

Keynote Westminster Palace Seminar, 11 March 2010

**‘Justifying UK New Build Nuclear’
Call for Independent Inquiry**

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**TECHNICAL OMISSIONS IN THE JUSTIFICATION
PROCESS**

JOHN H LARGE

PAPER SUPPLEMENTING THE ILLUSTRATED PRESENTATION

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Justification is the first element of the key process that is intended to introduce new nuclear power plants, together with the accompany nuclear activities particularly the front- and back-end fuel activities, radioactive waste management and, generally, a higher level of nuclear goings-on in the UK nuclear energy sector.

The justification process itself entails identifying the classes or types of practice involving ionising radiations in that, essentially, the benefits accrued must outweigh any health detriment caused by exposure to ionising radiations resulting from the practice.

Now this simple and somewhat worthy objective, or so it seems at first glance, is a considerable departure from the underlying tenet of the substantive *Nuclear Installations Act 1965* that places an absolute duty on the nuclear plant operator to secure, and I quote from Section 7 of the Act, “. . .no such nuclear occurrence. . .”, meaning routine operations, intended discharges and, indeed, incidents resulting in inadvertent releases of radioactivity, “. . . shall cause any injury or damage to any property of any person other than that of the licensee” or nuclear site operator.

So, in this respect the *Justification Regulations 2004* provides the UK nuclear industry with opportunity to relate plant performance, including any component of radiological detriment to its claimed economic benefit. That is, the Justification Regulations depart from the 1965 basis of absolute prohibition of health detriment to that of balancing the risk and probability of an inevitable health detriment.

Of course, as a practical person, I understand and acknowledge that it is just not possible to design, operate, institutionally and post-institutionally manage all of the nuclear activities associated with and deriving from nuclear power, including the very long term care of the irradiated or spent nuclear fuel, without some element of detriment arising to members of the public.

But, that said, it is not at all clear to me how the Justifying Authority has actually evaluated the benefits and detriments of the practices associated with the proposed UK new build nuclear programme. This is because, it lacks, by its own admission, the resources and expertise to evaluate any of the many complex issues, societal, economic and technical that arise during and from the pursuance of nuclear power.

I recall the meeting that I attended with the Justifying Authority way back in March of last year. Flicking through my notes of that meeting, I then noted that the human resources of the Justifying Authority comprised just 4 individuals, with two of these being part time; although it argued then that it utilised consultants, heavily relying upon the rather grandiose-sounding *Integrated Decision Management* or IDM that seems to be mainly serviced by associates drawn from a pool of ex-BNFL employees.

Even so, claimed the Justifying Authority, it received considerable support from the Nuclear Installations Inspectorate for evaluating the technical aspects of the Nuclear Industry Association's justification submission covering the reactor types proposed for the UK's new build

programme. But, we might ask how could the resource-strapped and beleaguered NII afford to provide such advice, particularly when it, itself, has yet to finish its own generic safety review of the proposed reactor designs?

So here is the nub of my challenge: In the absence of staffing resource and unbiased and competent advisers, just how can the Justifying Authority go about its business of recommending to the Secretary of State whether,

first, he should ratify his proposed decisions on new nuclear power, decisions which will place the United Kingdom firmly on the path to a greater dependency on nuclear power,

or, alternatively, as called for here,

if he should refer these new practises to an open public inquiry.

Now permit me to put some detail to my whinge on this justification process.

Well, as I see it there are a number of missing elements of the justification process. But here let me briefly consider two of these to arrive at a third misgiving. My nominated missing elements are:

- 1) First, failure to account for the Generation III nuclear fuel performance and characteristics;

- 2) Second, the ambitious and unrealistic expectations for the surety of the nuclear island containment;

and in light of these shortfalls and others

- 3) Thirdly, the misleading and misinformed nature of the consultation process itself.

On fuel performance, the Justifying Authority presents, via its consultants IDM, only the bright side and cost related benefits of the nuclear fuel planned for use in the Generation III reactors.

Essentially, Generation III reactor fuel is to stay in the reactor core longer where it is to be irradiated or 'spent' to a much greater extent – compared to the equivalent Generation II reactors, such as the Sizewell B pressurised water reactor, it is significantly more radioactive, its radionuclide content is more complex, actinide laden and longer lived, it is more heat generating and will remain so for decades longer,

But in advising the Justifying Authority, IDM's promotion very much follows and seemingly unashamedly endorses the Nuclear Industry Association's line in that it extols the only the virtues of higher fuel burn-up in terms of fuel economy, reduced volumes for interim storage and long term, post-institutional management and, importantly for our consideration, it claims that most of the received dose, that is radiation dose or health detriment, is accrued in the mining and milling of the uranium feedstock, with the tacit argument that that's okay then because all of this takes place overseas.

What is omitted, is any meaningful explanation of the consequences of accidents and incidents that result in a radioactive release and, even if the nuclear Generation III power plant operates accident free for the 65 to 70 years planned, the inevitable long term challenge of safely storing and eventually disposing of the spent fuel remain.

We are now discovering, particularly from hitherto safeguarded information steadily leaking from the AREVA-EdF nuclear safety case, that the higher burn-up fuel performs very poorly when subject to abnormal conditions, it is liable to release a much higher content of its fission product inventory than its Generation II counterpart, on a micro-scale its ceramic oxide matrix is highly friable and fragmented which has implications for its interim storage and eventual disposal in the long term.

Moreover, if the uranium fuel is replaced by a plutonium based Mixed Oxide of MOX fuel – planned for in the French based EPR plants at Flamanville – then the release from the fuel matrix can assume a very significant fraction at relatively low levels of burn-up.

Now, all of this uncertainty about the fuel abnormal event performance places much more emphasis of the surety of the reactor island containment – my second example of omission from the Justifying Authority's consultation.

The nuclear safety case for the French AREVA EPR design reckons for the most severely damaging, very worst reasonably foreseeable event,

including terrorist attack, that the maximum rate of release in the form of a containment bypass, not a breach or failure of the containment, would not exceed 0.03% of the reactor core inventory per day – that's right, the worse possible event would release no more than 3 ten-thousandths of the available radioactivity per day of the incident duration.

I can compare this postulate to the reality of Chernobyl where over the six days of open containment about 30 to 60% of the reactor core fission product released to atmosphere – for the French design, the worst case situation would not, over six days, release more than 0.18% of the core content – that's no more 2 one-thousandths of the core fission product releasing.

About now, my slides should be illustrating a comparative analysis of the health detriment arising from the same incident and radioactive release arising at the same location for an existing Generation II and a Generation III EPR nuclear plant.

The introduction of high burn-up, low enriched uranium fuel in an EPR just about doubles the statistically expected number of early fatalities and, if countermeasures are evoked, it requires about a threefold increase in the expected numbers evacuated from the region. Introduce the plutonium based MOX fuel then there is a further increase of early deaths, a rocketing of evacuees, up to over 650,000 in this example, and a projected 8,000 or so deaths.

All of this compares with the AREVA EPR design intent which, permitting only a piffling 3 ten-thousandths release fraction, results in no early

deaths, just 4 late deaths and a need to evacuate about 2,500 individuals from the path of the radioactive release.

These two examples, extended fuel performance of the proposed Generation III reactor new-builds and the absolute requisite need to minimise the amount of radioactivity released in real accidents and incidents, have not been included in the Justifying Authority's introduction and guide to the consultation process. There are other aspects relating to the performance, day-to-day and routine radioactive discharges, operational nuclear safety and safekeeping of the radioactive wastes arising from operation and eventual decommissioning of Generation III nuclear power plants that are also omitted from the Justifying Authority's consultation process.

In other words, in the dearth of information presented by the Justifying Authority the public has not had sufficiently comprehensive and reliable information placed before it to arrive at an intelligent and meaningful judgment with which to participate in the Justification Consultation Process. This omission is sufficient reason alone, I contend, for the Secretary for State to refer this matter of justification to an open public inquiry.

Thank you