



**BANNNG**  
Blackwater Against New Nuclear Group



## **A MANIFESTO FOR BRADWELL**

**Paper produced by the Blackwater Against New Nuclear Group (BANNNG) for Prospective Parliamentary Candidates, General Election, 2015**

**BANNNG Paper No. 25**

### **1. BRIEFING NOTES, MARCH, 2015 – THREE AREAS OF CONCERN**

#### **Area 1 New Nuclear Build at Bradwell**

##### ***Background***

The Blackwater Against New Nuclear Group (BANNNG) has campaigned since 2008 against the possibility of new nuclear build and storage of high-level wastes at the site adjoining the former Bradwell nuclear power station. We have responded in depth and detail to Government and other consultations on, for example, siting and the National Policy Statements (NPSs) for Energy and Nuclear Energy (see especially BANNNG papers 1, 2, 4 and 9 which set out the reasons for objection, summarised below). (A list of the BANNNG consultation responses is attached as Appendix A.)

BANNNG has also raised public awareness through public meetings, demonstrations, media publicity and especially through its 10,000 signature face-to face petition opposing the new build proposal. We found that communities were overwhelmingly opposed.

We normally send all our consultation responses, Press Releases and other material to local MPs, councils and other stakeholders.

Bradwell was identified as one of eight sites ‘potentially suitable’ for new nuclear reactors in the National Policy Statement for Nuclear Energy which was laid before Parliament and confirmed by vote of MPs in 2011.

Bradwell has not been a high priority for development. The pecking order seems to be: Hinkley Point, Wylfa, Sizewell, Oldbury, Moorside. That leaves three sites, Bradwell, Hartlepool and Heysham without development proposals at present.

However, since the Prime Minister’s visit to China in 2014 when an Accord was agreed facilitating Chinese investment into British infrastructure, Bradwell has become the object of Chinese attention as a site on which they could develop their own reactors. At

present the Chinese are ready to support EDF in developing the Hinkley Point project which is having great difficulty getting off the ground.

It is difficult to gauge the prospects for investment in the Bradwell site. It may be that continuing delays in the development of the UK's new nuclear programme will hold up further interest. On the other hand, the apparent enthusiasm of both the Government and the Chinese for a development may bring Bradwell into the picture for early investment especially as delays are met with elsewhere.

We understand negotiations are taking place at a high level with a view to Chinese participation in UK nuclear projects.

**It is BANNG's view that the Bradwell project should be stopped before the land is transferred or a developer displays serious interest in development.** At present discussions appear to be going on at a high level concerning finance, land purchase, etc. We have been told by the Environment Agency that they expect the process towards new nuclear development to start in 2016.

We consider Bradwell to be a wholly unacceptable site for the reasons set out briefly below (and in more detail elsewhere). These concerns have also been expressed by Colchester Borough Council after review by their Strategic Overview and Scrutiny Panel and West Mersea Town Council, with both objecting to new build proposals.

#### ***Reasons why the Bradwell site is unacceptable for new nuclear development***

1. *Problem of land transfer.* We understand that state-owned Chinese nuclear developers are seeking to purchase the site from its owners, EDF. Under competition rules one of the conditions of purchase by EDF of British Energy was that EDF was obliged to sell the site to another operator if approval were given for EDF to build two reactors on its Sizewell site. It would be helpful to know if this condition still applies. It would also be helpful to know the stage which negotiations between EDF and the Chinese have reached.
2. *Potential Flooding of the Site.* There is concern about the potential flooding of the site as a result of coastal processes and sea-level rise under the impact of climate change. Bradwell is a ***very low lying site*** on a part of the English coast which ***is sinking under isostatic readjustment*** as well as experiencing ***sea-level rise***. A nuclear power station is likely to be operational for at least sixty years and the operational lifetime of nuclear energy at the site will be much longer if there is a sequence of deployments. Highly radioactive spent fuel and other active nuclear wastes will continue to be stored at the site for at least 50 years after the last power station shuts down. We are not persuaded that it is feasible to protect the site and maintain the stores safely and securely until well into the next century.
3. *Availability of Cooling Water.* ***The Blackwater is a shallow estuary with a slow refresh rate and it may prove impossible to extract the volumes of water required from the river alone.*** Certainly, if two or more reactors were to be developed on the site, it would be necessary either to draw water from the open sea outside of the Marine Conservation Zone (MCZ), which itself extends some

distance offshore, which would be likely to prove impracticable in terms of cost and technology, or to construct cooling towers whose height and mass would be unacceptable in terms of the amenity damage they would cause.

4. *Environmental and Ecological Damage to the Blackwater estuary.* New nuclear reactors at the Bradwell site ***are likely to impose intolerable environmental damage to the estuary and its surrounds.*** The Blackwater is subject to several national and international designations supporting conservation of environments and protection of species and habitats, including the recent designation of a ***Marine Conservation Zone***, explicitly for the protection of the ***unique Colchester native oyster.*** We do not believe that Imperative Reasons of Overriding National Interest (IROPI), as set out in the National Policy Statements, are so compelling that the environmental degradation that would ensue from new nuclear power stations at this site is justifiable. Furthermore, the kill of both fish and the spawn of fish and shell-fish that would be associated with any cooling water intakes would appear to be unacceptable within the MCZ and unable to be mitigated.
  
5. *Impact of reactor design and scale.* ***It should be noted that new nuclear reactors would have a far greater generating capacity than the former Magnox reactors.*** A single new reactor of contemporary design will have a capacity of up to 1.6GW compared to the 0.275GW of the former Bradwell station. It is likely that at least two reactors will be built providing a capacity of around 3.3GW. Consequently demands for cooling water and impacts on the marine environment from higher water temperatures and discharges into the estuary will be far greater. The impact of reactor buildings, spent fuel and other waste stores, cooling towers, high level pylons and transmission wires will be a dominating and disfiguring intrusion on a low profile landscape.
  
6. *Radioactive Waste Storage at Bradwell.* We are concerned about the intergenerational implications of new nuclear power and radioactive waste management at the Bradwell site. In a departure from the practice at the old power station, it is intended to store highly active spent fuel and other radioactive wastes arising from nuclear power generation on site and these wastes will remain long after the reactors have closed down. They will remain on the site well into the next century, perhaps indefinitely. Forecasts of potential sea-level rise have consistently been revised upwards and there is great uncertainty about the possible rise in sea levels during the next century and beyond. The impact of more frequent and higher storm surges, coastal erosion and other coastal processes consequent on climate change are likewise difficult to forecast. The inner and outer areas of the Blackwater estuary have featured significant erosion in recent years associated with both tidal flows and storm surges requiring protective measures such as the import of rocks to strengthen sea defences and foundations including those of the turbines at the nearby Gunfleet wind farm ***The long-term management of radioactive wastes is a key area of concern and the delays in developing a disposal concept and suitable site for a geological repository may result in wastes being stored for an indefinite period on a vulnerable and deteriorating site.***

7. *Problems of Emergency Planning at Bradwell.* In the event of a major incident involving the release of radioactivity from the site it will prove difficult to evacuate the nearby population. In particular Mersea Island, two miles across the estuary from the site with around 8,000 residents - swelling to double that number during the summer season - has only a single road access which can be flooded at high tide. Other settlements around the estuary have limited access. A catastrophic event at Bradwell, on the scale of Fukushima, might require evacuation of a large surrounding area which could include major settlements such as Colchester with over 100,000 population within fifteen miles of the site. ***Evacuation may be impossible in certain circumstances.***

Given its position on a shallow estuary on a highly vulnerable coastline, Bradwell faces quite specific constraints which must rule it out as a site potentially suitable for new nuclear reactors, not to mention its close proximity to London (60 miles).

***We believe that Bradwell should be removed from the list of potentially suitable sites for new nuclear power and the NPS for Nuclear Energy revised accordingly.***

#### **QUESTIONS AND ISSUES TO CONSIDER ON NEW NUCLEAR BUILD**

- **What are the constraints on the potential land transaction between EDF and a credible nuclear operator?**
- **What is the state of negotiations between EDF and potential Chinese developers of the Bradwell site? For example, the sale of the Bradwell site by EDF on (or before) obtaining permission at Sizewell was to be required to promote competition in the market for nuclear generated electricity. It appears this requirement would not be met by the development of the Bradwell site by Chinese interests given their participation with EDF in the Hinkley Point C and potentially other projects. Would Chinese investment in Bradwell, therefore, be precluded on the grounds that it would not satisfy the competition requirements?**
- **Oppose development of new build at Bradwell on specific grounds (environmental and ecological damage, unsuitability of shallow estuary, problems of flooding and coastal change).**
- **Raise issues with Secretary of State, consider putting down Parliamentary questions and other interventions.**
- **Call for delisting of the site as part of a review of the National Policy Statement (NPS) on Nuclear Energy.**

## Area 2 Discharges and emissions and their impacts on the Blackwater estuary

### *Background*

For the past two years the Blackwater Against New Nuclear Group (BANNG) has been seeking to prevent the discharge of radioactivity into the Blackwater estuary and emissions to the atmosphere from the dissolution of fuel element debris (FED) at the Bradwell site.

When the old Bradwell power station closed in 2002 a process of defueling began. The spent fuel assemblies, which are highly active, heat-generating nuclear waste, were removed from the reactor cores and sent to Sellafield for storage. But the magnesium alloy casings in which the fuel was held were stripped off and left on site as fuel element debris (FED), classified as intermediate-level radioactive waste (ILW). The problem was what to do with it.

The solution, developed for testing at Bradwell, in the hope that it could be used elsewhere, was to construct a dissolution plant which would use a nitric acid based process to dissolve the FED, thereby reducing its volume by a factor of 20. This could then be stored in containers and placed in a purpose built facility on the Bradwell site. The problem was that some 15% of the radioactivity contained in the FED had to be discharged in an aqueous stream into the estuary and emitted into the atmosphere.

(It should be noted that this is the first time that nitric acid dissolution has been used in this way. A similar process, using carbonic acid is used at Dungeness. This process takes 15 – 18 years to complete. The radioactivity produced is discharged into the open sea. At Bradwell, the process will take 15 – 18 months to complete and the radioactivity will be discharged into the shallow estuary.)

Although this had been planned for some years, there had been little effort made to make the public aware of the proposal. BANNG first took up the issue in response to a rather obscure consultation by the Nuclear Decommissioning Authority (NDA) on the options for dealing with FED. It appeared that, for Bradwell, there was only the one option: dissolution. In fact, it was specifically stated that the Bradwell dissolution plant did not form part of the consultation.

### *Cause for Concern*

BANNG was concerned about the threat to environment and human health from discharging radionuclides into a shallow estuary with a vulnerable marine ecology.

Moreover, **dissolution was unnecessary** since at some other sites the preferred option was to store FED, untreated, *in situ*. BANNG pressed its opposition to dissolution, first by responding to consultations (see BANNG Papers Nos. 21 and 24 on the website), then by an extensive correspondence with the top brass at Magnox (the site operators), the Nuclear Decommissioning Authority (the policy makers) and the Environment Agency (the regulators) calling on them to stop the process before it started. BANNG held a Public Meeting in June 2014 addressed by Tim Deere-Jones, an expert on radioactivity in marine environments. He told a packed meeting in the Mersea MICA

Centre that: information on what was being dumped in the river was sparse; the monitoring was inadequate; and the impacts from discharges were largely unknown.

BANNG held two meetings with the Environment Agency at which it was argued that monitoring coverage was inadequate. The Agency agreed to increase the number and variety of monitoring sites accepting some of our suggestions for siting the monitoring points.

### ***Stop the discharges***

BANNG has repeatedly requested that the discharges not proceed. Discharges into the river began in late June 2014.

However, no sooner had the discharges begun than they were suspended. It was not until the end of October that Andy Blowers, Chair of BANNG, happened, by chance, to discover that the discharging had stopped almost as soon as it began. Apparently there had been a 'planned outage' necessary to ensure the plant could reach its maximum throughput. Discharging recommenced in early March, 2015.

The mystery was how a planned outage could last for so long when the plan had been to continue the discharges for eighteen months until the end of 2015, at which point all operations at the Bradwell site would cease and the site would enter into its long-term 'Care and Maintenance' (C&M) phase.

Furthermore, why had no announcement been made to the public who were clearly extremely concerned about the risks to health and environment?

As a result of the problems encountered at Bradwell, it is not now intended to use the nitric acid dissolution process elsewhere. Other means of dealing with FED at other sites are being considered, for example packaging and storage, and this means that ***Bradwell, on the shallow Blackwater estuary, will be the only site where dissolution of FED with nitric acid takes place. BANNG has always maintained that the FED at Bradwell should be packaged and stored.***

BANNG believes firmly the dissolution project should have been abandoned rather than carried on in the face of so much disquiet.

It appears the reason for continuing with dissolution at Bradwell is economic – so much money has been sunk into the plant (we believe it is of the order of £100M) that it would be difficult for the company to retreat now. In addition the volume reduction achieved through dissolution enables Magnox to use spare capacity in its new ILW store to accommodate wastes from other sites, Dungeness and Sizewell.

This represents a change of policy from self-sufficiency to regional waste stores. It will require a change in the conditions attached to the planning permission if it is to be effected. In view of the radioactive risks involved through transport and increased storage at Bradwell, BANNG considers these transfers should not take place.

*BANNG believes the changes proposed for the use of the Bradwell site for radioactive waste management and storage should be subject to a full process of public and stakeholder consultation and engagement.*

#### **ISSUES TO CONSIDER ON DISCHARGES AND EMISSIONS AND THEIR IMPACTS ON THE BLACKWATER ESTUARY**

- **Support the call for the FED dissolution process to be abandoned.**
- **Urge the Environment Agency to implement its monitoring proposals and publish the results.**
- **Oppose the transfer of intermediate level wastes from other sites to the Bradwell store.**

### Area 3      Radioactive waste storage at Bradwell

There are three issues of concern here:

1. *Former Bradwell site.* It is intended to leave the graphite reactor cores (minus the spent fuel) in the recently clad reactor buildings until the end of the century. No-one knows what will happen to them thereafter. There are concerns about the potential deterioration of the site, buildings and cores and at the absence of any realistic plans for long-term management beyond 2100. It is intended that security will be provided from a remote hub.

BANNG is also concerned that the proposed transfer of ILW from other sites sets a precedent that will establish Bradwell as regional store.

**Issue** Develop robust, credible and publicly acceptable plans for the long-term management of the graphite cores at Bradwell. Oppose the use of Bradwell as a regional store and urge that Care and Maintenance proceed to schedule.

2. *Spent fuel store (new build).* In the event of new build, highly radioactive spent fuel would be stored on site until well into the next century. Given the potential deterioration of conditions at the site this poses risks of hazards for future generations. It also raises issues of safety and security.

**Issue** Oppose storage of spent fuel and other wastes at the Bradwell site.

3. *Geological Disposal Facility (GDF).* Following the refusal by Cumbria County Council to proceed with a process for finding a site for a GDF, the Government has begun a new process. As before, the search for a suitable site will be based on voluntarism and partnership. Essex may well be an area that has suitable geology and volunteers (councils, landowners, etc.) may be sought. In the 1980s, both Bradwell and Potton Island were identified as suitable sites for the development of a deep disposal facility by Nirex.

The issue is whether anywhere in the county (and Bradwell in particular) is suitable for a massive infrastructure project deep underground, the size of up to eleven Albert Halls, to take in the country's most dangerous radioactive wastes which are currently mainly at Sellafield.

#### **ISSUE TO CONSIDER ON RADIOACTIVE WASTE STORAGE AT BRADWELL**

- **To maintain a watching brief on proposals for a siting process for a GDF.**



## 2. A MANIFESTO FOR BRADWELL – THREE AREAS FOR ACTION

### Area 1 We urge you to oppose new nuclear build at Bradwell

*BANNG invites you to declare your opposition to Bradwell as a site for new nuclear power and to demand the site be removed from the list of potentially suitable sites and to make your opposition a key plank of your campaign for election.*

**Local communities are overwhelmingly opposed.** The Blackwater Against New Nuclear Group (BANNG) has campaigned against new nuclear build at the Bradwell site since 2008. We gathered 10,000 signatures face-to-face against the proposals, surely the largest such expression of opposition to the Government's new nuclear proposals. Opposition has constantly been expressed at the well-attended public meetings BANNG has organised.

**Remove Bradwell from the list of potential sites now.** Discussions with potential Chinese investors should be terminated before any land deals or plans are initiated. Government and regulators should inform investors of the environmental and technical constraints and community opposition that make Bradwell a wholly unsuitable site.

#### **Bradwell is unsuitable because**

- *It is low-lying, floodable and vulnerable to coastal processes, erosion and storm surges, deteriorating as sea levels rise through climate change.*
- *The estuary is too shallow and the tidal refresh rate too slow to prevent severe impacts of high volumes of cooling water on the marine environment, fish and oysters.*
- *Discharges into river and estuary from nuclear power stations will pose an intolerable threat to sensitive and protected environments including the newly designated Marine Conservation Zone.*
- *The scale of the nuclear complex – reactors, cooling towers, nuclear waste stores, transmission pylons – will have a dominating and destructive impact on the estuary and its surroundings.*
- *Storage of highly active spent fuel on the site until well into the next century, perhaps indefinitely, is unethical imposing an unfair and dangerous burden on generations to come.*
- *In the event of a major incident it will be impossible to evacuate the nearby population especially those with limited access to the mainland e.g. Mersea Island is cut off by high tides.*

## **Area 2          Save our Blackwater estuary – stop radioactive pollution**

***BANNG invites you to oppose the discharge of radioactivity into the Blackwater and to insist on more extensive monitoring of our river and the surrounding area. Please make your opposition a key plank in your campaign for election.***

Highly radioactive Fuel Element Debris (FED) from the metal casings surrounding spent fuel is being dissolved and stored at the Bradwell site. Around 15% of the radioactivity is released into the Blackwater estuary and atmosphere. The dissolution was stopped for technical reasons but has now been restarted.

The Blackwater Against New Nuclear Group (BANNG) opposes the discharge of radioactivity into the Blackwater and has called on the Environment Agency to increase its monitoring.

**Dissolution of radioactivity into the estuary must be opposed because:**

- ***it is inappropriate to discharge into a shallow estuary with a slow refresh rate;***
- ***monitoring of the discharges has been inadequate both in coverage and extent;***
- ***dissolution is unnecessary since a safer alternative, storage, exists;***
- ***the process of dissolution using nitric acid will NOT now be used at other sites leaving Bradwell as the ONLY site where discharges from FED using this process will take place;***
- ***it has proved to be an expensive experiment (c.£100M.) at the wrong location.***

**Area 3            Prevent Bradwell from becoming a regional waste store or a permanent dumping ground for the nation's dangerous nuclear wastes**

*The Blackwater Against New Nuclear Group (BANNG) invites you to declare your opposition to the potential development of Bradwell as a regional waste store or a national nuclear dump and to make your opposition key planks in your campaign for election.*

Bradwell is in danger of becoming a national dumping ground for dangerous nuclear wastes. There are proposals to import intermediate level wastes from Sizewell and Dungeness for storage at Bradwell. This would set a precedent for Bradwell to become at least a regional store.

If new nuclear reactors are built at Bradwell, highly radioactive spent fuel would be stored on site indefinitely in deteriorating conditions. The Government is looking for a suitable site for deep underground storage of all the nation's most dangerous nuclear wastes. Bradwell has been fingered before and could be again.

**The development of Bradwell as a regional or national store for highly active and dangerous nuclear wastes must be prevented by:**

- *opposing the transfer of intermediate level nuclear wastes from other sites making Bradwell a regional nuclear waste dump;*
- *opposing new nuclear build and the spent fuel stores that would remain on site into the far future;*
- *rejecting any proposals for developing a geological disposal facility to host the nation's most dangerous nuclear wastes.*

## Area 4      **Bradwell nuclear safety and security issues**

### *Population at Risk*

The site of the Bradwell Nuclear Power Station is located within an area of significant population. A safety-related evacuation on the Fukushima scale would involve a number of significant settlements (see map). Within a radius of 10km. (the radius of immediate, high-level emergency evacuation from the Fukushima site) lie Mersea Island with a population of 8,000, doubling during the summer months, and Tollesbury with a population of 3,000. Within a radius of 20km. (the radius of long-term, compulsory evacuation of all property surrounding Fukushima) lie a substantial part of Colchester (pop. 122,000+, predicted to be over 200,000 by 2018); Clacton (pop. 85,000+); Maldon (population 62,000+); Witham (population 25,000+). Including the rural areas, within 20km. of Bradwell there is a population in excess of 300,000 people. (See Appendix A) In practice, it might well prove impossible to evacuate the resident populations of West Mersea and Tollesbury. Worse, during summer months there are also thousands of people using temporary accommodation (caravans and tents) who would need to be evacuated as a priority.

The site of the Bradwell Nuclear Power station is also **less than 50 miles from the centre of London** . At the time of the Fukushima crisis, foreign companies were warning their ex-pat employees to prepare to leave Tokyo - Tokyo is some 150 miles away from Fukushima.

**On grounds of safety and security it would be best not to build new reactors at Bradwell since, in the event of an accident, the impact could be catastrophic**

### *Danger from Radioactive Releases*

Absolute safety is impossible for any nuclear power station (as, indeed, for any complex engineering installation). There are the possibilities of large scale radioactive releases whether caused by accident or deliberate intervention.

Malfunctions are ‘normal’ in such complex operations and it is often merely good luck that they usually do not prove to be catastrophic. Such intrinsic engineering risks are increased by the dangers created by the flood-prone location of the Bradwell site. These dangers are compounded by the abiding risks of human error, the chronic problem of malfunctions within the computer control system and the ever-growing threats from terrorism. Nuclear power stations are heavily guarded but they are not invulnerable as new techniques of penetration such as overflying drones reveal weaknesses in their defence.

Computer failure is another possible source of accident. New nuclear power stations are controlled, and their safety systems monitored, by computer systems. The **Stuxnet**, the hacking attack upon the Iranian uranium enrichment plant via a USB, demonstrated that computer-based systems are vulnerable **to unanticipated vulnerabilities**, which can be exploited to undermine their functioning in safety-critical ways. Worse, computer systems can be designed with vulnerabilities – especially ‘**back doors**’ which will permit damaging access by those who have designed and installed the system. A ‘hole’ could be inserted into the initial computer system coding, which would allow the later

insertion of malevolent instructions to convert the nuclear power station into a ‘dirty bomb’ with the widespread dispersal of radioactive material.

The significance of computer-based control systems is highlighted by the fact that the future monitoring of the decommissioned Bradwell power station is to be undertaken remotely, via the internet.

### ***Reliance upon foreign operators and investment***

The prospect of a future new nuclear power station at Bradwell being constructed, owned and operated by foreign private or state-owned companies also raises serious questions about future financial burdens for the UK electricity-consuming population and hazards for the future of energy security. Loading electricity generation subsidies on to domestic electricity bills already threatens a ‘death spiral’ for the centralised model of electricity generation and distribution, as electricity consumers turn towards self-generation and away from reliance upon the national grid. Highly subsidised prices for electricity from a new Bradwell nuclear power station will merely reinforce this looming ‘death spiral’.

Foreign control of a strategic part of the economy also raises questions of potential danger to national interest and security.

### **CRITICAL QUESTIONS AND ISSUES OF SAFETY AND SECURITY THUS ARISE WITH REGARD TO THE BRADWELL SITE:**

**In the case of a major emergency it might prove to be impossible to evacuate the most at-risk populations.**

**Bradwell is exposed to serious threats from flooding and coastal change. Its location at the heart of a populous area and in relative proximity to London also raises the stakes from human error, malfunctioning computer systems and/or terrorism.**

**Foreign involvement in a new nuclear power station at Bradwell raises serious issues of national security and safety.**

## Area 5      Bradwell – nuclear power and the risks to health

### *A Controversial Issue*

Intense controversy persists over the impact of nuclear power stations upon the health of local residents, particularly in locations like those around the Blackwater estuary. The official position –downplaying any significant ill-effects – clashes with findings of cancerous clusters near nuclear installations. For instance, the Black Report identified a cluster near Sellafield in 1984 (Ref.: Black Report (1984) *Investigation of the Possible Increased Incidence of Cancer in West Cumbria*, Report of the Independent Advisory Group, Chairman Sir Douglas Black, Department of Health and Social Security, London, HMSO). More recently, a study commissioned by the German Government has indicated cancer clusters around nuclear power stations (Ref.: Kaatsch, P., Spix, C., Schulze-Rath, R., Schmeidel, S. and Blettner, M. (2008) ‘Leukaemia in young children living in the vicinity of German nuclear power plants, *International Journal of Cancer*, Vol. 122, February, pp. 721-6).

In addition there are the anecdotal impressions of many of those living near nuclear installations. But, while the association between nuclear facilities and health effects can be identified, it does not necessarily indicate a causal relationship. There are many factors to take into account and insufficient evidence to draw definitive conclusions. The link between nuclear facilities and harmful effects cannot be proved but nor can it be denied.

**Absence of evidence is not evidence of absence. In such a controversial situation the Precautionary Principle should apply. In the absence of scientific consensus that an action is not harmful, it is prudent not to take that action. Applied to Bradwell this means that the possibility of harm caused by living close to a nuclear facility strongly indicates that a new nuclear power station should not be built on the Blackwater.**

### *Impacts of Low-Level Radiation*

The controversy turns on the effects of protracted ingestion of low-level radioactive materials. The official position takes the view that prolonged exposure to low-level radiation is not harmful and, in any case, the protective measures taken by the nuclear industry are regulated and adequate. This position asserts that biological damage can only result from short-term exposure to intense levels of radiation – from nuclear detonations or intense irradiation during medical procedures. Critics emphasise the potential damage to cellular health from the ingestion of lower-level radioactive materials over the longer-term. In addition critics also point to the ‘spikes’ in radioactive emissions and discharges that occur during routine operations resulting in elevated doses of radioactivity.

Much of the argument involves the handling of statistical material; ‘evidence’ for the ill-effects of low-level radioactivity inferred from aggregate health records (which were not collected and collated for this purpose). There is controversy about the way in which these data are handled, particularly over the identification of the ‘populations’ for which health data should be analysed. Each side claims that the other manipulates the selection and processing of the data to suit its position.

### ***Room for Doubt***

The official position downplaying any ill effects from nuclear installations is used repeatedly to override the Precautionary Principle regarding potential risks from nuclear power stations. It rests upon an *a priori* proposition, supported by a self-justifying argument; a ‘Catch 22’ that proceeds as follows:

the official presumption that it is only acute exposure to high levels of radioactivity, rather than gradual, low-level exposure, that can cause significant health damage;

many cancers have multiple, potential ‘causes’;

where, therefore, some spikes of cancer incidence have been revealed (Sellafield, Dounreay), the official presumption underpins the claim that these spikes must have been caused by some other potential causes than the operations of the nuclear installations;

the possibility that the nuclear installations could, in any way, have contributed to the cancer spikes is thus ruled out on *a priori* grounds (rather than any properly scientific, empirical/experimental grounds).

Apparent spikes in cancer rates near nuclear installations have attracted renewed interest recently but have continued to be deemed to be not of ‘statistical significance’ officially. The crucial point here is that such tests of statistical significance do not, in themselves, *prove (or disprove)* connections or causality; they only provide a measure of chance in any apparent correlation that reflects the number of cases in any study. Merely failing a test of statistical significance does not, therefore, prove that there is no practical association between any phenomena.

### ***Need for Answers***

The juggling of historical statistics will never resolve questions about the health effects of nuclear installations fully. A much more concerted approach to achieving scientific consensus about what is known and what needs to be known is needed. The call by NGOs for a process of joint fact finding should be heeded. A longitudinal study of one population would go a long way towards such a resolution, but does not seem to have been undertaken. The population of a small and relatively stable, water-side village like Tollesbury could provide an ideal case-study, allowing the health records of selected age cohorts compared with nation-wide norms. The Committee Examining Radiation Risks of Internal Emitters (CERRIE) recommended further, detailed investigation of cancer occurrence around the Blackwater estuary on the eve of its premature closure by the Energy Department in 2004.

In the longer (but not that much longer) time-scale, DNA profiling techniques may well allow the identification of the characters, and causal paths, of various forms of cancer. This might well allow the effects of radioactive material to be differentiated clearly from

other possible ‘causes’ of different kinds of cancer for any one victim (with associated compensation implications from one or other of a number of authorities).

**In the contemporary situation of doubt and uncertainty about the risks from living near nuclear power stations, the precautionary principle must prevail. On grounds of potential health impacts alone, a new nuclear power station should not be built at Bradwell.**

#### **QUESTIONS AND ISSUES TO CONSIDER THAT REMAIN UNRESOLVED IN THE CONTINUING CONTROVERSY OVER THE HEALTH RISKS FROM NUCLEAR INSTALLATIONS**

**The controversy over the health impacts of radiation from nuclear power stations indicates a need to improve knowledge and understanding. In particular we suggest the following steps should be taken:**

- 1. Ensure that the membership of the official Committee on the Medical Risks of Radiation in the Environment (COMARE) satisfactorily reflects the full range of scientific perspectives on the issue of low-level radiation and nuclear facilities.**
- 2. Undertake research programmes, including those based on joint fact-finding, that support a balanced approach to resolving areas of controversy and avoid a ‘prudential’ bias towards the official position.**
- 3. Reinstate a balanced membership group to undertake the investigation into breast cancer rates around the Blackwater that was prematurely terminated in 2004.**
- 4. Provide a full and convincing response on the implications for the UK of findings of significant childhood leukaemia clusters around German nuclear power plant – rather than repeated statistical juggling of the UK data.**
- 5. Support extensive and continuing monitoring for radioactive residues around the Blackwater to ensure comprehensive records at a range of environmentally sensitive locations are kept.**



## **Appendix A -**

### **LIST OF RESPONSES MADE BY THE BLACKWATER AGAINST NEW NUCLEAR GROUP (BANNG) TO GOVERNMENT AND OTHER CONSULTATIONS ON NUCLEAR ISSUES AND OTHER PAPERS**

BANNG (2008) Consultation on the Strategic Siting Assessment Process and Siting Criteria for New Nuclear Power Stations in the UK, Response on behalf of BANNG, November  
(BANNG Paper No.1)

BANNG (2009a) 'Have Your Say' Government Consultation on Nomination of Sites for New Nuclear Power Stations, Response to the Consultation by BANNG, May  
(BANNG Paper No.2)

BANNG (2009b) The Justification of Practices Involving Ionising Radiation Regulations 2004, Consultation on the Nuclear Industry Association's Application to Justify New Nuclear Power Stations, Response to the Consultation from Blackwater Against New Nuclear Group (BANNG), March  
(BANNG Paper No.3)

BANNG (2010a) Consultation on Draft National Policy Statements for Energy Infrastructure: Draft Overarching National Policy Statement for Energy (EN-1); Draft National Policy Statement for Nuclear Power Generation (EN-6) and Associated Documents, Response of the Blackwater Against New Nuclear Group (BANNG), February  
(BANNG Paper No.4)

BANNG (2010b) House of Commons Energy and Climate Change Committee, Inquiry into Energy National Policy Statements, Evidence on Behalf of the Blackwater Against New Nuclear Group (BANNG), February  
(BANNG Paper No.5)

BANNG (2010c) 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 EDF; Consultation Document, Response by Blackwater Against New Nuclear Group (BANNG), October  
(BANNG Paper No.6)

BANNG (2010d) The Justification of Practices Involving Ionising Radiation Regulations 2004. Consultation on the Secretary of State's Proposed Decisions as Justifying Authority on the Regulatory Justification of the New Nuclear Power Station Designs Currently Known as the AP1000 and the EPR, response to the Consultation by the Blackwater Against New Nuclear Group, February  
(BANNG Paper No.7)

BANNG (2010e) The Energy Act 2008, Consultation on the Financing of Nuclear Decommissioning and Waste Handling Regulations, Consultation on a Methodology to Determine a Fixed Unit Price for Waste Disposal and Updated Cost Estimates for Nuclear Decommissioning, Waste Management and Waste

Disposal, Response of the Blackwater Against New Nuclear Group (BANNG),  
June (BANNG Paper No.8)

BANNG (2011a) Planning for New Energy Infrastructure, Consultation on  
Revised Draft National Policy Statements for Energy Infrastructure, Response of  
the Blackwater Against New Nuclear Group (BANNG), January  
(BANNG Paper No.9)

BANNG (2011b) The Energy Act 2008, Consultation on Revised Funded  
Decommissioning Programme Guidance for New Nuclear Power Stations and  
Consultation on an Updated Waste Transfer Pricing Methodology for the Disposal  
of Higher Activity Waste from New Nuclear Power Stations, Response from the  
Blackwater Against New Nuclear Group (BANNG), March  
(BANNG Paper No.10)

BANNG (201c) Management of the UK's Plutonium Stocks, Consultation on the  
long-term management of the UK-owned Separated Civil Plutonium, Response  
from the Blackwater Against New Nuclear Group (BANNG), May  
(BANNG Paper No. 11)

BANNG (2011d) Japanese Earthquake and Tsunami: implications for the UK  
nuclear industry interim report by HM Inspector of Nuclear Installations May  
2011, Comment on Behalf of the Blackwater Against New Nuclear Group  
(BANNG), August (BANNG Paper No. 12)

BANNG (2011e) Managing Radioactive Waste Safely: desk-based identification  
and assessment of potential candidate sites for geological disposal, Public  
Consultation, Response of the Blackwater Against New Nuclear Group  
(BANNG), September (BANNG Paper No. 13)

BANNG (2012a) Essex County Council's Waste Disposal Document: Preferred  
Approach, Public Consultation, Response of the Blackwater Against New Nuclear  
Group (BANNG), January (BANNG Paper No. 14)

BANNG (2012b) Geological Disposal of Radioactive Waste In West Cumbria?  
Public Consultation, Response of the Blackwater Against New Nuclear Group  
(BANNG), March (BANNG Paper No. 15)

BANNG (2012c) Application for Development Consent by NNB Genco (EDF  
Energy) for Hinkley Point C Nuclear Generating Station and Associated  
Development, Written Representation on behalf of the Blackwater Against New  
Nuclear Group (BANNG), May (BANNG Paper No. 16)

BANNG (2012d) Paper presented to the DECC/NGO Nuclear Forum,  
'Radioactive Waste Management and New Build – Problems and Policies',  
October (BANNG Paper No. 17)

BANNG (2013) Sizewell C Proposed Nuclear Development Stage 1 Pre-  
Application Consultation, Initial Proposals and Options Consultation Documents,

Response of the Blackwater Against New Nuclear Group (BANNG), February  
(BANNG Paper No. 18)

BANNG (2013) Call for Evidence on Managing Radioactive Waste Safely –  
Review of the Siting Process for a Geological Disposal Facility, Response by the  
Blackwater Against New Nuclear Group (BANNG), June  
(BANNG Paper No. 19)

BANNG (2013) Optimising the Number and Location of Interim Intermediate  
Level Waste (ILW) Storage Facilities on Magnox Limited and EDF Energy Sites  
in England and Wales – Credible Options. Nuclear Decommissioning Authority,  
May, 2013. Response from the Blackwater Against New Nuclear Group  
(BANNG), June (BANNG Paper No. 20)

BANNG (2013) Optimising the Number and Location of FED Treatment  
(Dissolution) Facilities in Magnox Limited – Credible Options. Nuclear  
Decommissioning Authority, May, 2013. Response of the Blackwater Against  
New Nuclear Group (BANNG), June (BANNG Paper No. 21)

(There is no Paper No. 22)

BANNG (2013) Review of the Siting Process for a Geological Disposal Facility.  
Response from the Blackwater Against New Nuclear Group (BANNG),  
December (BANNG Paper No. 23)

BANNG (2014) Comment paper on the preferred option of the Nuclear  
Decommissioning Authority (NDA) for optimising the number and location of:  
Interim intermediate level waste (ILW) storage facilities on Magnox Limited and  
EDF Energy sites; and FED treatment (dissolution) facilities in Magnox Limited,  
Comments from the Blackwater Against New Nuclear Group (BANNG), January  
(BANNG Paper No. 24)

## Appendix B - Bradwell and Fukushima map

This map demonstrates the ranges of potential fall-out danger around the Bradwell nuclear power station site. **10 kilometers** was the radius of immediate, high emergency evacuation from the Fukushima site. **30 Kilometers** is the radius for long-term, compulsory evacuation of all property surrounding Fukushima. The levels of high-levels of actual fall-out would be determined by the winds at the time of any accident: primarily blowing from the West to South-West, but often during blowing from an Easterly direction during summer.

