

Response from Stop Hinkley to the Justification consultation

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www.stophinkley.org

The Justification of new nuclear reactors

Introduction

Stop Hinkley is a local campaign group committed to shutting down the existing reactors at Hinkley Point and preventing new ones being built. We began campaigning in the mid eighties when the prospect of a new reactor was on the cards. Our group took an active part in the 14 month Hinkley C inquiry with an office at the Cannington College site of the inquiry.

Since the subsequent decision by the Conservative Government not to go ahead with the power station on economic grounds we have continued to campaign against the continued operation of Hinkley A and B and Oldbury in nearby South Gloucestershire.

We have studied the health and engineering aspects of nuclear power in some detail and over a long period of time in order to reach our conclusions and to demonstrate our fears to the west-country community.

Hinkley A indeed closed well ahead of expectations following our vigorous campaigns on safety and health grounds in 2000. The Chief Executive of BNFL, Sir Norman Askew told me directly that their early closure decision had been entirely due to our campaign and their loss of public confidence.

One or other of the twin reactors at Oldbury station was shut for a period of five years during an extensive investigation into the severe corrosion of the graphite reactor cores at the plant which we highlighted.

We have also highlighted a similar core corrosion problem at Hinkley B power station together with significant boiler corrosion after a long period on non-inspection. We have been waiting for more than six months for minutes of meetings where decisions were taken not to fit a third safety system on the ageing reactor which we applied for under the Freedom of Information Act.

We believe that nuclear power is not safe and produces significant health effects in the nearby population. So in this submission we make our case against the building of two massive nuclear reactors next to the existing operating and decommissioned reactors.

We believe the Nuclear Industry Application for Justification of new nuclear power stations presents a misleading case for determining the health effects of radiation discharged locally from nuclear power stations and for the ongoing safety of the European Pressurised Reactor and the Westinghouse AP1000.

Health risks to local people

Health issues are a vital concern to many who live near, especially downwind from, Hinkley Point and our group has commissioned several epidemiological studies showing excess breast cancer and infant deaths in the area. The local health authority pointed to Hinkley as a likely link to a 24 percent excess of leukaemia in young people in West Somerset in a seventeen year study in 1988. This paper has never been challenged.

We are bringing up these arguments in our submission to both DECC consultations but want to say here, as a process comment, that it would be helpful to see the results of a forthcoming study by the Committee on Medical Aspects of Radiation in the Environment (COMARE) into the very large German Government KiKK study into childhood leukaemia near nuclear power stations.

This important study showed a doubling of leukaemia within five kilometres of all reactor sites. COMARE expects its report to be ready in the spring but respondents will not have a chance to scrutinise it before the end of the DECC consultation, particularly the 'Justification' process which will decide on the ramifications of new nuclear build on health effects.

On that point we believe that the current Secretary of State, having already made his views known about new nuclear power, cannot be seen as an arbiter and decision-maker on the Justification question. The call for a public inquiry has so far been turned down but we believe this decision should be reviewed.

Another process issue is that, although the Nuclear National Policy Statement consultation has received some (arguably not enough) publicity, the Justification consultation has received pitifully little. Just one London-based seminar was arranged and none at the local sites listed in the NPS consultation.

The following commentary by **Richard Bramhall** from the Low Level Radiation campaign puts clearly the case that there is a serious flaw at the heart of the advice on the health effects of radiation. The International Commission on Radiological Protection seems most at fault here.

"Much of the evidence about health risk from radiation is post-Chernobyl, which ICRP entirely ignores in formulating its advice. A substantial book full of evidence suggesting that this oversight might be foolish is free to download at <http://www.euradcom.org/publications/chernobylinformation...htm>. See also <http://www.llrc.org/health/subtopic/russianrefs.htm> and a new book just published in the Annals of the New York Academy of Sciences (see <http://www.nyas.org/Publications/Annals/Detail.aspx?cid=f3f3bd16-51ba-4d7b-a086-753f44b3bfc1>). This latest one includes a review of studies of the

deaths attributed to Chernobyl fallout in Europe; they total nearly 1 million up to 2005.

The ICRP approach treats radiation as if it were homogeneous. That's like regarding all poisons as if they were of equal toxicity, weight for weight. "How much poison do you think would kill you?" asks the idiot. "Well it depends what poison you're talking about", says any half-way intelligent person. In terms of radiation exposure, the idiot question is "What dose is safe?", and the intelligent answer is "that depends; where is the radiation coming from? .. is it a source stuck on my DNA? ... is it stuck in my lymph nodes? is it delivering all its energy into a tiny bit of me and leaving all the rest unirradiated?"

The nub of the issue is that there are some kinds of radiation exposure which it is valid to regard as uniform, homogeneous, well-averaged, evenly distributed in the body (however many synonyms one needs). Examples are x-rays and cosmic rays.

But there are other kinds of exposure which are never evenly distributed, so that all their damage is concentrated into microscopic volumes of tissue. Hot particles are one example and there are many others. In these circumstances, the CERRIE committee advised in 2004, the very concept of dose may be meaningless at the cellular and molecular level.

So there is a massive caveat that should be posted on any expression involving the word "dose". One of the main reasons the nuclear establishment sticks to using dose is for the administrative convenience of lumping all kinds of exposure together. Well that's just not scientifically valid.

Here, <http://www.llrc.org/wobblyscience/subtopic/singtonsaspirin.htm> , is an example of the kind of nonsense scientifically illiterate journalists spout because they don't understand these caveats.

If you want to see the history of how the radiation protection community got stuck in the "average dose" model, look at www.llrc.org/switcheroo.htm.

ICRP has recently admitted

[<http://www.llrc.org/health/subtopic/icrpabdicates.htm>] that their risk model cannot be used for post-accident exposures.

By inescapable extension neither can it be used for routine releases of the same radio-isotopes, and operators can't use it to demonstrate compliance with regulations expressed in terms of numbers of cancers per year, which is what they're actually required to do. The big questions are "Where will they get their advice in future? Will it stand up under scientific examination?" The nuclear lobby may be able to dupe the occasional journalist and some of the public but the investors and the courts are another matter. If operators go ahead in spite of the evidence there will be huge bankruptcies on the asbestos model (only far larger).

*The idea has been put forward that fear of radiation is a greater risk than radiation-induced diseases. What WHO and IAEA **have in fact** said about the*

fear factor is in the Report of the Chernobyl Forum (where they were the lead agencies). The report cites [4] a small number of studies where "Chernobyl exposed" populations had higher rates of "mental health symptoms, medically unexplained physical symptoms and subjective ill-health". The mental health symptoms were "mostly subclinical and did not reach the level of criteria for a psychiatric disorder", but they had "important consequences for health behaviour, specifically medical care utilisation and adherence to safety advisories." In other words, these people took up a lot of time at the advisory centres set up to help them.

Big surprise then. Doctors call them "the worried well". Their subjective and subclinical presentations are no basis for dismissing the increases in clinical diagnoses of conditions such as cancers, congenital malformation, stillbirth, cataracts, and so on and on reported by many workers in the affected territories. One of these scientists observes "We have seen, since the accident, clear and diverse effects of irradiation in plants over time ... we bear in mind that these late effects in plants could not be related to 'radio-phobia'." [5] The radiophobia thing is just absurd, unscientific spin. "

Footnotes see references: (1,2,3,4,5)

Local health studies

We outline here some of the epidemiological studies which point to excess cancer and leukaemia in communities near nuclear power stations

"Leukaemia incidence in Somerset with particular reference to Hinkley Point" Dr Cameron Bowie, Somerset Health Authority 1984, '87, '88. The three reports studied leukaemia incidence in West Somerset, finding a 24 percent excess in those aged under 24 years over a seventeen year period, suggesting a link to Hinkley Point. There was a suggestion in the reports that accidental unrecorded discharges might have accounted for the higher numbers recorded.

(As these reports are not available on the internet due to their date of publication, we have posted them to DECC for inclusion with this submission)

Having our own doubts about the ICRP model, discussed above, Stop Hinkley decided in 1999 to commission a local cancer mortality study. The Office of National Statistics were able to provide figures of cancer deaths for all the Somerset wards and we asked Dr (now Professor) Chris Busby to examine the figures and see if they correlated with radioactive discharges from Hinkley Point.

"Breast cancer mortality and proximity to Hinkley Point nuclear power station 1995-98" Dr (now Professor) Chris Busby Green Audit 2000. Found an 89 percent excess of breast cancer deaths on Burnham-on-Sea north over a four year period. Follow up studies later confirmed the excess. (6)

We asked the South West Cancer Intelligence Service for details of cancer *incidence* as opposed to deaths in the area but they were reluctant to provide the figures, saying they were concerned about the confidentiality of individual cases. We argued that many people might actually want more information to help them ascertain what factors might have been involved in their illness. In the end we decided to set about our own doorstep survey, visiting the homes of about 3,000 people in Burnham North electoral ward. Stop Hinkley funded the survey and analysis while members of Parents Concerned About Hinkley undertook the door-to-door health questionnaire. Dr Busby of Green Audit analysed and published the results:

“Parents Concerned about Hinkley survey, 2002” doorstep survey by volunteers analysed by Dr Chris Busby. 100% response from 30% of Burnham north population between 1996 and 2001 showed: leukaemia incidence 2.7 times the England & Wales average; breast cancer 98% above average; kidney cancer 4 times average; cervix cancer 5.5 times average. A Government committee wrote off the study saying wrongly it was a 30% response of a 100% population and therefore unrepresentative. (7)

In 2004 we issued the following press release:

“Burnham breast cancer rate still high” 10th Jan 2004

Breast cancer in Burnham and surrounding towns is a fifth more prevalent than the national average, according to a scientist and campaigner who has studied new figures provided by the Cancer Intelligence Service.

Dr Chris Busby from Green Audit has examined the latest figures published by the South West Cancer Intelligence Service (SWCIS) and confirmed that, in thirteen years between 1990 and 2002, breast cancer registrations were 21 per cent higher than should be expected.

Last month SWCIS updated its annual cancer rates for Burnham North and South, Berrow and Highbridge, following its pledge in May 2003, and issued three years' figures on its website. But campaigners are unhappy with the way the statistics were presented, saying the agency spun the figures by presenting them in isolation, thus reducing their statistical significance. They say in best practice, the last three years should have been added to the previous ten years' figures to give increased statistical power.

Ironically the text of the SWCIS report warns about interpreting long-term trends on the basis of just three years' data but then goes on to say the figures provide reassurance. The one-page report shows local breast cancer to be almost ten per cent higher than average in three recent years 2000 to 2002 but says this is not statistically significant. Dr Busby added this fresh data to previously published SWCIS figures for 1990 to 1999 to give more meaning to the total.

Chris Busby said: "It is a very wrong use of epidemiology to take an isolated short period some considerable time after the main exposure and use it to argue there is no effect. No breakdown is given for individual wards but we might assume from past research that Burnham North would have an even greater incidence rate that has been averaged out in the report."

Jim Duffy, campaigner from Stop Hinkley said: "This confirms once again the breast cancer link to an environmental cause. If we believe the agency figures then the effect might be reducing slightly. This trend may continue with the closure of Hinkley 'A' as has happened near American decommissioned nuclear power stations. But no marks go to SWCIS for their trustworthiness, just when their Director has been appointed to COMARE, supposedly the country's top research unit on the health effects of radiation."

PCAH spokesperson, Julian Plested said: "We're very concerned about the figures but not surprised as they confirm the findings of our doorstep survey. We should now turn our attention to Hinkley 'B' which may possibly contain cracks in its reactor core. If this is the case it could lead to a large accidental release of radiation on top of its routine discharges."

[Jim Duffy](#), Stop Hinkley Coordinator

The following article was published in 2008 highlighting a Stop Hinkley commissioned Green Audit report on infant mortality near Hinkley Point:

"N-PLANT CANCER FEARS HIGHLIGHTED"

Western Daily Press, 1st March 2008

Infant mortality is almost three times more likely to occur in Severn Estuary towns and villages downwind of Hinkley Point power station than inland parts of Somerset, a report says. Details of the study by Dr Chris Busby, of Green Audit, which was supported by a former director of the South West Cancer Registry, were aired last night on the BBC's Inside Out West programme.

Using Government figures, Dr Busby found there was an almost three times greater risk of infant mortality between 1996 and 2001 in the estuary wards of Brean, Berrow, Burnham, Highbridge, Huntspill, Comwich and Pawlett, compared with inland wards.

The rate of deaths in under one-year-olds was found to be 10 per 1,000 compared with 3.5 per 1,000 further inland. Campaigners said the findings added weight to the theory dangerous radioactive particles discharged into the sea and air at Hinkley were ingested by residents downwind from the power station.

Neonatal deaths (in children up to 28 days old) were also found to be high, particularly in Burnham North during the period 1993-98 at six times the rate expected.

Dr Chris Busby was commissioned by campaign group Stop Hinkley to follow up earlier cancer studies that had shown high numbers of breast cancer and leukemia in the area near contaminated mudflats between Hinkley and Burnham-on-Sea. Dr Derek Pheby, former head of Cancer Registry, said the findings were significant.

Jim Duffy, spokesman for Stop Hinkley, said: "The tide is turning with more scientific support for the compelling evidence that radiation is harmful to local communities and particularly to vulnerable infants.

"COMARE, the Government watchdog assigned to monitor health trends near nuclear plants should now be disbanded." (8)

The health officials at South West Public Health Observatory argued that children were safe near the power station but in later 'replicating' the Green Audit study they added one electoral ward and removed another from the study population. We believe these unpublicised changes affected their results.

In the same year a very large childhood cancer study was undertaken in Germany:

"Leukaemia in young children living in the vicinity of German nuclear plants", Kaatsch, 2008 International Journal of Cancer (KiKK report). A very large German Government study showed more than doubling of leukaemia in children living within 5 kilometres of nuclear power stations with an effect as far away as 50 kms. Created a public outcry and many pregnant women moved away from nuclear plants.

"Breast cancer incidence in Burnham-on-Sea, 1994 – 2004. Further evidence of effects from radioactive discharges from Hinkley Point nuclear power station", Prof Chris Busby, Green Audit 2008. This study over a lengthy period showed five extra women per year in Burnham were registered with breast cancer compared with the national average. Over 50 women during an eleven year period seem to have contracted breast cancer as a result of Hinkley radioactive discharges. (Study not yet published – paper copy enclosed with this submission)

The above studies seem to confirm what a lot of local people suspect: that living near Hinkley Point, especially in coastal and estuary areas downwind of the plant carries a health risk. We have had reports that patients in oncology departments in Bristol have discovered that others in the waiting room came from Burnham or nearby, against all statistical expectations.

It should be pointed out that the 1988 Somerset Area Health Authority report above, which was never challenged, only covered upwind areas of West

Somerset and Bridgwater. Their catchment area did not include Burnham-on-Sea which was part of the Weston-super-Mare catchment at the time. Had the study covered the downwind towns, we suspect the figures would have been even more disturbing.

Topography and health effects

Still in respect to health issues, in a meeting facilitated by the Environment Council at Hinkley Point in 2001, the BNFL epidemiologist acceded in theory that the local topography around Hinkley Point could be problematic. This was in response to our contention that radioactive particles accumulate on the 50 hectare mud-flats upwind of Burnham-on-Sea. Although this phenomenon applies to Hinkley it should also apply to other estuarine sites where nuclear power stations could be built, particularly those with a high proportion of mud to which the particles are more prone to attach. Initial studies seem to show a breast cancer excess in Maldon near Bradwell upstream along a tidal river which would bring in radionuclides on the tide. The effect was not found in Burnham-on-Crouch whose tidal river is downstream of the plant and therefore nuclides would not be swept up the river Crouch to the town. Oldbury seems to have the health effect on nearby Chepstow which has tidal currents which would theoretically create this impact, as well as communities directly downstream from the plant on the Avon side.

Summary of health objections

The difficulty with the conventional approach to radiation risk is that the model does not allow sufficiently for *internalised* radioactive particles. The International Commission on Radiological Protection who advise on this, base their predictions on Hiroshima survivors but a single blast of radiation should be treated differently from long term exposure to inhaled particles. So experts predict low, statistically insignificant health effects. When these turn out to be higher than expected in epidemiological studies, they wrongly say it cannot be connected to the radiation. This is an unscientific approach, based on expected outcomes not on real outcomes.

The Committee Examining Risks from Internal Emitters (CERRIE, 2004) reported that radioactive 'dose' is now irrelevant, so radioactive discharges measured in millisieverts will not accurately predict whether individuals will be harmed. They also recommended that regulators should recognise that children are particularly vulnerable.

We submit that two very large nuclear reactors pouring radioactive particles into the Bristol Channel will result in continued excesses of cancers in the area. We support Sedgemoor District Council's request for EdF to conduct a Health Assessment of the vicinity. We would be very prepared to assist with the design of such a study, for example basing it on data on a post-code basis which would furnish more pin-point information than much broader electoral ward data.

Nonetheless we believe there is sufficient information to reverse the proposals to construct two or even one nuclear power stations at Hinkley.

The full examination of the KiKK study being carried out by the Committee on Medical Aspects of Radiation in the Environment (COMARE) has not been completed in time for this consultation, and has not been subjected to an independent critique.

It is not acceptable for something as important as the COMARE review to be published after this consultation has closed.

Risks from a serious accident or terrorism: Safety of the European Pressurised Reactor and Westinghouse AP1000

We believe that there are real safety risks associated with operating a European Pressurised Reactor (EPR). We note the recent misgivings of the Nuclear Installations Inspectorate Generic Design Assessment team with regard to the Control and Instrumentation systems in the EPR design. Nuclear Consultant John Large has written in some detail about the risks to an EPR from an aircraft attack as well as the consequences in terms of fallout in the event of a containment by-pass accident.

We note that the NII has described their concerns in the strongest terms possible about the vulnerability of the Westinghouse AP1000, slated for Oldbury and Wylfa, to an aircraft terrorist attack. (9,10,11)

We are not convinced that the EPR is immune from the same threat, which we will outline below. On the grounds that effective landscaping can reduce the accuracy of an aircraft attack on the plants, we contend that the spoil from excavations should be built up not just on the south side of the station, as proposed by EdF to mitigate the visual and noise impacts, but in each compass direction. However we feel the residents of the village most affected should be given a choice in an official referendum.

We explore the safety issues below.

Regulator criticisms of the EPR design

Stop Hinkley issued the following press release on 27 November 2009:

Safety regulator slams reactor design

The Nuclear Installations Inspectorate (NII) today announced they have major concerns over key aspects of the safety systems in the EPR reactor proposed for Hinkley Point. They state they would not issue a license for the reactor unless the Control and Instrumentation system is fixed. A top nuclear consultant suggests the error could hold up the UK nuclear project by up to three years.

In their Part 3 Report of the Generic Design Assessment , the safety regulators claimed that in the Control and Instrumentation system the computerised shut-down systems were not sufficiently separated from the normal operating systems. Consequently they aired their concern that a fault could affect the performance of crucial safety systems. They raised a 'Regulatory Issue' or red flag over the issue, the highest warning they can give to a nuclear operator.

The Control and Instrumentation system, if not acceptable, could be replaced with a version from an older reactor the 'N4' but the N4's control system was itself found to be faulty and so it used an even older version from an earlier reactor, the '1300 MWe' built in the 1980's. EdF have suggested using a hard-wired system to replace the computerised control of the safety systems but this is an early proposal with no detail attached.

The NII pin-pointed other areas of concern with the reactor design:

- More work was required on the prevention of cracks in the fuel cladding due to thermal stress. This is very important as the 'high burn up fuel' which will be deployed in the EPR is hotter and more radioactive than fuel used in previous Pressurised Water Designs. It is crucial that the fuel is effectively contained within its cladding.*
- Analysis of the human factor in the safety of the reactor was seen as being unclear in the design proposals. This section deals with how workers or others might deliberately or for other reasons sabotage the reactor. EdF were told to put more effort into their arguments to back up their safety claims.*
- Managing radioactive waste: an assessment on the disposability of the highly radioactive spent fuel arrived too late for consideration for this part of the assessment. Campaigners are keen to examine this area as the spent fuel will be twice as hot and twice as radioactive as from conventional PWRs and will need to stay on site at Hinkley for an estimated 160 years before it can be physically put in 'permanent' containers for eventual movement to a hoped for (but as yet unplanned) Deep Geological Repository.*
- Design changes: The regulators state they find it difficult keeping track with a reactor design which is not complete. As it is currently being built on two sites in Finland and France , the designs are frequently changed. The regulator has asked for a 'frozen' design as of 2008 but acceded that changes can be incorporated.*

- *Categorisation & classification: The EPR design has been found to be not entirely in alignment with international good practice eg on mechanical systems where there is no classification system for delivery of a safe function.*
- *Exclusions: The regulators have conceded that construction could conceivably go ahead despite outstanding areas of concern but only up to the point where the specific concern becomes relevant. There is some risk to EdF here but also the regulator would be under mounting pressure to give way once the momentum of the project had reached a certain point.*

Jim Duffy, spokesman for Stop Hinkley said:

"This reactor has had an unlucky history. It was based on the earlier 'N4' reactor of which only four were ever built due to thermal fatigue flaws in the important heat removal system. They took between 16 and 19 years to reach operational output."

"Its construction in Finland is nearly four years late with 3,000 recorded building errors(2). The French version is currently two years behind schedule and now the UK regulators are as critical as they can be over the risks with its computerised safety system. EdF may need to apply a thirty year old system to replace it or simply hard-wire it. This is hardly 'state-of-the-art' that EdF boasts of their new reactor design. It makes you wonder how it got approval to get as far as it has in Finland and France ."

"We could avoid a great waste of time and money by a change of direction and fully backing renewables before that's too late to help stop climate change."

[Jim Duffy](#), Stop Hinkley Coordinator

A comparison has been made regarding the C & I system that it is like having a fault in your car steering that means the brakes also stop working. It does not inspire confidence that the EPR has got so far without this potentially dangerous fault being rectified. We were very surprised that the normally restrained French nuclear authority ASN were equally critical of the system as well as the Finnish regulators, STUK.

On the issue of human factors, I worked as a psychiatric nurse at Southwood House in King Square, Bridgwater in the 1980's. One of my clients for counselling was a shift manager at Hinkley Point B. Although he did not have a 'mental illness' as such he was very preoccupied with family problems. In one session he reported having made an important mistake in operating the reactor which had led to a discharge of radioactive gasses. The accident was reported in The Guardian at the time in which Dr John Large suggested it was the worst UK accident since Windscale.

Colleagues reliably informed me at the time that another Hinkley worker with safety responsibilities had Alzheimer's Disease and was effectively being 'carried' by co-workers.

I discussed this event at the Hinkley C public inquiry. I raise the question now as I am still concerned that human factors could contribute to a serious accident at a reactor. The fact that the NII have pointed out the inadequacies of EdF's analysis in this area is of great concern.

Large & Associates reports:

Vulnerability of the EPR to terrorism:

In 2006 a letter from EdF to the French Government was leaked to a French campaigner and consequently published. The letter was on the question of the EPR's vulnerability to a deliberate aircraft attack. John Large was asked to write a report on the contents of the letter. Here is the summary of his report. The full report is available at (12)

The EdF letter referred to is below the report summary.

OPERATIONAL RISKS AND HAZARDS OF THE EPR WHEN SUBJECT TO AIRCRAFT CRASH

SUMMARY

This is a brief review of a confidential EdF document that has been leaked to the public domain in France.

The EdF document relates to the projected performance of the AREVA designed Generation III EPR reactor. The first of this reactor type is presently being built at Olkiluoto in Finland and construction of a second EPR is expected to commence shortly at the established nuclear power station site at Flamanville in France.

In or about 2003 it seems that EdF prepared a statement to the Direction Générale de la Sûreté Nucléaire et de la Radioprotection in response to its request to demonstrate the safety of the EPR design against the deliberate crashing of a large civil aircraft onto the nuclear island. The resulting EdF document endeavours to prove the ability of the plant to withstand such attack and it claims to do so by comparing the footprint and time sequencing of the impact of a small military (fighter) aircraft to that of a large, fully fuelled commercial airliner.

However, this leaked EdF document shows the claim to be flawed in a number of important respects: First, in that the impact signatures of the small military fighter and very much larger commercial passenger aircraft are unlikely, contrary to the reckoning of EdF, to be sufficiently similar in

both time span and magnitude for the design resistance of the EPR to an accidental military aircraft strike to equally apply to a passenger airliner intentionally targeted the nuclear island of the plant – indeed, the basis of reckoning the resistance of the built structures is so grossly simplified that it is inapplicable to a real impact situation. Second, the EdF assumption that the 100 or more tonnes of aviation fuel spilt during the moment of impact would ignite and burn itself out within 2 minutes or so is entirely without justification and unproven, with there being a good possibility that highly explosive vapour would be formed within and around the structures, the deflagration of which could be severely damaging to the EPR building structures and nuclear equipment within. And, quite incredibly, one line of mitigation proposed by EdF is that the terrorist would have insufficient skills to pilot the aircraft onto the intended target, this being quite contrary to the dedicated training undertaken by the terrorists who masterminded the 9/11 attacks.

The EdF document draws on a poorly constructed argument of the resilience of the EPR design against the international terrorist threat – it has been drawn up on the basis that the terrorist has limited knowledge of the EPR plant, little capability to acquire the necessary skills to launch and successfully see through the attack, and that a determined terrorist group will not intelligently and intentionally seek out the vulnerabilities of the EPR design. Not only is it an entirely unjustified postulate that the present military aircraft accidental crash safety case is adequate to cover the damage severity caused by an intentional attack with a large passenger airliner, also the claim that the resulting radiological consequences to the public will be within the existing prescribed statutory limits for accidents cannot be demonstrated at all sound by the EdF document.

Indeed, it has to be hoped that considerably more valid thought and preparation has gone into improving the resilience of the EPR design since the 2003 date of the EdF document and, one might muse, if the paperwork design of the EPR is showing such shortcomings, what of the resilience to terrorist action of the many operational nuclear plants scattered across France and elsewhere in Europe?

Finally, I am not surprised at the hoo-ha generated within the French nuclear industry by this leaked document. This is not because it reveals some highly sensitive details about the EPR design, which it certainly does not, but more because it reflects what seems to be an almost total lack of preparation to defend against the inevitability of terrorist attack. Moreover, EdF admits that it does not consider itself responsible for providing protection against all conceivable acts of terrorism this being, according to EdF, the responsibility of the French state.

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To The Director of Radioprotection and Nuclear Security
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75572 PARIS
Paris, August 12th 2003

Dear Sir,

In your letter, you ask me to examine the EPR reactor capacity of resistance to withstand a potential commercial plane crash, and then to make any necessary suggestions. Very quickly after the September 11th attacks in the USA, the EDF made a point of analysing the problem and in particular with regards to the conception/design of the EPR.

As you note in your letter, the new project takes into account **resistance** to a military plane crash, which is already a heavy charge. For this, the designers have chosen functional and geographical building plans taking account of such accidents. The project has 4 trains which are completely separate, and a part of the construction is "bunkerised": in particular the buildings containing the reactor and used nuclear fuel, and one building containing 2 of the 4 safeguards trains (electrical and mechanical parts).

The "bunkerised" part, designed to resist to the impact of a military plane, presents a high resistance and especially with regards to perforation: a military plane is considered to be the equivalent of a perforating missile. All this gives to the EPR an important capacity to resist to the impact of a commercial plane, so no change has been made in the construction plans.

Despite this capacity for resistance to plane accidents, it is nevertheless necessary to note that **EDF is not in a position to ensure resistance to eventual war or terrorist action. Prevention or limitation of such action and its possible results involve State responsibility** In this case

- The controls concerning resistance to such accidents and any necessary supplementary measures are to be considered as outside the (normal) design basis of the building, and I am obliged to place this situation amongst the "Risk Reduction Categories"
- The study of different possibilities concerning an impact should induce a **reasonable response to the risk incurred and will not be able to take into consideration/cover each and every possibility**. Furthermore, the measures should, in my opinion, be in complete coherence with the measures adopted internationally, and should not be too different from the measures adopted for other industrial risks. I also consider that the different scenarios studied, the rules and analysis used to do so should not appear in the security reports immediately available or which could become available to the public.

Precisions concerning this general logic are to be found in the joined annex. And, added to this, in order to decide or control the design basis of the protective construction/shear wall of the "bunkerised" part of the building, it

will be necessary to define a reference impact load. This reference, whilst generally covering the case of the sort of planes which could crash in the event of an intentional action, should not be associated directly to a particular plane nor to a particular speed of impact. It should correspond to a general hypothesis based on criteria and calculation of a general and conventional nature.

For this reason I propose to retain as the reference the impact charge given in the annex which represents the risks reasonably considered possible by the sorts of planes in European skies.

Yours faithfully,

B. LESCOEUR.

Note: [Stop Hinkley emphasis **in bold**]

I was concerned that an inspector representing the Nuclear Installations Inspectorate GDA team at the DECC / NGO meeting on 15th November said he was not aware of the EdF letter to the French Government referred to above, suggesting the EPR reactor could be vulnerable to certain forms of attack. Our concerns here are obvious. It is not at all clear that the EPR could withstand a terrorist attack. EdF have claimed that in this short time-span they have reinforced the reactor designs to the level that it could withstand such an attack but this seems difficult to believe. In his fuller report John Large goes on to say:

“Obviously, to safeguard against intentional aircraft crash the only effective measure (other than security at the departure airports) is to physically enhance the structure of the building enclosures although, since the fundamentals of the building design are committed to at an early stage of the design process, other than a radical change of the building structures and/or layout (for example, building underground), little can be done to improve the resilience of the existing EPR containment design. There are no apparent signs that the post 9-11 EPR designs have undergone such a radical enhancement.”

Effects of a serious accident at Hinkley C

John Large gave a presentation in Bridgwater in 2008 which illustrated his concerns that the projections for a worst-case accident in an EPR were very probably badly understated and that a fallout plume could contaminate people a long distance from Hinkley.

An accident projected for weather patterns on the day of Chernobyl showed Devon then Wales, Ireland and Iceland becoming covered with the (invisible) radioactive plume. On a second random date Bridgwater was contaminated

within an hour, then the Isle of Wight within four hours before the plume moved on to Northern France. The report is summarised below:

**HINKLEY NO BUILD?
IS HINKLEY POINT A SUITABLE SITE FOR
TWO NEW EUROPEAN PRESSURISED REACTORS (EPR)?
JOHN LARGE, LARGE & ASSOCIATES, CONSULTING ENGINEERS,
LONDON
British Legion, Castle Street, Bridgwater Somerset - Monday 13
October 2008**

The present operational nuclear power station at Hinkley Point B comprises two Advanced Gas-Cooled Reactors (AGR) but plans announced (24 September 2008) by EdF at its takeover of the present Hinkley operator British Energy, suggest that of the 4 European Pressurised Reactor (EPR) nuclear plants that it has planned for the UK, two will be built alongside the existing nuclear plants at Hinkley Point, with the other two at Sizewell, Suffolk.. The first EPR is planned to be in electricity generation by 2017 so, with the expected retirement of the fault ridden and troubled existing Hinkley AGRs within a few years, the spare electricity distribution grid capacity from Hinkley strongly favour this first EPR being commissioned at Hinkley Point.

Compared to the AGR reactors, each of 600MWe capacity, the EPR is rated at about 1,600MW_e generating capacity. With a projected operational life of 60 to 65 years, the EPR nuclear plant is capable of utilizing uranium based nuclear fuel to much higher irradiation (burn-up) levels and also of being fuelled with plutonium based fuel (MOX).

In 1982 the then National Radiological Protection Board (NRPB but now part of the Health Protection Agency) published the results of its comprehensive analysis into a radiological incident at the proposed Sizewell B pressurised water reactor (PWR) nuclear power station. For this analysis it was assumed that a severely damaging incident would rupture the reactor containment dome (containment failure) giving rise to a very significant release of radioactivity into the environment, yielding a maximum of 2,600 (130 probabilistic expected value) or so deaths in the short term and around 31,000 (3,300 expected) deaths in the longer term.

This projection of health detriment assumed that countermeasures would be judiciously implemented, including the speedy evacuation of about 300,000 (24,000 expected) members of public from the locality around the Sizewell site. However, for its mortality and morbidity projections the NRPB relied upon the then ICRP 26 standard that is now superseded by the universally adopted ICRP 60 recommending a x4 increase in the causal effect of radiation exposure, so much so that the 1982 analysis is now considered to be an under-estimate of the potential consequences of such a release.

The next projection for the radiological consequences of a PWR reactor accident carried out in the UK was in 1988 for the PWR nuclear plant proposed at Hinkley Point in Somerset. For this study, obviously in account of the Chernobyl disaster two years earlier, the damage and worse case incident considered to be credible comprised a very limited release of radioactivity with the reactor containment remaining intact throughout and following the incident, thereby constraining the radioactive release to a containment bypass for which no early or longer-term deaths were projected.

For the EPR the designer, AREVA, reckon that the nuclear plant is entirely protected from accidents and malicious acts that could result in significant release of radioactivity. In making this claim AREVA place extraordinary reliance on its failsafe engineered systems and containment, so much so that, in the very worst and most severe incident, the release would be limited to just 0.03% of the reactor fuel radioactive inventory. Put another way, over the six days following the explosion at the Chernobyl Unit N^o 4 reactor, it is reliably estimated that at least 30% of the total reactor fission product radioactivity released uncontrolled into the atmosphere. The equivalent worst case reactor incident release from an operational EPR at Hinkley Point would, according to AREVA, result in no more than (6 x 0.03%=) 0.18% of the radioactive inventory.

John Large will give an illustrated presentation that provides an up to date prediction of the radiological consequences of a severely damaging incident at Hinkley Point, this being the first time since 1982 that a revised radiological impact assessment for PWR has been publicly aired.

Based on EdF's undertaking that two EPRs, will be commissioned at Hinkley Point, the radiological health consequences of these larger nuclear plants will be analysed taking into account upwards revisions to the causal factors linking radiation dose to health detriment, the larger core mass of nuclear fuel, the increased irradiation or burn-up of uranium fuel rendering it more radiotoxic, and the impact of MOX (plutonium) fuelling, all in account of the lessons learnt from Chernobyl.

The modeling and analysis will draw upon the outcome of highly confidential terrorist attack exercises carried out on nuclear plants in the United States, it will assume the same capabilities of the terrorist to penetrate the security at Hinkley Point, seek out the vulnerabilities of the nuclear plant, and to contrive effective means by which a radioactive release will take place; and for the radioactive dispersion and consequences the European standard COSYMA software has been deployed, together with NOAA satellite data to provide real time imaging of the dispersion and radioactive fall-out in the aftermath of the release.

The analysis and projections for Hinkley Point will be expressed in terms of the risk of any one individual sustaining health harm in the aftermath of a radioactive release and, related to the increased health risk from the larger EPR plant operating with a greater extent of irradiation (burn-up) and/or with a plutonium based fuel core, the need to extend both the range and resources

allocated to the local authority off-site plan (under the Radiation (Emergency Preparedness and Public Information) Regulations 2000)

LARGE & ASSOCIATES
CONSULTING ENGINEERS, LONDON
<http://www.largeassociates.com> (13)

Chernobyl

Following directly from the real risks of an accident in a new reactor and the health risks outlined earlier we want to say something about Chernobyl.

We believe the health effects of the Chernobyl 'containment by-pass' accident have been consistently underreported. The agreement by WHO with IAEA to not undermine nuclear power is extremely regrettable in this respect. It is also regrettable that HPA and COMARE do not take on board the findings of studies by Russian and other Eastern European scientists. My own regular visits to Belarus, the country most affected by Chernobyl tell me that many more people were and are affected than the offensive standard figures which are routinely doled out. A similar accident at Hinkley or elsewhere would produce very much more illness over a wider area than we would be led to believe.

- 24 years ago Chernobyl contaminated 21 percent of neighbouring Belarus and 1.5 million of its citizens with radiation.
- Chernobyl's plume was 200 times more radioactive than Hiroshima and Nagasaki combined.
- All the surviving 100,000 liquidators are now reported ill. Hundreds have died.
- 1.3 million hectares of Belarus farmland is contaminated.
- Half the Chernobyl radiation contaminated Belarus, Ukraine and Russia...
- Half spread over the rest of the world but was not officially studied.
- A 30 kilometre uninhabitable zone surrounds Chernobyl.
- Taunton is 25 kilometres from Hinkley Point.
- 374 UK farms including 200,000 sheep are still restricted

Chernobyl health predictions

4,000 cancer deaths in Belarus, Ukraine and Russia were estimated in a IAEA/WHO press release in 2005 which was widely publicised. But the actual WHO report predicted 9,000 cancer deaths in those countries, which remained unpublicised.

30,000 to 60,000 cancer deaths worldwide were predicted by an alternative committee of scientists: The Other Report on Chernobyl (TORCH) 2006.

Rosie Bertell, President of the International Institute of Concern for Public Health said:

"Clearly the true damage to health attributable to the Chernobyl disaster has been kept from the general public through poor and incomplete scientific investigation."

We ask the question, could it happen at Hinkley C or elsewhere?

Extracts from a recent article, drawn from EdF documents, seems to suggest there is a serious threat:

Industry documents reveal modern reactors more dangerous in an accident than the ones they replace

Independent on Sunday, 8 February 2009 (extracts):

“New nuclear reactors planned for Britain will produce many times more radiation than previous reactors that could be rapidly released in an accident. The revelations – based on information buried deep in documents produced by the nuclear industry itself – call into doubt repeated assertions that the new European Pressurised Reactors (EPRs) will be safer than the old atomic power stations they replace.

Instead they suggest that a reactor or nuclear waste accident, although less likely to happen, could have even more devastating consequences in future; one study suggests that nearly twice as many people (28,000) could die. Information in the documents shows that they produce very much more of the radioactive isotopes technically known as the “immediate release fraction” of the nuclear waste, because they could get out rapidly after an accident.” (14)

Proximity to civil aircraft movements

Although there is a 2,000 feet high and 2 nautical mile wide radius exclusion zone around Hinkley Point this has been flouted on occasions. Soon after the zone was adopted, the Western Daily Press leased an aircraft and flew it taking photographs over the nuclear plant, with complete impunity. The photos were posted on the front page of the newspaper overdrawn with a target circle, with the obvious implication that terrorists could easily fly an aircraft into the reactor. We would add that deliberately targeting the cooling ponds containing high volumes of very radioactive spent fuel would be much more dangerous,

especially given their relative lack of physical protection. (This prevailing condition impacts also on the previous statement.)

We understand the 9/11 terrorists planned to fly into a nuclear power station in Pennsylvania. The July 7th London bombers also possessed plans of a nuclear power station. Hinkley Point is just minutes' flight away from both Bristol and Cardiff airports. A hijack detouring a fully fuel laden airliner could wreak havoc on any nuclear plant. Our group is not convinced by EdF arguments that the EPR could withstand such an attack. It is unlikely the engineering could have evolved in such a short time since 9/11 to protect the reactor buildings.

As discussed above, in August 2003 Bruno Lescouer of EdF wrote to the French regulator to say that the EPR would not fully withstand such an air

attack and it was the Government's responsibility to prevent such attacks. The letter was later published by French campaigners.

Proximity to military activity

The firing range at Lillstock off the coast is actively used for military activities. Military aircraft regularly overfly the site. It is not inconceivable that a military plane could be used as an attack weapon against a nuclear power station. It was previously unthinkable that suicide bombers would fly airliners into skyscrapers. Post 9/11 we must consider all possibilities.

Proximity to dangerous industrial facilities and operations

The EdF consultation paper seems to brush aside the fact that the planned reactor(s) will be built alongside existing nuclear reactors. Although Hinkley A is currently being decommissioned (very slowly due to lack of funds), Hinkley B is still operating with a licence till 2016. British Energy may wish to extend this date, which may overlap with the predicted start date of Hinkley C.

Should a serious accident occur at Hinkley B this would require the entire evacuation of Hinkley C. As Hinkley B managers have conceded that there are numerous cracks in the graphite reactor cores, this eventuality is more likely than hitherto. The boiler tube system was found also to have age-related cracks which required a seven-month shut down two years ago to effect partially repairs. Welders needed to work in a very radioactive environment to patch up the boiler tubes. Even so the plant is currently operating at 70 percent output to reduce the pressure and temperature in the boiler system

Should a series of tubes fail, the resultant pressure wave could disrupt and distort the reactor core which is in the same housing. This in turn could trigger a nuclear fuel fire through coolant failure at one or several fuel elements.

The risk of not arresting this fuel-fire scenario is strengthened by the fact that the tertiary 'boron beads' shut-down system assumed by many, including EU officials, to be in place, was never built in.

Stop Hinkley requests through the Freedom of Information Act for details of this dangerous anomaly have been rejected. British Energy (part of EdF) has strongly objected to the Nuclear Installations Inspectorate releasing the documents which they acknowledge they possess.

Demographics

We consider the site to be much too close to centres of population. Large towns such as Taunton, Bridgwater, Burnham-on-Sea, Weston-super-Mare

and even Cardiff are within a 30 kilometre radius of identical size to the uninhabitable exclusion zone around Chernobyl. Consultant engineers, Large & Associates argue that Areva's confidence in the reactor buildings being proof to a deliberate aircraft attack could be misplaced. As described above, in a presentation in Bridgwater in October 2008 Dr Large showed the plume dispersal of radioactivity should a 'containment by-pass' accident occur. The plume reached Bridgwater in half an hour and northern France in 6 hours, in one scenario. (15)

Emergency Planning Procedures

We believe the Emergency Planning procedures would be totally inadequate to protect or evacuate the local populace in the event of a serious accident or act of terrorism. Potassium iodate tablets, which give some protection against just one form of radiation-induced cancer, are only pre-distributed to those within 3.4 kilometres of the nuclear plant. But a nuclear plume would contaminate hundreds of thousands within an hour or so with no realistic means of them receiving the pills which could prevent just one form of cancer.

We are concerned generally that emergency measures would break down. At Three Mile Island ninety percent of medical staff were not at their posts after the accident.

A police report to the Nuclear Industry Association at Oldbury power station in 2002 said that protective breathing gear had a life limit of just twenty minutes in a contaminated environment. Police officers would in any case be advised to voluntarily abandon their 'space-suit' kit as it would panic the local population. We were also told that police officers had a smaller maximum dose in such circumstances than ambulancemen and even council officers. This would lead to chaos, if it were enacted, as policemen would walk away from the accident scene while ambulancemen were supposed to continue tending to the injured and contaminated population and council officers were supposed to carry on giving out iodate tablets to a probably bewildered and angry public.

Summary

In view of the serious questions posed by the Large report and the presentation that came with it, we strongly contend that no reactors should be constructed at Hinkley or elsewhere. Should a decision be made to go ahead with the project, then we feel that emergency arrangements must be enhanced to allow better public protection. For example the current practice of pre-distributing potassium iodate tablets just within the 3.4 kilometre radius around Hinkley should be enhanced to take account of the fast pace that weather patterns can deliver radiation to locations much further away. As the Isle of Wight is about eighty miles from Hinkley we suggest the iodate tablets should be pre-distributed to all homes, schools, offices and factories within 100 miles.

Nuclear waste and spent fuel

We are concerned at the prospect of highly radioactive spent fuel being stored at Hinkley Point during and for a long time after the operation of the two proposed EPRs at Hinkley. The fuel will be 'high burn up fuel' which means it must be stored in mechanically cooled water for one hundred years before it is capable of being handled in preparation for the next stage of its management.

This problem so far into the future means we are leaving a serious legacy to future generations. Part of the risk is that of a terrorist attack and we do not know whether terrorism will have become more accurate and sophisticated. Nor do we know whether the economy and social cohesion will have collapsed with unthinkable consequences in terms of managing the hot spent fuel. The fuel management process is not a 'passive' one.

Another issue is that because of the very heat of the fuel, its containment is more likely to splinter or corrode, creating potential local contamination and a headache of a problem to solve.

We support the recent paper submitted to the EdF Hinkley C Stage 1 consultation by Hugh Richards of Wales Anti-Nuclear Association which delves into much greater detail on the subject referring to the US regulators' long term concerns about the spent fuel.

We are also concerned that the advice given by the former committee looking into nuclear waste has been ignored or misrepresented. The Committee on Radioactive Waste Management came down against Deep Geological Disposal for new build nuclear waste. This was because, while 'legacy' waste had to be dealt with in some way despite obvious risks, 'new build' spent fuel did not need to be created in the first place as there are alternate means of generating electricity.

CoRWM's proposal that communities should only volunteer to host the Repository looks shaky now that the Government has stated it may force Cumbria or other communities to accept the nuclear waste dump if they do not volunteer. The whole process is very flawed and has produced no results thus far in terms of any agreed permanent site or solution.

Response summary

Our group is not convinced that nuclear power is safe either in terms of health effects that are likely to occur to communities near the plants, nor in terms of protection from a serious 'containment by-pass' accident.

There are currently no means of mitigating against these risks: the industry needs to pour and supposedly disperse radioactive particles in huge volumes into local rivers or the sea in order to prevent the accumulation of trillions of

litres of radioactive low level waste. But these particles are ingested by local members of the public.

Similarly emergency procedures would be impossible to carry out in the event of a serious accident from a simple logistical point of view. Chaos and human nature would kick-in while the toxic plume would spread too quickly to evacuate people who would be contaminated in their hundreds of thousands.

We strongly object to the building of these polluting and dangerous forms of power stations. As discussed earlier, if DECC decides to proceed with the process then a public inquiry should be held. The Secretary of State, with his well known views biased in favour of nuclear power, should not make the Justification decision.

Yours

Jim Duffy
Stop Hinkley Coordinator

Enclosures (sent by post)

Somerset Health Authority reports: "Leukaemia incidence in Somerset with particular reference to Hinkley Point" 1984, 1987, 1988, Dr Cameron Bowie, PD Ewings PhD (three reports)

Green Audit report: "Breast cancer incidence in Burnham-on-Sea, 1994-2004, Prof Chris Busby.

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<http://www.guardian.co.uk/environment/2010/jan/10/nuclear-power-irrational-fears>

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