunday 19 June, the pool was refilled, to minimize the radiation and making it possible to work again at this place. On 21 June, the first stage of strengthening at the second floor in the building under the pool was finished: 32 steel columns 8 meters long with a weight of 40 tons each were placed at the second floor. By 30 July, the concreting of the supporting columns was completed.

From 16 June, water injection to the spent fuel pool was switched from using the concrete pumping vehicle to an alternative water injection line.

On 31 July, the spent fuel pool was switched from the water-injection cooling system, to a circulatory cooling system.

On 31 January 2012, six litres of radioactive water (35,500 becquerels per litre) leaked from the spent fuel pool of reactor 4 onto the floor in the building from a broken pipe. The leakage was stopped after a valve was closed, and was thought to have been caused by the cold weather. The next day (1 February 2012), TEPCO released an even higher figure: 8500 liters were leaked after a pipe was dropped off after the water inside had turned into ice. The leakage appeared to have started at around 5 p.m. on 31 January 2012. This water was contaminated with radioactive isotopes, because it was mixed with water that was in contact with the fuel rods from the spent-fuel pool. TEPCO made plans to check whether there were similar cases in the other damaged reactor buildings.

In June 2012, TEPCO confirmed that reactor 4 building had indeed suffered severe damage during the 2011 hydrogen explosion. Holes were reported in the upper stories of the reactor building's external walls (described in diagrams of UK ABWR, as "secondary containment") and vertical walls in the upper stories were reported "out of the vertical".

On 30 June 2012 around 6:25 hours local time, an alarm went off, and the cooling system of the spent fuel pool halted. At that time, the temperature was 33.3 degrees Celsius; no leakage of radioactive contaminated water was reported. On 4 June, a similar situation caused the cooling to be halted. On 1 July shortly after 3 p.m. the cooling was resumed, the water temperature of the pool having risen to 42.9 °C. TEPCO had feared that the temperature could reach 65 °C, the upper limit designated in safety regulations. The cause of the troubles was laid in some parts of the emergency power system, and these were to be replaced.

On 18 March 2013 at 6:57 p.m., the cooling system for the spent fuel pools of the No. 1, 3 and 4 reactors stopped, after the electricity instantaneously went out at the plant's accident response centre. TEPCO suspects that the problem was situated in one makeshift power switchboard controlling the cooling system. The injection of water into the Nos. 1, 2 and 3 reactors was not affected. According to TEPCO, restoring the cooling system of the spent fuel pool of reactor No. 4 had the "highest priority", because the number of fuel assemblies stored in that tank was larger than in the pools of unit 1, 2 and 3. On 19 March at 10 a.m., the temperatures ranged between 15.9 C and 30.5 C, and it would take about four days until the temperature of the water inside the No. 4 spent fuel pool reaches the upper safety limit of 65 C. TEPCO was prepared to inject water into the pool whenever needed in case the water warmed up and started to evaporate.

On 19 March around 1:20 p.m., one of the two lines forming the cooling system of the No. 4 spent fuel pool was restored. Around 8 p.m. TEPCO was expecting to get the other line in operation. The cooling system of the No. 1 spent fuel pool was put back in action at 2:20 p.m. The power loss caused anxiety and questions among residents of the region. The news was communicated by the Nuclear Regulation Authority around three hours after the incident happened. On 22 March 2013, the evacuation zones were to be reclassified, and some residents would be allowed to make day trips to their homes. Some people thought that all was under control, and others with little children were afraid for yet another evacuation. Electricity went out simultaneously at nine facilities of the plant in total, a filter system to remove radioactive materials from cooling water for the reactors, and a cooling system for yet another pool were affected too. TEPCO admitted, that this was the first occasion that such a power failure happened at so critical facilities at the site since the plant was brought under control in December 2011. On 20 March before 1:00 a.m. all systems were online again. The cooling system of pool no. 4 was restored as last. TEPCO blamed a provisional power switchboard to be the cause of the troubles. According to TEPCO, this was the last remaining makeshift power switchboard at the plant, installed after the nuclear crisis. Criticism was there from the central and prefectural government, the late announcement three hours after the power loss had caused "significant anxiety" among local people. TEPCO promised that it would seek to communicate relevant information more quickly on issues that could stir public concern. During the investigation to find the cause of the power loss, a 6-inch rat was found electrocuted near a switch board. Further investigations were needed to find out whether this was the only cause.

It is widely reported that although cooling water backup systems were available for the reactors, the power loss proved that that was not the case for the spent fuel pools.

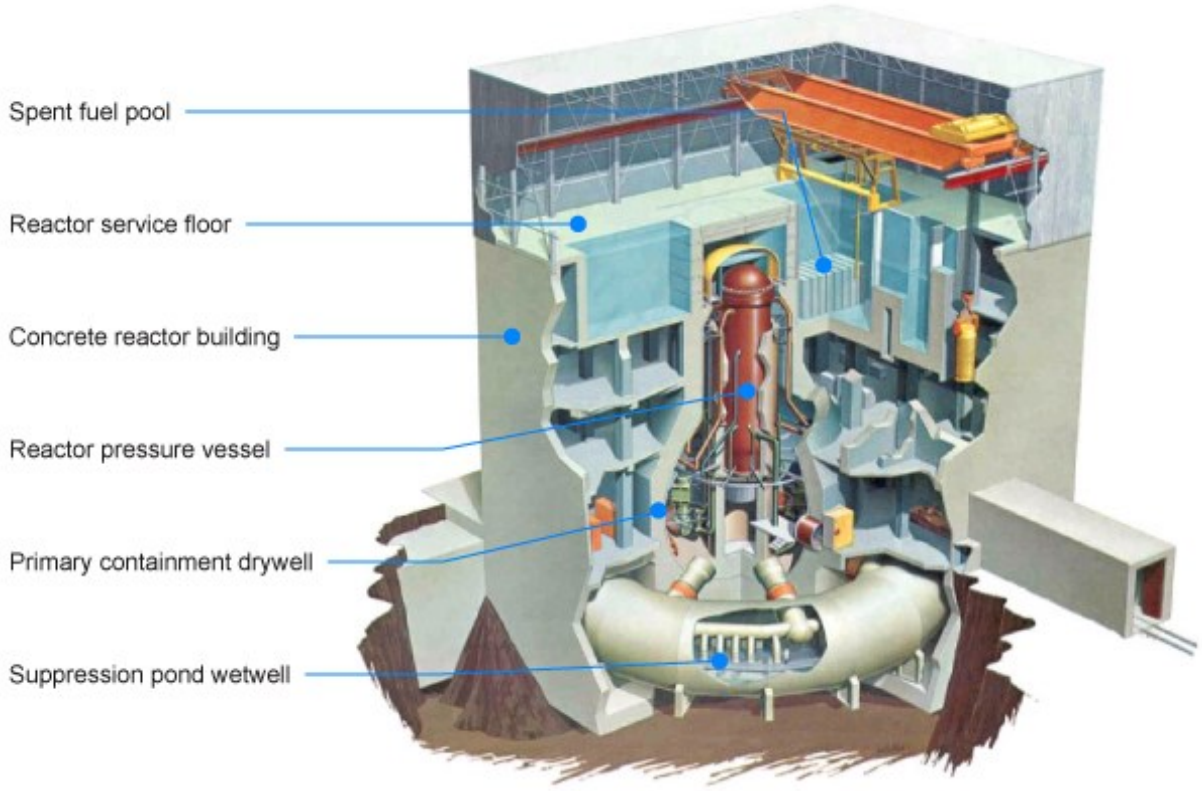
1:6 The World Nuclear Association reports as follows

Fukushima: Background on Fuel Ponds (Updated February 2016)

Used fuel needs to be cooled and shielded. This is initially by water, in ponds. After about three years under water, used fuel can be transferred to dry storage, with air ventilation simply by

convection. Used fuel generates heat, so the water is circulated by electric pumps through external heat exchangers, so that the heat is dumped and a low temperature maintained.

There are fuel ponds near the top of all six reactor buildings at the plant, adjacent to the top of each reactor so that the fuel can be unloaded under water, when the top is off the reactor pressure vessel and it is flooded. The ponds hold some fresh fuel and some used fuel, pending its transfer to the central used/spent fuel storage on site. (There is some dry storage on site to extend the plant's capacity.)



The intention was to ship used fuel from the plant periodically for recycling. Tepco and JAPC are building a Recyclable Fuel Storage Centre in Mutsu, due to operate from mid 2012 with 5000 t capacity. The JPY 100 billion facility will provide interim storage for up to 50 years before used fuel is reprocessed at Rokkasho. NISA approved this in August 2010. Until the Mutsu storage is finished and operational in 2012 there has been a build-up of used fuel at reactor sites. The Rokkasho plant has been much delayed, and is now expected in commercial operation in October 2012. There is some storage capacity there, though this may be full.

At the time of the accident, in addition to a large number of used fuel assemblies, unit 4's pond also held a full core load of 548 fuel assemblies while the reactor was undergoing maintenance, these having been removed at the end of November.

The temperature of these ponds is normally low, around 30°C when circulation is maintained with the Fuel Pool Circulation and Clean-up (FCP) system, but they are designed to be safe at about 85°C in the absence of pumped circulation (and presumably with moderate fuel load). They are about 12 metres deep, so the fuel is normally covered by 7 metres of water.

Unit 2, 3 & 4 ponds are about 12 x 10 metres, with 1240, 1220 and 1590 assemblies capacity respectively (unit 1 is about 12 x 7 m, 900 assemblies). Unit 4 pond contained a total 1331 used assemblies (783 plus full fuel load of 548), giving it a heat load of about 3 MW thermal, according to France's IRSN, which in that case could lead to 115 cubic metres of water boiling off per day, or about one tenth of its volume. Other estimates put the heat load at 2 MW. Unit 3's pool contains

514 fuel assemblies, unit 1 has 292 and unit 2 has 587, giving it a heat load of 1 MW. There is no MOX fuel in any of the ponds. Unit 4 pond also had 204 fresh fuel assemblies which were ready for loading. In 2012 some of these were removed and checked, and found to be undamaged. Unit 4 fuel pond was emptied by the end of 2014.

Two of the reactor unit ponds (2 & 4) were unusually full even before unit 4 core was unloaded in November, since there was little spare space (only for 465 assemblies) in the central fuel storage pond on site. Thus there was a lot more fuel in the reactor ponds with correspondingly high heat loads and cooling requirements than might have been the case.

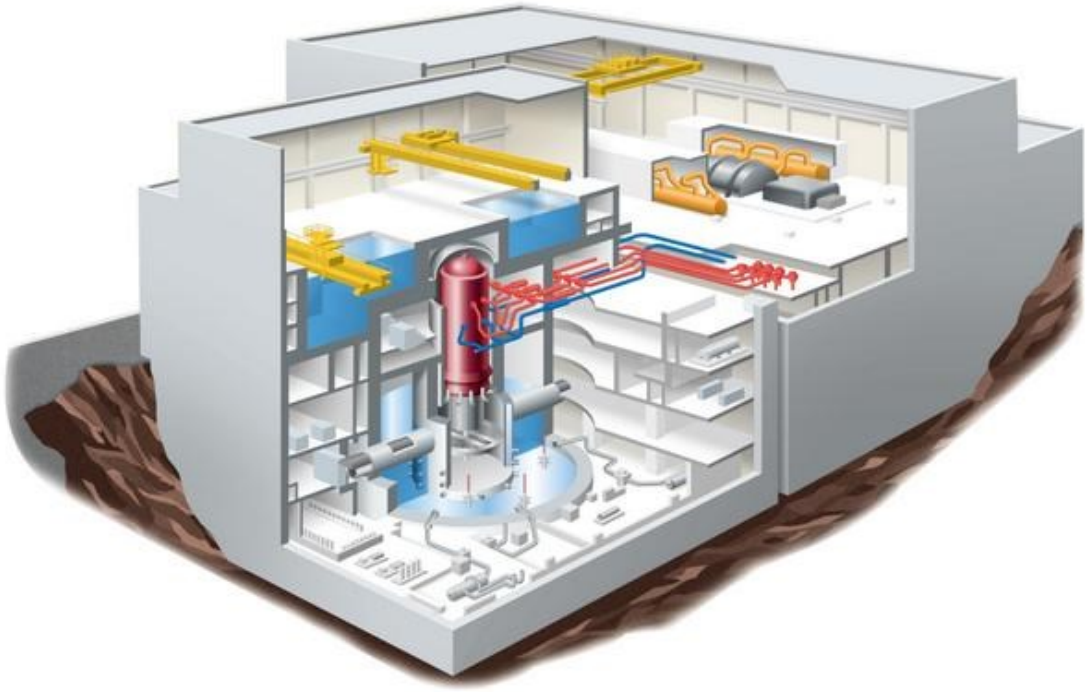
Moving the used fuel from reactor ponds to central storage involves loading it under water into casks which are lowered down and trucked the short distance (see RH side of cutaway diagram above). It requires access from the service floor and the use of cranes which were damaged in the hydrogen explosions.

The central fuel storage on site near unit 4 has a pond about 12 x 29 metres, 11 m deep, with capacity of 3828 m3 and able to hold 6840 fuel assemblies. In March 2011 it held 6375 assemblies, and was not damaged in the accident. Its building is about 55 x 73 m. Due to the fuel here being older, it has very low decay heat. As well as this pond, there are 408 used fuel assemblies in dry cask storage - utilized since 1995 for used fuel no longer needing much cooling.

A further concern raised during the accident was regarding criticality in the spent fuel ponds. Studies of safety and security of spent fuel storage have noted this possibility but not analysed it, pointing out that no previous criticality accidents have resulted in significant radioactive releases outside the plants, since the criticality itself immediately disperses the source material.

……..

1:7 The NFLA notes that the design siting of the SFCPs in the UK ABWR is currently proposed to be a replication of the Fukushima type BWR SFCPs



Hitachi GE diagram of proposed UK ABWR reactor showing the Spent Fuel Cooling Ponds, located above and to either side of the reactor, in the upper stories of the reactor building.

……..

1:8 N.B. Hitachi GE documentation reports that the reactor building is expected to be 45 metres high.

Some Hitachi GE documentation refers to the exterior concrete outer wall of the reactor building as “secondary containment”.

1:9 The Hitachi GE diagram of the UK ABWR and its associated SFCPs shows no apparent difference from the layout of the SFCPs at the Fukushima BWR. To date there is no evidence that significant major changes, structural or design based, have been made to the SFCP design and layout in the light of the Fukushima experience.

1:10 Accordingly, the NFLA believes that the design flaws leading to some of the reported Fukushima SFCP failure issues have been carried over to the UK ABWR : issues of particular concern are

a: the potential for structural failure in the event of a severe reactor accident: due to the highly elevated position of the UK ABWR SFCPs a severe reactor accident has the potential to damage both SFCPs and the “secondary containment”/exterior concrete wall (as indicated in the case of the Reactor 4 cooling ponds at Fukushima).

b: the potential for structural failure in the event of a terrorist attack aimed at the upper reaches of the reactor building where SFCPs are located, appears highly likely in the event of mortar, RPG or aerial attack

c: both types of incident (severe reactor accident and/or terrorist attack) carry a high potential to generate breaches not only of the “secondary containment” concrete exterior wall of the upper stories of the reactor building, but also to the “primary containment” concrete walls of the elevated SFCPs themselves.

d: such breaches are consensually agreed to carry with them varying degrees of potential for criticality of SFCP used fuels, though it must be noted that different commentators attribute different degrees of risk and potential magnitude of impact severity from such events

e: as the Fukushima events have clearly demonstrated, such breaches will inevitably require rapid, effective and medium to long term remedial action to maintain cooling water levels and ambient safe temperatures in damaged SFCPs.

f: such action will generate high levels of ECW (emergency cooling water) application to the damaged SFCPs over potentially long term time scales

g: breaches of SFCP containment carry with them a high potential for uncontrolled release of radioactive contamination : either as a result of the initiation of criticality due loss of temperature control/cooling water, and/or as a result of loss of, and subsequent “escape” of liquid coolant from the reactor building containment system.

……

2: NFLA response to Spent Fuel Cooling Pond issues

2:1 The NFLA therefore requests that the regulators and the GDA process undertake a further review and description of these and associated issues with specific attention to

a: the potential for occurrence of breaches of SFCP containment in the event of terrorist activity or reactor accidents

b: processes/safeguards to reduce the risk of criticality and SFCP coolant loss in the event of SFCP breaches of containment

c: effectiveness of long term SFCP ECW supply and application in the event of a severe INES scale incident

d: strategies for the collection, containment, treatment, safe management and disposal of escaped primary SFCP coolant in the event of any such breach

e: strategies for the collection, containment, treatment, safe management and disposal of remedial ECW (under long term/high volume application scenarios)

f: clear and complete strategies for the total prevention of either "primary" SFCP coolant or ECW escaping from the "reactor island" and subsequently entering the terrestrial environment, freshwater environment or marine/tidal environment.

g: in the event of such a breach, strategies for the complete monitoring and analysis of ALL radio nuclides present in the primary SFCP coolant and in any ECW, thus enabling a complete assessment of potential dose impacts to regional human and wildlife populations.

h: in the context of the TEPCO statement that "the weight of the (ECW) water could weaken the reactor building" the ability of damaged SFCPs and the reactor building to carry the weight of large volumes of ECW under post event containment breach conditions.

……..

3: Aqueous discharge issues

The NFLA notes that the only ABWRs which have ever been "operational" are 1st generation ABWRs and that prior to their post Fukushima mothballing, their operating life was plagued with technical problems to such a degree that their overall operating efficiency was often less than 50%.

(to date no 2nd, 3rd or 4th Generation [i.e. Wylfa Newydd) have been constructed

3:1 ABWR Operating Efficiency Factors (OEF):

Reactor station	Start of Commercial Operation	OEF until 2011
Kashiwazaki Kariwa 6	07/11/96	72%
Kashiwazaki Kariwa 7	02/07/96	68.5%
Hamaoka	18/01/2005	46.7%
Shika	15/03/2006	47.1%

NB: Inexplicably, 2006 Hitachi PR material for the UK ABWR claims OEF of 90%+ “on the basis of “operating experience”. No supporting evidence was offered for this claim.

…….

3:2 The EA/NRW GDA consultation document makes the following statement

“Variability in quantity of aqueous discharges has been considered” and

“All sources of aqueous radioactive wastes have been id’d”.

In the context of this statement the NFLA notes that the GDA document under discussion contains no discussion of historical leaks or “accidental discharges” of liquid or gaseous radioactive wastes at UK and Japanese NPS of any type, and specifically none relevant to ABWR performance.

NFLA research, to date, has been unable to find any example of a NPS where absolutely no leak of gaseous or liquid radio active waste has occurred during the lifetime operation of such stations.

NFLA research to date has been unable to find any example of a NPS where absolutely no leak of gaseous or liquid radio active waste has occurred during any single year of operation.

3:3 The NFLA therefore requests that the EA/NRW GDA for UK ABWRs re-examines this issue in depth and provides:

a: a summary of the leakage/accidental discharge occurrence frequency of world wide NPS of all types and

b: a detailed analysis of the frequency of leaks and accidental discharges of both liquid and gaseous radioactive wastes from all UK NPS and all ABWRs that have been operational.

3:4 The NFLA requests that such analysis should address the following specific issues:

a: annual frequency of , and specific (per year) number of liquid and gaseous leaks at sites during their working life and through their subsequent decomm’ process

b: range of “magnitudes” of leaks (gaseous/liquid discharge volume and radioactivity aggregate of each leak)

3:5 The NFLA notes that over the 60 year proposed operating life span of the proposed UK ABWRs such leaks may represent highly significant additional and un-quantified aggregated radioactivity inputs into marine, coastal and tidal environments, via pathways of direct discharge to sea (liquid wastes) and fallout and washout (gaseous wastes).

3:6 The NFLA also notes that the majority of operating UK NPS have been granted additional lifetime operating extensions following the completion of their original proposed design life and notes that such an eventuality may have an additional significance in terms of the frequency and number of leaks and accidental discharges from UK ABWRs.

3:7 The NFLA requests that the GDA process comment on whether, or not, such lifetime extensions will be prohibited in the case of any future operating UK ABWR

3:8 NB: In February 1979, a single Hinkley Point NPS leak lasted for 6 months (January to June) and discharged an officially estimated 185 million Bqs (of mainly Cs 137) across the open, and publicly accessible, foreshore and into the sea during this incident. No additional detail was ever provided of the other radio nuclide constituents of the leak.

3:9 NB: In 1983 a leak/accidental discharge of radioactive liquid wastes to sea occurred through the Sellafield Reprocessor's sea discharge pipelines. This leak was not discovered by site operators but by Greenpeace campaigners working at sea. BNF and relevant government agencies were unable to provide precise details of the constituent radio nuclides or of the total/aggregated radioactivity yield of the discharge. It was widely stated that the leak approximated to roughly a years worth of authorised liquid discharges (multiple Terra Bqs).

……..

4: The EA/NRW GDA consultation document makes the following statement

"Variability in quantity of aqueous discharges has been considered" and

"All sources of aqueous radioactive wastes have been id'd".

4:1 The NFLA notes that the GDA paper under discussion makes no reference to the phenomenon of washout or fallout of radioactive wastes discharged via the proposed site "stacks" to the atmosphere. The NFLA notes that these discharges to atmosphere would be expected to consist of gases, steam and particulate material.

4:2 To date the NFLA has been unable to find any detailed discussion of the behaviour and fate of the totality of such radioactive discharges to the atmosphere. In particular there appears to be a major dearth of information relating to fall out and washout of the full range of radio nuclides listed for atmospheric discharge from proposed UK ABWRs.

4:3 A number of scientific papers have discussed the fallout/washout of atmospheric radioactive pollution discharged following major nuclear accidents such as Chernobyl and Fukushima. The evidence of such papers, and indeed the experience of affected populations at considerable distance from the point source, have amply demonstrated that fallout and washout from such relatively short duration, "single incident" events has made major contributions to increasing concentrations of ambient environmental radioactivity on terrestrial and marine/coastal/tidal environments at considerable distance from the point source.

4:4 The UK experience of the Chernobyl fallout/washout has been tolerably well recorded, especially in the context of Cs 137 inputs, by UK annual radiological monitoring programmes in the years following the Chernobyl event. The (then current) Aquatic Environment Monitoring reports (AEMRs) produced by MAFF from 1986 onwards are a case in point.

4:5 The relevant AEMRs make it quite plain that significant amounts of radioactive fallout (Cs 137) entered UK marine/coastal/tidal environments by a variety of pathways including direct "primary" fallout/washout to sea surfaces and "secondary" input via fluvial etc run off from land surfaces and fresh water courses contaminated by Chernobyl fallout and washout.

4:6 Contemporary AEMRs (1986 onwards) recorded rapidly rising and notably enhanced concentrations of Chernobyl derived radio nuclides in UK marine/coastal and tidal environments and biota.

4:7 The NFLA notes the proposed 60 years life span for UK ABWRs, and has already alluded to it in earlier paragraphs. The NFLA has also alluded to the possibility that UK ABWR reactors may yet be granted additional operational life span extensions to the proposed design life although normal operational atmospheric discharges.

4:8 The NFLA proposes that, although chronic atmospheric discharges from normally operating UK ABWRs will plainly not generate the elevated, short term, very high aggregated radioactivity loading of the atmosphere seen during the acute Chernobyl and Fukushima events, planned and un-planned releases to the atmosphere of the range of radioactive wastes proposed for discharge from normally operating UK ABWRs have the potential (over the proposed 60 years operating life span plus any possible “extension”) to make potentially significant, long term inputs of washed out and fallen out radioactivity to UK marine, coastal and tidal environments. Given the half lives of some of these radio nuclides, the long term implications of such phenomenon may have significance.

4:9 The NFLA notes that the current proposed sites for UK ABWRs (Severn estuary, and Wylfa Newydd) exhibit features likely to support relatively high levels of fallout and washout of atmospheric radioactive wastes: including “wet” prevailing winds, relatively higher rainfall than other parts of the UK and, in the case of Wylfa Newydd, mountainous topography.

4:10 The NFLA requests that the EA/NRW GDA process examine the issue of atmospheric radioactive waste discharges and fallout/washout in order to clarify the inevitable additional inputs to marine/coastal and tidal environments from fallout/washout.

4:11 The NFLA requests that, in the context of the above request, the EA/NRW GDA process investigates and reports on the following specific issues:

a: provide a detailed review of the available empirical scientific data on the fallout and washout of atmospheric radioactive waste discharges

b: such a review should report the available empirical data on the behaviour and fate of ALL forms (gas, steam, particulates) of atmospheric radioactive waste discharges under the range of environmental, meteorological and topographical conditions found at proposed UK ABWR sites

c: such a review should report the behaviour and fate of each individual radio nuclide constituent of proposed atmospheric radioactive waste discharges (normal operational performance) under the range of environmental, meteorological and topographical conditions found at proposed UK ABWR sites

d: such a review should report the available empirical evidence on the amount (aggregated radioactivity) of each constituent radio nuclide entering the UK marine/coastal and tidal environments as a result of fallout and washout mechanisms due to normal operational conditions.

e: in the case of an absence of such empirical data, the proposed review should attempt to model/calculate the above factors for UK ABWRs located at the proposed UK sites, while making

plain that this is a modelling, not empirical data, and while referencing and describing all empirical data inputs

f: as indicated in the previous chapter (above) such a review should also provide full data on the number, frequency, volume and aggregated radioactivity of the historical un-planned, accidental discharges of gaseous, steam and particulate radioactive wastes from historically and currently operating UK NPS

g: such a review should also provide detailed empirical data on the operational discharges of "atmospheric" radioactive wastes at Japanese ABWRs

h: such a review should also provide detailed empirical data on the accidental, un-planned discharges of gaseous, steam and particulate radioactive wastes discharged during the operational life of the Japanese ABWRs.

……

5: The EA/NRW GDA document under discussion states that with regard to aqueous radioactive wastes:

"Significant" radio nuclides have been identified and quantified in line with relevant guidance"

5:1 However, the NFLA is concerned that the "Relevant Guidance" uses an out-dated definition of "Significant" radio nuclides: (Euratom/2004/2) which does not reference the most recent scientific evidence on some specific radio nuclides discharged to sea from existing operational UK NPS, and proposed for discharge to sea, or likely to be a constituent of the liquid discharges to sea from the UK ABWR.

5:2 One example of such a radio nuclide is Plutonium (Pu) 241 and it's decay/daughter product Americium (Am) 241.

5:3 Issues arising from the decay production of Americium 241:

During the late 1980s it was realised that there was an issue of rising marine environmental concentrations of alpha emitting Americium 241 derived from the decay of Plutonium 241 which had been discharged to sea in unlimited and largely un-quantified quantities since the inauguration of discharges to sea.

5:4 It has been projected that, by the end of the 21st century, marine Americium 241 production from the decay of previously discharged Pu 241 will be delivering approximately 1,300 curies (48 TBq) per year into Irish Sea (and associated marine area) environments. (First report of the House of Commons Environment Committee. HMSO: London 1986)

5:5 The annual RIFE reports confirm, and make regular reference to, this issue (Am production by Pu 241 decay, in relation to marine sediments). However, neither the reactor manufacturers, new build developers nor the regulating agencies (via GDA) discuss the phenomenon in relation to the proposed ongoing discharge of Pu 241 (which generates decay production of Am 241), nor have they discussed the issue in relation to the direct discharge of un-quantified volumes of Am 241

5:6 In this context the NFLA draws attention to the wide consensus that

a: Americium 241 is a known alpha emitter and considered potentially at least as radio toxic as the Plutoniums (if not more so)

b: that Americium 241 has a very long half, is known to be environmentally persistent, mobile through marine environments in association with mobile sediments, to readily and effectively bio-accumulate through marine food webs, and to transfer from the sea to land with (under specific circumstances such as the formation of marine aerosols) major enrichment factors relative to ambient marine concentrations.

c: all the available evidence confirms that, like the other alpha/actinides, decay product Americium 241 will eventually appear in coastal and estuarine fine sediment deposits.

5:7 The NFLA concludes that, in the context of the information set out in the preceding paragraphs, there are significant issues relating to the discharge to sea of both Pu 241 and Am 241 from proposed nuclear new build which have not been examined during the GDA process.

5:8 Thus the potential environmental and subsequent public health impacts of the discharges of Pu 241 and Am 241 (in conjunction with the decay product Am 241 arisings) currently remain unknown and un-quantified in the context of Pu 241 discharges from proposed UK ABWRs.

5:9 The NFLA therefore requests that the EA/NRW GDA process undertake a review of the issue of Americium 241 production by decay of Pu 241 discharged from UK ABWRs and further requests that the GDA process provide details of, and review in depth, the following specific issues:

a: Will UK ABWRs discharge any Plutonium 241 and or any Americium 241, and if so, in what quantities:

b: Will the discharges, from UK ABWRs, of Pu 241 and Am 241 be at a constant rate or are there likely to be pulses or intermittent inputs of such radio-nuclides.

c: If such discharges are expected to be pulsed or intermittent what is the reason for such pulsed or intermittent discharges

d: What annual aggregated discharges of Pu 241 will be discharged to sea from each single UK ABWR per year.

e: On the basis of current understandings, what is the expected annual arising of Am 241 in UK waters (by decay) from proposed discharges of Pu 241 from a single UK ABWR

f: What is the expected lifetime (60 year) aggregated discharge of Pu 241 to sea from a single UK ABWR

g: On the basis of current understandings, what is the expected lifetime (60 year) arising of Am 241 in UK waters (by decay) from proposed discharges of Pu 241 from a single UK ABWR

h: What is the expected total lifetime (60 years) aggregated discharge to sea of Pu 241 from the totality of all of the proposed UK ABWRs.

i: On the basis of current understandings, what is the expected total lifetime, aggregated arising of Am 241 (by decay of sea discharged Pu 241) from the totality of all proposed UK ABWRs

……..

6: The EA/NRW GDA document under discussion states that with regard to aqueous radioactive wastes:

“Significant” radio nuclides have been identified and quantified in line with relevant guidance”

6:1 However, the NFLA is concerned that the “Relevant Guidance” uses an out-dated definition of “Significant” radio nuclides: (Euratom/2004/2) which does not reference the most recent scientific evidence on some specific radio nuclides discharged to sea from existing operational UK NPS, and proposed for discharge to sea, or likely to be a constituent of the liquid discharges to sea from the UK ABWR.

6:2 Another specific example of such a radio nuclide is Tritium (H3), discharged to sea as liquid radioactive waste, most specifically tritium discharged in the form of tritiated water and (post discharge) becoming organically bound and forming OBT after discharge into organically enriched marine/coastal/tidal environments. The NFLA notes that neither the Relevant Guidance, nor the GDA paper under consideration, makes reference to OBT.

Latest understanding of the Fate and Behaviour of tritium in marine environments.

6:3 Historical understanding of the significance of fate and behaviour of tritium

Historically there has been a wide consensus between the nuclear industry and the regulatory agencies that Tritium was of little radio biological significance, largely based on the their stated assumption that discharged tritium (as tritiated water) would naturally dissolve to infinity once in the marine environment and thus present no radio biological hazard. This attitude was typified by the following example:

6:4 In 1985, liquid Tritium discharges from the Hinkley A Station were increased following work to clean the coolant circuit. The 1985 discharge was 23 TBq, compared to previous years when the annual liquid discharge of Tritium from this station was less than 1 TBq per year.

(MAFF Aquatic Environment Monitoring reports (AEMRs) nos 12, 13, 14: Table 1)

6:5 Despite the observed 23 fold increase in tritium discharges in 1985, the regulatory authority stated that: “the increased discharges were of negligible radiological significance”

(MAFF AEMR: no 14, section 6:6: page 36))

6:7 However by 1999 this approach appears to have been under review, when a more precautionary position began to appear when reference was made to the “relatively high levels of organically bound tritium (OBT) in local fish and shellfish” from the Cardiff area of the Bristol Channel/Severn Estuary (max of 33,000 Bq/Kg in cod and 26,000Bq/Kg in mussel).

(RIFE Report no 5: pub’ 2000: section 8:2 and 11:2 and tables 8:2a and 8.2c: page 111)

6:8 It was also reported that additional sampling of tide washed pasture and wildfowl (Curlew, Pintail, Shelduck and “duck”) that feed in the Bristol Channel/Severn Estuary intertidal zone had found elevated levels of tritium in most samples with:

a: lowest wildfowl concentrations at 2,400 Bq/Kg

b: “the highest values found were in Shelduck at about 61,000Bq/Kg total tritium”

c: grass concentrations ranging from less than 3 Bq/kg to 2,000Bq/Kgd:

d: intertidal sediment concentrations ranging from 18Bq/Kg to 2,500Bq/Kg

6:9 While the ambient sea water concentrations of total tritium were reported to range from 9.2 Bq/Kg to 10Bq/Kg: thus representing an extremely high rate/level of biological accumulation of total tritium (assumed to be OBT + tritiated water)

6:10 In the context of these findings it was reported that research and further sampling were underway “to examine the mechanisms by which tritium becomes incorporated into biota in the marine environment”

(RIFE Report no 5: pub’ 2000: section 8:2 and 11:2 and tables 8:2a and 8.2c: page 111)

7: A follow on study of the behaviour of Tritium (3H) in the Severn Estuary and Bristol Channel (published in 2001) found that:

a: Tritium concentrations in sea water from the Atlantic approaches to the Bristol Channel is estimated to be less than 0.4 Bq/Kg.

b: Measured Tritium concentrations in sea surface water samples at the mouth of the Bristol Channel were lower than the detection level of 2 Bq/Kg.

c: Measured Tritium concentrations in seawater inside the Bristol Channel were at their highest (between 2 and 10 Bq/Kg) on the English side of the Bristol Channel in the vicinity of the Hinkley Nuclear Power Station outfalls.

d: Measured Tritium concentrations reached their Bristol Channel second highest concentrations (between 2 and 7Bq/Kg) in the vicinity of the Cardiff outfalls

e: In general, measured concentrations were at their most elevated (2 to 5Bq/Kg) in the eastern end of the sea area and at their least elevated to the west of the Hinkley discharge points.

(McCubbin.D et al: “Incorporation of Organic tritium (3h) by Marine Organisms and Sediment in the Severn estuary/Bristol Channel:UK. Marine Po0llution Bulletin. Vol 42. Issue 10. Oct’ 2001: pps 852-863)

7:2 The 2001 study also reported that marine organisms incorporate Tritium, via exposure to tritiated water, very rapidly and, within a range of a few minutes to a few hours and reach concentrations close to that of the tritiated sea water in which they are immersed or from which they are acquiring their food.

7:3 The NFLA believes that these are highly significant findings in the context of the information discussed in above. If there were to be discrete pulses or peaks (individually consisting of as much as 21% of annual discharge limit) of liquid tritium discharge, it follows that tritium concentrations in

marine organisms, with their very rapid incorporation rates, will be subject to similar time related peaks of concentrations of tritium.

7:4 From the information currently available it remains unclear whether the various assumptions for delivered doses of tritium have been based on steady state delivery of liquid tritium discharges to the Hinkley marine environment or whether they are based on the peaks and troughs of tritium discharges implied by NNB Genco's statements.

7:5 The 2001 study also found that:

a: tritium becomes incorporated into the organic matter of cells and becomes Organically Bound Tritium (OBT), but at a slower rate than above and typically reaches a concentration of about half that of the ambient tritiated seawater

b: Organisms which consume tritiated food accumulate OBT at a faster rate than those exposed only to tritiated water and may reach higher concentrations by bio-accumulation

c: environmental monitoring through out UK waters demonstrates that concentrations of 3H in seafood in the Bristol Channel/Severn Estuary sea area are significantly greater than in other UK marine areas

d: there was an observed disparity in the rate and degree of Tritium bioaccumulation between sediment, seaweed, benthic (seabed) organisms and fish; however this was provisionally attributed to different processes of Tritium uptake by different species

e: that bioaccumulation of tritium by benthic organisms and demersal fish occurs primarily via transfer up through a web of sediment dwelling microbes and meiofauna, which had been feeding on organic bound tritium. In this context it was observed that herbivorous species and pelagic fish had lower concentrations of tritium than carnivores and demersal (dwelling near the sea bed) fish

(McCubbin.D et al: "Incorporation of Organic tritium (3h) by Marine Organisms and Sediment in the Severn estuary/Bristol Channel: UK. Marine Po0llution Bulletin. Vol 42. Issue 10. Oct' 2001: pps 852-863)

7:6 More recent research on the fate and behaviour of tritium discharged to sea

A more recent study (published in 2009) has built upon the emerging understanding of the behaviour and fate of tritium in the marine environment illustrated above and reports that:

a: tritium's reactivity with organic materials and solids in the marine environment had previously been "assumed to be limited", and that

b: previously, the accumulation of tritium in organic rich sediment and the food chain of the Severn Estuary "including concentration factors in excess of 100,000 for demersal fish and shellfish, were ascribed to the existence of organically bound tritium (OBT) in local nuclear waste in the form of specific bio-chemicals, including carbohydrates, vitamins and amino-acids"

(Turner A. et al: "Distribution of tritium in estuarine waters: the role or organic matter": Journal of Environmental Radioactivity. Vol 100. Issue 10. October 2009. pps 890-895)

7:7 However, the 2009 research demonstrated that, contrary to this assumption, the research "found that its distribution appears to be influenced by its affinity for organic matter" and that "Significantly, a measurable fraction of sorbed tritium associates with proteinaceous material that is potentially available to sediment-feeding organisms."

7:8 It was also noted that the discharge of tritiated water from a nuclear establishment on the Tamar estuary resulted in the immediate dilution to activities of less than 10 Bq per Kg in ambient water, “whereas corresponding activities of about 300Bq/Kg (dry weight) in sediment” where observed.

7:9 In the context of the above effect (which has been noted in this and other, estuarine waters) it was reported that the research absorption and adsorption (sorption) experiments had demonstrated that “sediment organic matter is critical to the removal of tritium from the aqueous phase” and that the effect “was greater in seawater than in river water”

7:10 The 2009 study noted that “the most remarkable aspect of our investigation is the extent of associated tritium, with both dissolved HOM (hydrophobic organic matter) and fine estuarine particles”.

7:11 “Experimental results, suggest that the presence and nature of organic matter is critical to the fate of tritium in the aquatic environment, and that there is also potential for its interaction with and uptake by inorganic phases. Association of tritium with sediment organic matter was corroborated in our studies by its near complete (greater than 95%) digestion in untreated estuarine particles”

7:12 Noting that “these characteristics have not been reported previously”, the 2009 study concluded that:

“Clearly the view that tritium occurs exclusively as tritiated water and therefore dissolves to infinity should be considered cautiously. Further research into the concept and nature of tritium partitioning in natural waters is required, and the adoption of unit value (or sub-unit value) distribution coefficients and concentration factors that are currently recommended by the IAEA, but not supported by clearly defined measurements, may require reconsideration.”

((Turner A. et al: “Distribution of tritium in estuarine waters: the role or organic matter”: Journal of Environmental Radioactivity. Vol 100. Issue 10. October 2009. pps 890-895)

7:13 N.B. It is relevant to note that, as late as this 2009 study, academics were still commenting on the fact that there was a perception that radioactive wastes discharged to sea would dissolve “to infinity”.

8: Summary conclusions on Tritium:

Aqueous tritium discharged to sea rapidly mixes with surface water and behaves like any other water. Thus there are good technical grounds for assuming that it will transfer easily from the sea to the land in marine sea sprays and aerosol droplets.

8:1 A search of ‘Science Direct’ has been unable to find any publications/references for the subject “Tritium in sea spray and marine aerosols”, this Submission therefore concludes that there is little, or no, published research on this subject.

8:2 There is a broad public consensus that there are no available techniques to remove tritium from reactor coolant and thus, to avoid the build up of tritium in the coolant, a portion of the coolant must be discharged to sea and replaced. (i.e. reactors cannot be safely operated without the discharge of tritium)

8:3 UK GDA processes repeatedly state that discharge strategies are normally decided by the site operator and that they will identify the preferred management strategy regime before the start of operational management of the plant.

8:4 If such a strategy is employed at UK ABWR sites this could lead to as much as 21% of annual discharge being discharged in 1 month, leading to major peaks and troughs of discharge across a 12 month period. It follows that tritium concentrations in marine organisms, with their very rapid tritium incorporation rates, will be subject to similar time related peaks of concentrations of tritium.

8:5 From the information currently available it remains unclear whether the various assumptions for delivered doses of tritium (via seafoods) have been based on steady state delivery of liquid tritium discharges to marine environments or whether they are based on the peaks and troughs of tritium discharges implied by some NPS manufacturers statements.

8:6 The previous hypothesis was that tritium would disperse and dilute to infinity after discharge into UK marine/coastal/tidal environments and hence that tritium discharges were of negligible significance.

NB This hypothesis is a re-iteration of the original hypothesis for the behaviour and fate of all radioactive wastes discharged to sea.

8:7 However, the evolving (post 2000) empirical research now demonstrates that, contrary to the previous view:

a: tritium does not disperse and dilute to infinity

b: tritium rapidly bonds with suspended organic/sedimentary particles in the receiving waters

c: tritium concentrations in fine sediment deposits are significantly elevated over those found in ambient seawater

d: tritium bio-availability is much greater than expected

e: uptake through organic/sedimentary particles to marine and estuarine food webs is demonstrated to be much higher than was expected, (tritium concentration factors in demersal fish and shellfish of up to 100,000)

8:9 As a result of these and other findings, independent and academic researchers have stated that:

a: existing IAEA recommendations are not supported by clearly defined measurements

b: the adoption of unit value (or sub-unit value) distribution coefficients and concentration factors currently recommended by the IAEA may require reconsideration

c: further research is required

8:10 It is highly relevant to note that the actual annual discharges, and annual limits for discharges, of Tritium from UK nuclear power stations had been markedly reduced, over the decade prior to nuclear new build applications, in response to the evolution of the understanding of tritium.

8:11 Thus, in 1999, the combined Hinkley A and B station Tritium actual discharge was 355.8TBq (RIFE 5). But by 2009 the combined Hinkley Point A&B station Tritium discharge was reduced to 105.232TBq (RIFE 15)

8:12 However the Regulating Agency has now concurred with the demand for a reversal of that recent policy and thus:

a: If the proposed new Hinkley and Oldbury reactors come on line, tritium discharge limits (for combined existing and new Bristol Channel NPSs) will rise by 50% from 653 TBq to 983 TBq per annum and

b: If the proposed new Hinkley and Oldbury reactors come on line the actual annual discharge of tritium (for combined existing and new Bristol Channel NPSs) will rise from 105.4 TBq to 314.6 TBq per annum (3 fold rise)

8:13 N.B. To date, the available empirical monitoring/sampling data (as presented in RIFE reports) on the concentrations of Tritium in seawater, sediments and biota appears to be restricted to relatively small areas adjacent to points of discharge.

8:14 However, although there remain some considerable data gaps concerning the near, mid and far field behaviour and fate of tritium in marine environments, the evidence presented in the preceding paragraphs offers a growing body of evidence to point to the environmental significance of Organically Bonded Tritium and it's potential for bioaccumulation and delivery of doses by both ingestion and inhalation to coastal human populations.

……..

9: The NFLA notes that, in the context of tritium discharges to sea from proposed UK ABWRs, there is a strong body of evidence to suggest that there are high concentrations of organic material in the Wylfa Newydd downstream marine and tidal environment.

9:1 In this context the NFLA requests that the EA/NRW GDA process examine the issue of the discharge of tritium (as tritiated water) to sea in the liquid radioactive waste streams of proposed UK ABWRs.

9:2 The NFLA requests that specific attention is paid to a review of the available data on the fate and behaviour of tritiated water (post discharge) and the subsequent formation of Organically Bonded Tritium.

9:3 The NFLA requests that the EA/NRW GDA process undertakes a specific and detailed analysis of the annual cycle of the organic content of receiving waters for the proposed liquid radioactive discharges from identified and proposed UK ABWR sites (Severn Estuary/Bristol Channel and Liverpool Bay/north-east Irish Sea)

9:4 The NFLA requests that, in the context of the scientific evidence discussed above, the EA/NRW GDA undertakes quantification of the expected Organic Bonding of tritium (as tritiated water) discharged from the proposed UK ABWRs, and summarise the rates of bio-accumulation of OBT in proposed UK ABWR discharges, downstream marine/coastal/tidal sediments and biota.

9:5 The NFLA requests that the EA/NRW GDA process provides a summary of the data (available to the GDA process) on expected doses, to the public, of sea to land transfer of both tritiated water and OBT via both inhalation pathways and ingestion (of terrestrial foods) across downstream coastlines.

9:6 The NFLA further requests (in the context that it is agreed that greater quantities of tritium are discharged to atmosphere than to the sea from proposed UK ABWRs), that the GDA process examine and provide a detailed report on the washout/fallout potential of atmospherically discharged tritium (from proposed UK ABWRs) and it's subsequent impact on tritium and OBT concentrations on marine/coastal/tidal environments associated with, and downstream of, proposed UK ABWRs.

……

10: Total constituents of UK ABWR liquid discharges

The GDA document under discussion states that, with regard to quantification and identification of the radiological content/constituents of radioactive aqueous wastes from proposed UK ABWRs, the discharge calculation is based upon Japanese reference methodology based on "assumed" release rates caused by fuel failures, decontamination factors and activity flow through at liquid waste treatment systems for 1st Generation ABWRs.

10:1 The NFLA notes that, semantically, it is plain that this means that such quantifications are NOT based on empirical data and that such calculations are heavily reliant on "modelled" and "assumed" assessments. The NFLA is concerned that there appears to be a lack of available empirical data on these parameters and that the input of inadequate data to such modelled assessments militates against the generation of suitably accurate information.

10:2 In support of this concern, the NFLA has noted the following data sets presented by Hitachi in relation to the UK ABWR liquid discharges of radioactive wastes to sea:

a: A Summary table for Liquid releases consists of 35 radio nuclides

b: An Assumed Annual Liquid Discharge Rate from ABWRs only consists of 24 radio nuclides

c: A Calculated Annual Liquid Discharge Rate of Wylfa Newydd ABWR only presents data for 10 radio nuclides: All others deemed "insignificant"

d: An Actual Measured Values for liquid discharges from Japanese ABWR which only references Tritium/H3

10:3 The NFLA is concerned that, in the context of the above “summary”, “assumed” and “calculated” liquid discharge release data and the fact that one table provides “actual measured values” on the liquid discharges of only one radio nuclide (Tritium/H3), there is

a: a major absence of empirical data on the liquid discharge performance of the predecessor/precursor ABWRs, and

b: that in such a context, the liquid discharge performance of the proposed UK ABWRs cannot be adequately and accurately assessed, and

c: that in the absence of such data the post discharge short, medium and long term environmental impacts (behaviour & fate in marine/coastal/tidal environments, transport/mobility potentials, environmental concentrations in seawater and sediments, biological accumulations in marine algae, sea foods, sea to land transfer mechanisms and concentrations cannot possibly be accurately calculated or assessed.

10:4 Noting the absence of empirical data on the totality of the radio nuclide constituents of proposed liquid rad’ waste streams from both precursor ABWRs and the proposed UK ABWRs: the NFLA requests that the EA/NRW GDA process examines and review this issue in depth and provides

a: the most recent, detailed available empirical information regarding the radio nuclide constituents of liquid discharge out-put of precursor ABWRs and also

b: specifically a full list of each and every radio nuclide expected to be found in liquid discharges of radioactive waste from the proposed UK ABWRs.

10:5 The NFLA requests that the GDA process further provide empirical data on both the annual, and lifetime, aggregated radioactivity discharge of each and every radio nuclide expected, and/or likely, to be discharged in liquid rad’ waste streams of the proposed UK ABWR

10:6 The NFLA specifically requests that the GDA process provides all the available detailed and empirical data on the aggregated annual and lifetime radioactivity of “total alpha”, all Plutonium isotopes, all Americium isotopes, all Curium isotopes and Tritium planned for discharge as constituents of the liquid rad’ waste stream discharges from both the precursor ABWRs and the proposed UK ABWRs

10:7 The NFLA requests that, in the event that the GDA process cannot acquire and present the empirical data requested above (as it applies to both precursor ABWRs and the proposed UK ABWR) that the GDA process

a: explain how, in the absence of such empirical data, attempts to calculate environmental concentrations and potential doses to wildlife and humans, from each and every radio nuclide thus discharged, will be carried out

b: explain how, in the absence of such empirical data, any attempted modelling of environmental concentrations and potential doses to wildlife and humans can be verified PRIOR to the discharges occurring

……

Appendix 2: Poster included in the response from People Against Wylfa B

Natural Resources Wales (NRW) is preparing to give green light on acceptability of pollution and wastes from a new nuclear reactor design:

the UK Advanced Boiling Water Reactor (UK ABWR).

STOP THE NRW JUGGERNAUT FROM IMPOSING ON WALES ACCEPTABILITY OF THIS NEW NUCLEAR REACTOR DESIGN

What is the NRW "consultation"?

The NRW is "consulting" on approving a new reactor design. The NRW considers the new design reactor will produce acceptable levels of radioactive discharges and wastes, as long as it continues to operate as normally expected. The NRW also accepts the new design will expose the public and workers to acceptable doses of radiation during normal operation. The NRW is **not consulting** on radioactive discharges, wastes and radiation doses when a reactor suddenly starts behaving abnormally, or suffers serious accident.

"consultation" hype

The NRW is not asking whether the people of Wales accept any nuclear reactor design (however new fangled). All reactor designs discharge radioactivity into the environment, and manufacture significant nuclear wastes. The NRW has not a clue about what to do with even the existing highly radioactive wastes routinely churned out by operating nuclear reactors. How and where to finally dump nuclear wastes is the responsibility of the Welsh Government and the UK Government. The NRW is conveniently off the hook.

Seeking nuclear gold dust

Hitachi is a multinational corporation based in Japan. General Electric is multinational behemoth based in the USA. The two joined forces in 2007, hoping to gain from future prospects for nuclear power. With the order books empty, Hitachi-GE Nuclear Energy Ltd hope to use Wylfa Newydd for show casing the new reactor design to the rest of the world, in a chase for nuclear lucre. Hitachi, of course, acquired Horizon Nuclear Power in 2012 to oil the wheels, as it were. Hitachi plans to build two UK ABWRs at Wylfa. They will hand over the keys to Horizon Nuclear Power to operate and manage all incidents and any accidents. Horizon could also, in future, sell on reactor operation to some other entity. Horizon requires large subsidies from the UK Government to operate the reactors. The Government plans to dump the costs directly on consumers. And, Horizon requires further subsidies to make good shortfalls in the amount of capital required to build Wylfa Newydd. According to *The Times* (24 January 2017), Horizon continues to struggle to raise all the necessary capital without injections from taxpayers. Lobbying continues to butter up governments in UK and Japan.

Wylfa Newydd

The proposed two reactors at Wylfa Newydd would be the largest reactors in Welsh history. The twin reactors would create the greatest concentration of highly radioactive waste in Welsh history, anywhere in Wales. Wylfa Newydd will create a triple risk of nuclear accident. The two large nuclear reactors. And, the very large nuclear waste storage facilities at Wylfa. Plus, potentially the biggest modern threat to cohesiveness and survival of Welsh language culture, and significance of Welsh communities on Anglesey. Capping it all, nuclear waste risks persisting continuously for future 10,000 generations.

Responding to the NRW

Even the most modern reactor is the safest ever designed, until only the next nuclear accident. Before three Boiling Water Reactors at Fukushima simultaneously suffered nuclear fuel meltdown accidents, on 11th March 2011, Japanese reactors were widely regarded as safe. Even, as the best designed against the effects of large earthquakes. Hitachi built Boiling Water Reactors at Fukushima, under licence from General Electric. Plainly, it is not a question of IF but WHEN and WHERE the next reactor goes haywire. The NRW needs to refocus its resources and energies on core duties to enhance the sustainability of the environment in Wales, minus the complications of nuclear waste accumulation and disposal, and nuclear accidents.

NRW "consultation" ends 3 March 2017. Access consultation documents http://naturalresources.wales/about-us/consultations/our-own-consultations/assessing-new-

Mae Cyfoeth Naturiol Cymru (CNC) yn paratoi i roi'r golau gwyrdd ar dderbynioldeb llygredd a gwastraffau o gynllun adweithydd niwclear newydd:

Uwch Adweithydd Dŵr Berw y DU (UK ABWR).

ATALIWCH JYGARNOT CNC RHAG GORFODI DERBYNIOLDEB Y CYNLLUN ADWEITHYDD NEWYDD YMA AR GYMRU

Beth yw "ymgynghoriad" CNC?

Mae CNC yn "ymgynghori" ar gymeradwyo cynllun adweithydd newydd. Mae CNC yn ystyried y bydd y cynllun adweithydd newydd yn cynhyrchu lefelau derbyniol o ollyngidadau a gwastraffau ymbelydrol, cyhyd â'l fod yn gweithredu yn ôl y disgwyl arferol. Mae CNC hefyd yn derbyn y bydd y cynllun newydd yn peryglu'r cyhoedd a gweithwyr i ddognau derbyniol o ymbelydredd yn ystod gweithrediad arferol. **Nid** yw CNC **yn ymgynghori** ar ollyngiadau ymbelydrol, gwastraffau na dognau ymbelydredd pan ddechreua adweithydd ymddwyn yn abnormal yn sydyn, neu'n dioddef damwain ddifrifol.

Heip "ymgynghoriad"

Nid yw CNC yn gofyn a yw pobl Cymru yn derbyn unrhyw gynllun adweithydd niwclear (pa mor newydd bynnag). Mae pob cynllun adweithydd yn gollwng ymbelydredd i'r amgylchedd, ac yn cynhyrchu gwastraffau niwclear arwyddocaol. Nid oes gan CNC syniad beth i'w gwared â gwastraff niwclear, a damweiniau niwclear.

wneud gyda'r gwastraffau ymbelydrol iawn sy'n bodoli a gynhyrchir gan adweithyddion niwclear presennol. Mae sut a ble i ddympio gwastraffau niwclear yn gyfrifoldeb l Lywodraeth Cymru a Llywodraeth y DU. Yn gyfleus yn hyn o beth, mae CNC yn achub eu croen eu hunain.

Ceisio llwch aur niwclear

Mae Hitachi General Electric yn fehemoth rhyngwladol â'l gartref yn yr Unol Daleithiau. Ymunodd y ddau â'l gilydd yn 2007, yn y gobaith o ennill o ragolygon y dyfodol am ynni niwclear. Gyda'r llyfrau archeb yn wag, mae Hitachi-GE Nuclear Energy Ltd yn gobeithio defnyddio'r Wylfa Newydd i arddangos y cynllun adweithydd newydd i weddill y byd, mewn ras am ffortiwn niwclear. Prynodd Hitachi, wrth gwrs, Pwer Niwclear Horizon yn 2012 I roi olew ar yr olwynion, fel petai. Mae Hitachi yn cynllunio I godi dau UK ABWR yn y Wylfa. Byddant yn pasio'r agoriadau i Bwer Niwclear Horizon i weithredu a rheoli pob digwyddiad ac unrhyw ddamweiniau. Gallai Horizon hefyd, yn y dyfodol, werthu'r cwbl I endid arall. Mae angen cymorthdaliadau mawr ar Horizon oodi wrth Llywodraeth y DU i weithredu'r adweithyddion. Mae'r LLywodraeth yn bwrw'r costau yn uniongyrchol ar ddefnyddwyr. Ac, mae angen rhagor o gymorthdaliadau ar Horizon i wneud iawn am brinderau yn y cyfanswm cyfalaf sydd ei angen i adeiladu Wylfa Newydd. Yn ôl *The Times* (24 Ionawr 2017), mae Horizon yn dal i gael trafferth i godi'r holl gyfalaf angenrheidiol heb gyfraniadau gan drethdalwyr. Mae lobïo yn parhau er mwyn seboni llywodraethau yn y DU a Siapan.

Wylfa Newydd

Y ddau adweithydd a gynigir yn Wylfa Newydd fyddai'r rhai mwyaf erioed yn hanes Cymru. Byddai'r ddau adweithydd yn creu'r crynhoad mwyaf o wastraff ymbelydrol iawn yn hanes Cymru, unrhyw le yng Nghymru. Bydd Wylfa Newydd yn creu perygl triphlyg o ddamwain niwclear. Y ddau adweithydd niwclear mawr. A'r cyfleusterau storio gwastraff niwclear mawr yn y Wylfa. Ar ben hynny, y bygythiad modern mwyaf I gyfanrwydd a goroesiad yr iaith Gymraeg a'i diwylliant, ac arwyddocad cymunedau Cymraeg ar Ynys Môn. I goroni'r cyfan, peryglon gwastraff niwclear i'r 10,000 cenhedlaeth nesaf.

Ymateb I CNC

Yr adweithydd mwyaf modern yw'r un diogelaf a gynlluniwyd erioed, tan y ddamwain niwclear nesaf. Cyn I dri Adweithydd Dŵr Berw yn Fukushima ddioddef ymdoddiad tanwydd niwclear yr un pryd, ar 11 Mawrth 2011, ystyriwyd adweithyddion Siapaneaidd fel rhai diogel. Hyd yn oed fel y rhai gorau a gynlluniwyd yn erbyn effeithiau daeargrynfeydd mawr. Cododd Hitachi Adweithyddion Dŵr Berw yn Fukushima, dan drwydded gan General Electric. Yn amlwg, nid yw'n gwestiwn OS ond PRYD a BLE yr aiff yr adweithydd nesaf allan o reolaeth. Mae angen I CNC ailganolbwyntio'u adnoddau ac egni ar ddyletswyddau craidd i wella cynaliadwyedd yr amgylchedd yng Nghymru, heb gymhlethdodau crynhoi a chael

"ymgynghoriad" CNC yn dod I ben 3 Mawrth 2017. Gweler dogfennau ymgynghori http://naturalresources.wales/about-us/consultations/our-own-consultations/assessing-new-nuclear-power-station-designs/?lang=en

PAWB 02/2017

Appendix 3: Response from STAND Against Oldbury

STAND's response to the proposed Hitachi /GE's Generic Design for Wylfa and Oldbury.

We object to the design because the Generic Design does not incorporate inherent flood defenses.

We understand that the GD is not site specific, but in the case of Oldbury it is essential that the site conditions be taken into account before any design can be approved. Flood defense must not be an 'add on feature' but should be an integral and crucial part of the initial design. Our reasons are shown below.

Flooding to the Oldbury site is not just a possibility or even a probability but virtually inevitable within the lifetime of the proposed Nuclear Power Station and it's decommissioning at Oldbury.

1. The Government's Nirex Report in 2005

https://rwm.nda.gov.uk/publication/summary-note-for-corwm-on-impact-of-rising-sea-levels-on-coastal-sites-with-radioactive-waste-store-a-technical-note-2005/

states:

"The tidal range within the Severn Estuary is particularly large, primarily because of the funnel shape of the estuary and Bristol channel and their orientation with respect to the Atlantic ocean and the prevailing southwesterly winds. Mean High Water Spring Tides reach +7.5 m AOD at Sharpness just north of Berkeley. Both the power station sites are at about 10 m OAD and are protected by embankments. The whole of the area alongside the estuary between Oldbury and Berkeley is low lying at about 5-6 m AOD and is subject to tidal inundation; both sites are regarded as potential problem areas with regards to erosion. Regular inundation in historical times has resulted in a blanket cover of tidal flat deposits overlying the solid geology. Following the construction of sea defences in historical times, the land was drained and reclaimed for agriculture. As at Hinkley, the areas subject to inundation are characterized by loamy soils that are variously clay, silt or sand rich with a peaty surface and influenced by groundwaters at shallow depths. At both sites, the landscape within the coastal flats comprises a mosaic of fields, hedges, ditches, drainage channels and ponds.

At both sites sea defences are present, but they are more substantial at Oldbury, which is further down the estuary. At Berkeley, the shoreline is protected by an armoured rock surface, but there is much evidence of erosion of the tidal flats. Erosion of the tidal flats is also evident at Oldbury.

Projected Future Characteristics

Both Oldbury and Berkeley lie on land subject to inundation and both stations are threatened by erosion from the tidal River Severn. The embankment at Berkeley is armoured, but is under attack, whilst at Oldbury the extensive intertidal mudflats merge with cliffs cutting back into marine alluvium.

As discussed in the context of Hinkley Point, the Severn Estuary is experiencing marine transgression and stratigraphic 'roll-over', an overall process that can only accelerate as sea level rises into the future, placing increased pressure on the existing embankments and other defences.

As at Bradwell, the land on which the power stations have been built alongside the Severn Estuary has been artificially excluded from the natural system that would regulate the distribution and accretion of fine sediment in areas subject to inundation.

Flood protection of valuable sites along the Severn Estuary over the next 15 years should not be unaffordable given the existing infrastructure, but storm surges may be expected to inflict periodic damage with occasional overtopping and flooding of low-lying areas. On a 100 year timescale, some degree of managed retreat may prove to be inevitable."

Table A2, in the summary shows the risk to Oldbury and Berkeley as vulnerable to inundation by the year 2100. " Progressive marine transgression likely to claim the sites unless protected."

2. Since 2005 the evidence on Global Warming indicates an even greater risk of flooding due to rising sea levels in the Severn Estuary.

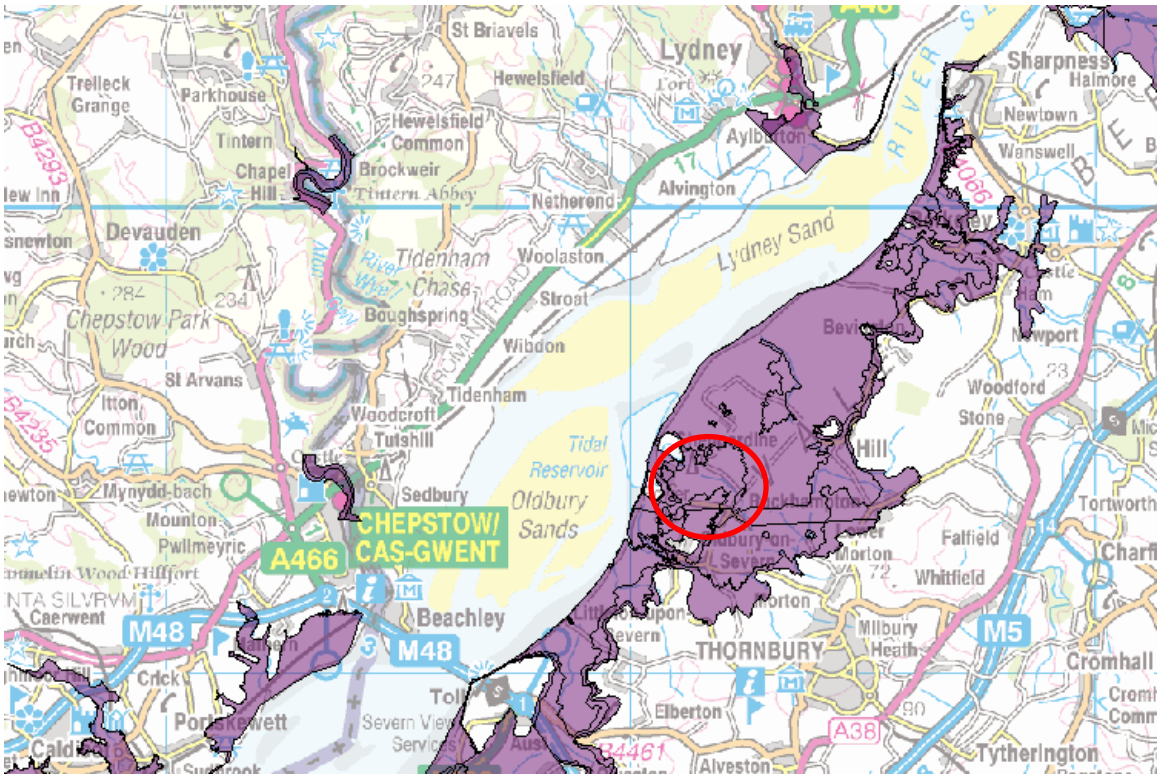
There are many scientific studies warning that the rate of sea level rise is currently underestimated, of which the following is just one:

https://www.theguardian.com/environment/2016/jan/26/sea-level-rise-from-ocean-warming-underestimated-scientists-say#img

Many Government departments have produced flood risk information for the area.

The environment agency:

For many areas at risk of flood, we warn residents when floods are likely to occur.
If you live within a shaded area on the map, then flood warnings are available to you



The red ring shows the area of the proposed Oldbury Nuclear Power Station

Source: http://www.environment-agency.gov.uk/homeandleisure/37835.aspx

Concern was raised by DECC in 2010:

“the highest recorded tidal ranges have been up to 15m”

“the majority of the nominated site is at risk from tidal flooding ….with a small proportion…at risk from tidal flooding with an annual probability of >5% in any one year”

“in this area there is a significant number of smaller watercourses…, which represent a flood risk…..this additional flood risk should be identified through more detailed assessment”

“there are potential cumulative effects with other proposed projects, including ….Hinkley”

From: Appraisal of Sustainability: Site Report for Oldbury, prepared by DECC 2010

3. On top of the rising sea level there is also a risk of increased water level due to storm surges and supertides.

Historically...

1483: 'a wonderful flood and inundation in the river Severn which did unspeakable spoil as old records in Bristol report.'

1606: The Great Flood.....Hundreds of people drowned as salt water to a depth of 2m swept across the land both sides of the estuary.

1687, 1703, 1770 :Great estuary floods are recorded but no detailed accounts.

1957: The Supertide [unusually high astronomical – ie predicted - tide]....The Citizen newspaper reported a 33'6" tide at Sharpness dock, which rose 5'4" at Gloucester flooding the Isle of Alney and washing over the carriageway at Minsterworth. Fortunately, the weather was fine, with high pressure and no storm surges, otherwise the flooding would have been catastrophic

1995: A low depression and strong winds led forecasts to predict a half metre surge on the tide. However, the wind swung westerly and jumped from force 3 to force 9 prior to the tide, forcing a revised prediction of a 1.3 metre surge. The A48 was closed and six thousand homes were without power for several hours. Fortunately this did not coincide with an astronomically high tide.

So - two near misses in the last 60 years. Can it be guaranteed that one day soon there will not be a storm surge coinciding with an astronomically high tide? Can we hope that 99.9% of the world’s scientists are wrong and that sea levels will not rise?

4. We understand that a planning application for an encasement plant at Berkeley has been refused because of inadequate flood defense planning. (Information from Gemma Coomes Communications Officer South West, MAGNOX)

5. When we wrote to Horizon with our concerns re flooding this is the only reply we had:
"At this early stage in the development of our proposals we have yet to carry out many of the studies which will allow us to develop proposals on how to defend the site against flood risk. This means that I cannot provide informed responses to your questions at this time.

"Please be assured that our proposals with regards to flood protection, along with other key aspects of our plans, will of course be scrutinized extremely thoroughly by the regulators. The Office for Nuclear Regulation continually reviews safety arrangements against world best practice,

applying knowledge from lessons learned from around the world both before and throughout the operational lifetime of a plant."

This does not reassure us.

6. It follows therefore, that as it cannot be guaranteed that there will not be inundation at the Oldbury site – that indeed, by the Government's own agency's admission, it is almost inevitable - any design for a new nuclear power station in the Severn estuary should have an inherent capacity to withstand flooding of the main reactor buildings to a depth of several meters for several days or weeks. Any other approach would be foolhardy and risk another Fukushima type disaster. If such a disaster occurred at Oldbury it would require the evacuation of the whole of Bristol and The Forest of Dean

Appendix 4: Response from Anglesey County Council

Asesiad o Ddyluniad Generig Adweithydd Dŵr Berwedig Lefel Uwch (ABWR) Hitachi-GE UK

Cyfeiriaf at yr uchod,

Fel Awdurdod, rydym yn ddiolchgar am y cyfle i ymateb i gam diweddaraf yr asesiad o'r dyluniad generig a gallaf gadarnhau bod Swyddogion yn bresennol yn y digwyddiad i gydranddeiliaid yng Nghemaes, Ynys Môn ar noson 30 Ionawr 2017.

Rydym yn deall yn llwyr bod yr ymgynghoriad hwn yn ceisio barn partïon â diddordeb a chydranddeiliaid ar faterion dylunio generig mewn perthynas â'r ABWR ac nid yw'n ymwneud â safle penodol yr orsaf niwclear newydd arfaethedig yn Wylfa.

Yn amlwg, nid rôl yr Awdurdod Lleol yw ailadrodd yr hyn a ddywedwyd gan y Rheoleiddwyr ac nid yw'n fwriad gennym i ddarparu ymatebion manwl i'r cwestiynau penodol ac unigol a godwyd fel rhan o'r ymgynghoriad. Serch hynny, rydym yn credu bod dyletswydd arnom, fel sefydliad sydd â'r prif nod o warchod yr Ynys, i fodloni ein hunain bod y broses a gynhaliwyd yn gadarn ac yn dryloyw.

Yn seiliedig ar y canfyddiadau hyd yma, mae'r Awdurdod yn deall bod yr asesiad rhagarweiniol yn dwyn sylw at 2 fater (yn unol â'r Adroddiad Atodol i'r ymgynghoriad) y bydd angen mynd i'r afael â hwy cyn y gellid ystyried Ddatganiad llawn ar Dderbynioldeb dyluniad ABWR ar gyfer y DU. Mae'r rhain yn ymwneud â datgomisiynu ABWR a bod Hitachi-GE yn gallu dangos bod ystyriaeth briodol wedi ei rhoi i agweddau amgylcheddol a diogelwch y dechnoleg, er mwyn sicrhau'r dyluniad gorau. Mae'n deall ymhellach bod 17 o ganfyddiadau'n ymwneud ag Asesiadau yn yr ymgynghoriad y bydd disgwyl i Hitachi-GE roi sylw iddynt yn y dyfodol ac ar yr adeg briodol i fynd i'r afael yn y dyfodol, ac ar yr adeg briodol yng nghylch bywyd yr orsaf.

Casgliad rhagarweiniol yr ymgynghoriad yw y gellid cyhoeddi Datganiad o Dderbynioldeb y Dyluniad yn amodol ar ddatrisiad rai faterion GDA a ganfyddiadau. Fodd bynnag, yn y cyfamser, y casgliadau rhagarweiniol yw y gellid cyhoeddi Datganiad Interim o Dderbynioldeb y Dyluniad ar gyfer ABWR yn y DU.

Mae'n anochel bod llawer o'r pynciau sydd wedi eu cynnwys yn yr ymgynghoriad yn dechnegol iawn ac yn hynod o gymhleth. Fodd bynnag, rydym wedi cael sicrwydd y bydd angen i Hitachi-GE fodloni'r Rheoleiddwyr yn y pen draw er mwyn sicrhau bod y cyhoedd, gweithwyr yn y safle ynghyd â'r amgylchedd yn cael eu gwarchod yn briodol cyn y gellir cyhoeddi Datganiad o Dderbynioldeb ar gyfer y Cynllun.

Dyma'r materion penodol y mae'r Awdurdod yn dymuno tynnu sylw atynt yn ei ymateb.

a) Er bod Cyngor Sir Ynys Môn wedi ymrwymo i ddatblygu "Ynys Ynni", bydd angen sicrwydd ar ein cymunedau y bydd y dechnoleg yn ddiogel ac y bydd mesurau diogelu ychwanegol yn cael eu defnyddio i wella'r dechnoleg flaenorol. Mae'r Awdurdod yn credu y gallai'r broses GDA, o ran y dogfennau ymgynghori, fod yn gliriach o ran y gwelliannau dylunio penodol sydd wedi cael eu hymgorffori yn ABWR y DU. Dylai hyn roi eglurder i bobl o ran y gwelliannau a sicrwydd na fydd Hitachi-GE, drwy'r Rheoleiddiwr, ond yn symud ymlaen gyda thechnoleg sydd o'r safon uchaf o ran diogelwch a dibynadwyedd.

b) Mae'r ddogfen ymgynghori yn awgrymu bod Iechyd Cyhoeddus Lloegr (HPA, 2009) wedi argymell bod llywodraeth y DU yn pennu cyfyngiad o 150µSv/y o ran y dôs i aelodau'r cyhoedd o orsafoedd ynni niwclear, sef union hanner y dôs a ddyfynnwyd fel y trothwy cyfredol yn y DU ar gyfer unrhyw ffynhonnell newydd (300µSv/y). Yn hyn o beth, byddai'n ddefnyddiol pe gellid egluro beth oedd y berthynas rhwng y ddau ddôs ac ai cynnig yn unig yw'r lefel is y sonnir amdani. Yn wir, mae'r Awdurdod yn nodi mai'r nod yw i'r dôs fod mor isel ag sy'n rhesymol gyraeddadwy (ALARA) a bod y dosau o ABWR yn y DU i fod rhwng 14 a 25µSv/y. Mae'r cyhoedd yn annhebygol o fod yn gyfarwydd gyda ffigurau o'r fath ac mae'r Awdurdod yn meddwl tybed a fyddai'n bosibl darparu cymhariaeth â ffynonellau nodweddiadol eraill o ymbelydredd ïoneiddio. Gorau oll petai hyn yn berthnasol i gyd-destun lleol er rydym yn gwerthfawrogi na all fod yn benodol i'r safle yn Ynys Môn.

c) Cyfeirir at system oddi ar y nwy a gollyngiadau trwy simnai uchel ar ben adeilad yr adweithydd. Er y gwneir cyfeiriad at simnai o'r fath yn Ffigwr 8.1 o'r ddogfen ymgynghori, nid yw Ffigwr 3.1 na'r llun ar glawr blaen y ddogfen ymgynghori yn awgrymu bod simnai'n rhan o'r cynllun. Mae'r Awdurdod yn gofyn i'r diffyg hwn gael ei gywiro ar gyfer unrhyw ymgynghoriadau yn y dyfodol. Byddai hyn o gymorth o safbwynt gweledol ac yn cadarnhau y bydd angen 'simnai' fel rhan o'r dechnoleg arfaethedig ar Ynys Môn ac y bydd yn rhan o'r ystyriaethau dylunio ar gyfer yr Awdurdod ble lleolir yr orsaf niwclear newydd yn Wylfa.

d) Mae'r Awdurdod yn nodi bod y DU-ABWR yn cynnwys nifer o fwyleri ategol a generaduron deisel brys a allai effeithio ar ansawdd yr aer yn lleol. Mae'r Awdurdod yn ymwybodol o drafodaethau gyda Horizon, y bydd nifer o'r cynlluniau arfaethedig ar gyfer Wylfa Newydd yn cael mewnbwn thermol llawer iawn mwy na'r lefelau a nodir ym mharagraff 546 y ddogfen ymgynghori GDA. Tra'n sylweddoli y gall dyluniad ar gyfer safle penodol fod yn wahanol i'r hyn a drafodwyd yn nogfennau'r GDA, mae'r Awdurdod

yn mawr obeithio y bydd manylion am unrhyw newidiadau i'r dyluniad sy'n digwydd ar yr un pryd â'r broses GDA yn cael eu bwydo yn ôl i'r Rheoleiddwyr perthnasol i'w hystyried cyn gynted ag sy'n bosibl.

d) Mae'r Awdurdod yn ymwybodol iawn o'r ffaith y bu arafwch o ran nodi a darparu safle cenedlaethol ar gyfer Gwaredu Gwastraff Daearegol (GDF). Mae hyn yn pryderu'r Awdurdod a chymunedau'r Ynys yn enwedig o ystyried y byddai disgwyl i'r safle, yn amodol ar gael y caniatâd perthnasol ac ar faterion ariannol, fod yn storfa tymor hir ar gyfer gwastraff ymbelydrol a gweddillion tanwydd yn Wylfa.

f) Mae'r Awdurdod yn cefnogi'r casgliadau ynghylch y prosesau ar gyfer nodi'r technegau gorau sydd ar gael (BAT) i ymdrin â gwastraff ymbelydrol a lleihau gollyngiadau er mwyn diogelu pobl, yr amgylchedd a rhywogaethau 'nad ydynt yn ddynol'.

Mae'r Awdurdod yn hyderu y bydd y materion uchod yn cael ystyriaeth ofalus a sylw dyledus fel rhan o'r ymgynghoriad ac os ydych angen unrhyw wybodaeth bellach, cysylltwch gyda mi ar unwaith os gwelwch yn dda.

Generic Design Assessment of Hitachi-GE's UK Advanced Boiled Water Reactor (ABWR).

With reference to the above,

As an Authority we are grateful for the opportunity to respond to the latest stage of the generic design assessment and I can confirm that Officers attended the stakeholder event at Cemaes, Anglesey on the evening of the 30th January 2017.

We fully understand that this consultation seeks the views of interested parties and stakeholders on generic design issues in relation to the ABWR and is not site specific to the proposed nuclear new build at Wylfa.

Clearly, it is not the role of the Local Authority to replicate that of the Regulators and it is not the intention to provide detailed responses to the specific and individual questions raised as part of the consultation. Nevertheless, we do believe that as an organisation with the primary aim of safeguarding the Island and the community's interests, there is an obligation on us to satisfy ourselves that the process undertaken is robust and transparent.

The Authority understand that based on finding at this stage, that the preliminary assessment highlights 2 Issues (as per the Addendum Report to the consultation) which will need to be addressed before a full Statement of Design Acceptability for the UK ABWR could be considered. These relate to the decommissioning of a ABWR and that Hitachi-GE demonstrate that appropriate consideration has been given to both environmental and safety aspects of the technology, in order to achieve an optimized design. It further understands that there are 17 Assessments findings in the consultation which Hitachi-GE are expected to address in the future, and at the appropriate stage in the life-cycle of the plant.

The preliminary conclusion according to the consultation is that subject to resolution of GDA Issues and assessments findings a Statement of Design Acceptability (SODA) could be issued. However, in the meantime the preliminary conclusions are that an Interim Statement of Design Acceptability (iSODA) could be issued for the UK ABWR.

It is inevitable that many of the topics areas covered within the consultation as very technical and extremely complex. We are however reassured that Hitachi-GE will ultimately need to satisfy the Nuclear Regulators in order that the public, workers at site as well as the environment can be properly protected before a Statement of Design Acceptability can ultimately be issued.

In terms of specific matters the Authority wish to highlight in its response.

a) Although the Isle of Anglesey County Council is committed to developing an "Energy Island", our local communities will require assurances that the technology will be safe and that additional safeguards will be employed by way of improvement to previous technology. The Authority believes that the GDA process in terms of the consultation documents could be clearer on what specific design improvements have been incorporated into the UK-ABWR design. This should provide clarity to people as regards what the improvements are and that Hitachi-GE, through the Regulator will only move forward and with a form of technology of the highest standard in terms of safety and reliance.

b) The consultation documentation suggests that Public Health England (HPA, 2009) have recommended that the UK government select a dose constraint limit value of 150μSv/y for members of the public from nuclear power stations, which is precisely half the value quoted as the current UK constraint for any new source (300μSv/y). In this respect it would be helpful if it could be explained what the relationship between both limits are and whether this lower level is merely a proposal. Indeed, the Authority notes that the aim is for the dose to be as low as reasonably achievable (ALARA) and estimated doses from the UK ABWR to be between 14 and 25μSv/y. The public are unlikely to be familiar with such figures and the Authority wonders whether it would be possible to provide a comparison with other typical sources of ionizing radiation. Preferably this should relate to a local context although we appreciate that it cannot be site specific in Anglesey terms.

c) Reference is made to an off-gas system and discharges via a high level stack on the top of the reactor building. Although reference is made to such a stack in Figure 8.1 of the consultation document, neither Figure 3.1 nor the drawing on the front cover of the consultation document suggest the presence of a stack. The Authority would request that this omission is rectified for any future consultations. This will assist in visual terms in that a 'stack' will be required as part of the proposed technology on Anglesey and it will feature as part of the design consideration for the Authority which will host a new nuclear power plant at Wylfa.

d) The Authority notes that the UK-ABWR incorporates a number of auxiliary boilers and emergency diesel generators which may affect local air quality. The Authority is aware from discussions with Horizon that several of the proposed plans for Wylfa Newydd have considerably larger thermal inputs than those specified in paragraph 546 of the GDA consultation document. Whilst we appreciate that site specific design may differ from that discussed in the GDA documentation, the Authority sincerely hope that where design changes are concurrent with the GDA process these are fed back to the relevant Regulators for consideration at the earliest possible stage.

e) The Authority is very much aware of the fact to date that there has been slow traction in terms of identifying and delivery of a site nationally for a Geological Disposal Facility (GDF). This is a concern to the Authority and the Island's communities particularly bearing in mind that subject, to the relevant consents and financial matters, it will be expected to host long term storage of radioactive waste and spent fuel at Wylfa for a considerably period of time.

f) The Authority supports the conclusions regarding the processes for identifying best available techniques (BAT) in order to deal with radioactive waste and minimizing discharges so as to safeguard people, the environment and 'non-human' species.

The Authority trust that the above matters will be given careful and due consideration as part of the consultation and that if you require any further information please do not hesitate to contact myself.

Natural Resources Wales Customer Care Centre 0300 065 3000 (Mon-Fri, 9am-5pm)

Our Customer Care Centre handles everything from general enquiries to more complex questions about registering for various permits and can provide information about the following topics:

- water and waste exemptions
- lower and upper tier carrier and broker registrations
- hazardous waste registrations
- fish net licences
- cockling licences
- water resources permit applications
- waste permit applications
- water quality permit applications
- permit applications for installations
- marine licence applications
- planning applications
- publications

Email

enquiries@naturalresourceswales.gov.uk

By post

Natural Resources Wales
c/o Customer Care Centre
Ty Cambria
29 Newport Rd
Cardiff
CF24 0TP

Incident Hotline 0800 80 70 60 (24 hour service)

You should use the Incident Hotline to report incidents such as pollution. You can see a full list of the incidents we deal with on our report it page.

Floodline 0345 988 1188 (24 hour service)

Contact Floodline for information about flooding.
Floodline Type Talk: 0345 602 6340 (for hard of hearing customers).

Would you like to find out more about us or about your environment?

Then call us on
03708 506 506 (Monday to Friday, 8am to 6pm)

email
enquiries@environment-agency.gov.uk

or visit our website
www.gov.uk/environment-agency

incident hotline 0800 807060 (24 hours)
floodline 0345 988 1188 (24 hours)

Find out about call charges: www.gov.uk/call-charges

Environment first: Are you viewing this on screen? Please consider the environment and only print if absolutely necessary. If you are reading a paper copy, please don't forget to reuse and recycle if possible.

LIT10656