BANNG
Blackwater Against New Nuclear Group

Comments on the UK HPR1000 reactor design and technology

Comments on Stage 2 of the GDA process from the Blackwater Against New Nuclear Group (BANNG)

BANNG Paper No. 38A

Preamble

The Blackwater Against New Nuclear Group (BANNG) was established ten years ago to oppose the development of new nuclear reactors at the Bradwell site. A substantial part of our work has been to make critical responses to consultations on a range of matters. Our responses are contained in the 37 BANNG papers on our website, Banng.info. Among the papers especially relevant this consultation on Stage 2 of the GDA are: paper 6 on GDA; papers 1, 2 and 33 on strategic siting; and papers 4, 9 and 34 on the National Policy statement for new nuclear power. BANNG has been over the territory covered by GDA on several occasions and, no doubt, will have further engagement with government, regulators and operators on these matters.

This response is presented in general and relatively simple terms. This is for three reasons. First, it is clear that the process is at a very early stage setting out principles, general design issues, methodology and process. Consequently, there is very little of substance on which to comment at this stage. Second, matters on which comments might be welcomed are not identified leaving respondents unclear as to what is expected of them. And, third, the 27 chapters that comprise the Part 2 submission are couched in inaccessible, technocratic language unlikely to inspire any but the most persistent or conscientious respondent.

We understand that the GDA is a long process and there will be many opportunities for comment. We anticipate engagement both with the regulators and the operators during the course of the next few years. Therefore, our comments at this point are intended to focus on our main concerns about the project and relate to specific chapters in the submission.

Chapter 3 Generic Site Characteristics

Relationship of generic to specific

Although the GDA is, by definition, generic, the design is to an extent constrained by generic siting characteristics. Moreover, the UK HPR1000 is, at present, destined for a specific site in the UK, namely the Bradwell site on the Essex coast. Therefore, it is anticipated that the generic siting characteristics will take this into account. At this stage it is indicated that the design is applicable to coastal sites for access to sea water for cooling. It is unclear whether the design might also be applicable to estuarial sites with shallow water and marine protection regimes.

The following comments on generic siting made in our response to the GDA for the AP1000 and the UK EPR (BANNG Paper No. 6, 2010) may also be applicable in this case:
"It is not sufficient simply to leave all the details to specific site evaluation. Generic principles that are developed without regard to some general site characteristics may be too unspecific. Conversely, attempts to make generic principles fit every specific eventuality would obviously destroy the concept of the GDA. It is important that the GDA ensures that generic design features are generally capable of being implemented at all sites.

For this reason the GDA offers the concept of a 'generic site' for which an assessment of the impact of radioactive discharges can be made. The generic site is defined by the regulators as follows: 'The characteristics of the generic site should be appropriate to sites in the UK where nuclear power stations might be built and will define the "envelope" of applicability of any statement of design acceptability that we might issue' (GDA, AP1000, p.108). The idea is to confine the development of generic principles within the constraints of what are 'realistic' siting options.

The two proposed designs under consideration have approached the generic site issue differently. Westinghouse have proposed a definition based on information from five coastal sites – Dungeness, Hartlepool, Heysham, Hinkley and Sizewell. From these they compile data on population, exposed groups, habitats, meteorology, terrestrial environment, coastal environment and non-human species to provide an indication of radiological impact.

The Areva EPR proposal for the generic site assumes a coastal site and includes data on population and exposed groups and habitats, non-human species, meteorology, terrestrial environment and coastal environment.

We note that, in both cases, the regulators consider the definitions 'are appropriate to use in its assessment of radiological impact at the GDA stage' (p.110). There are two issues of concern here.

1. *Exclusion of non-coastal sites.* One is that by confining the generic site to coastal locations all other types of location are excluded. This would exclude sites on large rivers such as Owston Ferry on the River Trent which was identified as a potentially suitable site for new nuclear in the Atkins study of

alternative sites (2009).

2. *Exclusion of Estuarial Locations.* By focusing on coastal sites, the generic site does not include estuarial sites where impacts may be more severe through cooling water discharge impacting on marine ecosystems. Impacts on the terrestrial environment are also likely to be different to those experienced in coastal locations. It is noted that the AP 1000 generic site is derived from five coastal sites and does not include either Bradwell or Oldbury, estuarial locations with quite different characteristics to coastal sites."

In our view the operator, in conjunction with the regulators, should conceive a generic site that encompasses impacts in non-coastal locations, including estuarial sites.

Risk of flooding from consequences of climate change

We consider that sites which are liable to be inundated within 200 years as a result of seal level rise, coastal processes and storm surges should be excluded from further consideration. Flooding of sites is not just a site-specific issue. Given that the GDA designs assume coastal locations and the nominated sites are almost all coastal or estuarial, the issue of flooding is relevant to all sites and, therefore, should be regarded as a generic issue.

Over the time-scales during which there is likely to be a nuclear presence, covering operational, decommissioning and waste management, the impacts of climate change will increase. Forecasts of coastal change reveal that, for example, parts of the Dengie peninsula on which Bradwell B is proposed will be permanently below sea level within the next century. The government considers that it is not practicable to consider the situation beyond 2100. In other words, assessments of safety and integrity of coastal sites cannot feasibly be made beyond the next century. Taking the Bradwell B example and assuming it starts generating in 2030 with an operational lifetime of 60 years followed by, perhaps, fifty years storage on site before a GDF is available it will be at least the middle of the next century before the site is fully decommissioned and cleaned up. Estimates of time-scale are, of course, uncertain but these are broadly in line with current government forecasts. And this is a highly optimistic picture. Decommissioning is likely to be a protracted exercise, a GDF may not be available for new build spent fuel and site deterioration may set in well before the site is cleared. It is highly probable there will be nuclear activity on floodable sites for up to two centuries. Indeed, this may be a conservative estimate.

We believe that the continuing viability of sites is a generic issue and, therefore, should be covered in the GDA. Any circumstances which threaten the integrity of nuclear operations or waste management on sites must be taken into account. Sites that are liable to inundation within the next 200 years must be ruled out. BANNG considers that the continuing integrity of sites is an issue that must be identified and taken into account in the GDA.

Chapter 23 Radioactive Waste Management and Fuel storage

It is difficult to comment in any detail on proposals for radioactive waste management since these are indicative outlining the general principles underlying a safe and secure management system. The system has not been designed though it will be based on the Fangchenggang plant.

It is not possible to comment at this stage on emissions to air and discharges to sea since this is a site specific issue and tidal flows, currents, depth of water and refresh rates will be significant factors.

It is understood that long-lived solid radioactive wastes (ILW) and spent fuel will be managed on site. It is assumed that wastes will be securely managed in interim stores and eventually disposed of in a geological repository. Again, details on volumes, methods, transfer, treatment and timing of waste management in stores are unavailable and are a matter for comment at Step 3. At that point a more detailed and robust explanation of proposed ILW storage will be required. As for spent fuel stores, an operational lifetime of 100 years is quoted, extending forty years beyond anticipated reactor shut down. In its NPS on Nuclear Energy (EN-6) the government concedes that wastes may be stored on site for a period of around 160 years (DECC, 2009, p.24). Location, capacity and design of the SPIS are unknown at this stage.
On government estimates, a repository if available, would not be ready to receive new build wastes until the national inventory of legacy wastes has been dealt with. It is questionable if the GDF will have sufficient capacity to deal with the unknowable inventory of new build spent fuel.

The GDA is predicated on the eventual development of a disposal facility. Although the government has stated that 'it is satisfied that effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations' this amounts to no more than a claim. It is highly unlikely that spent fuel will be cleared from the site within 100 years; therefore, provision will need to be made for transfer of some of the spent fuel to a replacement store or to another site.

There is, therefore, at this point no certainty that a repository will be available to receive the spent fuel and solid ILW or even that deep geological disposal will continue to be the favoured solution. It must be recognised that it is quite possible that wastes may remain on sites indefinitely, certainly longer than 160 years.

The GDA must recognise that prospective availability, capacity and time-scale of a GDF are incredibly vague at present. Consequently, proposals for managing long-lived ILW and spent fuel must assess the possibility of indefinite on-site storage or storage at another site. At Step 3 we would expect detailed, credible and robust plans for storage of wastes based on reasoned assumptions and convincing evidence.

Chapter 24 Decommissioning

Radioactive waste management is an integral part of decommissiong; therefore, the comments on the previous chapter are relevant here. Again, the plans and proposals are set out in such a general way that forbears any detailed comment at this stage. This applies to two issues in particular.

There is no assessment of the two options of immediate dismantling and safe enclosure followed by deferred dismantling. Clearly it is a question of resources and technology. We might presume a public preference for immediate dismantling and clean up though in practice the difference may not be great since, as indicated above, spent fuel and other waste stores and reactor cores will not be available for immediate dismantling. We suggest that the feasibility of both options is assessed in terms of cost, radioactivity, volumes and clean up.

There is no indication of time-scales beyond the vague statement that ‘Decommissioning should be carried out as soon as reasonably practicable, taking all relevant factors into account.’ The timing of the decommissioning should be rigorously justified. Should decommissioning need to be deferred, then this should be explicitly justified in the safety case and strategy as appropriate. Unless some idea of time-scale is given the statement is rendered practically meaningless. As already indicated the time-scales of activity on site are likely to be determined by the management of wastes in store and the (non)availability of a GDF.

The GDA must provide some indication of time-scales for decommissioning and an assessment of whether it is feasible and sustainable to undertake it in view of the generic site characteristics.

Chapter 26 Environment

At this stage we have no comments on the environmental impacts as these are clearly at a rudimentary level of analysis and can be dealt with during Step 3 or as part of the planning permit stage. We do, however, have comments on the cooling water system. It is assumed that the generic site is coastal and the preferred cooling system is a once-through circulating water system.

It appears that a site where cooling water may be abstracted from and discharged to the open sea is envisaged. This assumes a depth of water close to the power station sufficient to deliver the volumes of cooling water required. Tidal flats or shallow water extending for some distance out to sea would require pipelines some kilometres long. This might be difficult to achieve technically and economically and might increase maintenance, safety and security issues by extending the footprint of the power station far out to sea. Similarly, estuarial locations with shallow waters, risks to marine life and livelihood, including fishing, and slow refresh rates would appear to be ruled out as sources for cooling water. The alternative of cooling towers raises issues of feasibility and visual impact on low-lying coastal areas.

Supply of cooling water is clearly one of the major issues facing a GDA. The limitations and constraints must be clearly spelled out at this early stage. These are: water from the open sea must be accessible within a short distance from the plant; shallow water and estuarial intakes must be avoided; long distance transfer to access deep water must be ruled out; cooling towers must be avoided on low lying coastal sites. If any of these conditions applies when applied in a specific context, then the site must be removed from any further consideration.

Chapter 27 Security

We do not wish to comment on the security issues at this point but intend to do so when we have had the opportunity to consider the matter in more detail. We note that the chapter emphasises the congruence between the UK and China's security systems and requirements. Clearly, the security systems will have to satisfy the most stringent requirements.

There are understandable concerns among the public about the Chinese involvement in developing a UK HPR1000. These concerns are both commercial and political. It is important that reasons of commercial confidentiality and economic development do not compromise the ability of the UK's regulators effectively to scrutinise all aspects of the safety systems. At a more strategic level there are concerns about the involvement of the Chinese state (in the form of CGN) in highly sensitive UK infrastructure. It is axiomatic that control over security must be exercised by the UK and that the Chinese state will not be able to interfere with the operation of nuclear power stations in UK territory. Reassurance on these sensitive matters will be a necessary condition for public acceptability of the development of Chinese reactors in the UK.

Andrew Blowers, OBE, Chair,
On behalf of Blackwater Against New Nuclear Group
August 30 2018

References

BANNG (2010) Environment Agency Generic Design Assessment AP1000 Nuclear Power Plant Design by Westinghouse Electric Company LLC. UK EPR Nuclear Power Plant Design by Areva NP SAS Electricité de France SA . Consultation Document. Response by Blackwater Against New Nuclear Group (BANNG) Paper No.6, October