

OLD AND NEW AT SIZEWELL!

i) NUCLEAR INSTALLATIONS INSPECTORATE'S DECISION NOT TO PROSECUTE SIZEWELL A OVER THE JANUARY 2007 RADIOACTIVE LEAK and ii) ADEQUACY OF THE NUCLEAR SAFETY AND EMERGENCY PLANNING REGIMES FOR SIZEWELL C?

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COMMUNITIES AGAINST NUCLEAR EXPANSION & SHUT DOWN SIZEWELL CAMPAIGN

7:30 pm, Tuesday 10 November 2009
Leiston Community Centre, Sizewell Rd, Leiston, Suffolk

Sizewell A: In the early hours of 7 January 2007 a radioactive release arose as a direct consequence of a breach in the pipe work serving the spent fuel pond water recirculation system resulting in uncontrolled spillage of about 40,000 gallons (180m³) of (radio)active water over a period of about 45 minutes. About one-quarter of this spillage discharged completely untreated to the marine environment via the Sizewell A site storm drainage system.

In its subsequent investigations into the incident the nuclear safety regulator, the Nuclear Installations Inspectorate, found the root cause of the failure and radioactive discharge to comprise that Magnox Electric had failed to put in place proper inspection and appropriate maintenance regimes for the pond water recirculation and containment systems; its staff were poorly trained and ill-prepared; vital detection and alarm systems were either not fully commissioned and/or not working; lessons had not been learnt, particularly from a previous and almost identical failure of the recirculation pipe work; and, generally, such was the significance of the mistakes made by Magnox Electric staff that their suitability to carry out their roles effectively must be at issue. In fact, if it had not been for the quite fortuitous presence of a contractor in an adjacent laundry area who reported flooding in that locality, then the leakage could have completely drained down the pond, uncovered the spent fuel and, in all probability, resulted in a fuel fire with an off-site airborne release of highly radioactive fission product – this scenario could have developed within 10 hours of the initial pipe failure, that is inside the 12 hours rota of the walk-through inspections of the fuel pond area in operation at the time of the incident.

The role, omissions and weaknesses of the NII's methodology, including its own failure to adhere to prescribed procedures, in reaching a decision on whether to prosecute Magnox Electric for criminal breach of the Sizewell A Nuclear Site Licence and the Nuclear Installations Act 1965 are considered and conclusion drawn in the first part of the presentation.

Sizewell C: Present government policy encourages at least 6 to 8 new build nuclear plants at UK existing nuclear generation sites and, to this end, last year the French owned Électricité de France (EdF) utility took over Britain's nuclear generator British Energy and its seven existing nuclear sites. EdF has stated its intention to develop the existing British Energy nuclear sites at Sizewell and Hinkley Point (Somerset) each with two pressurised water reactors (PWR) for which it has promoted the new build *European Pressurised Reactor* (EPR) presently under construction at Olkiluoto in Finland and at Flamanville in France. Compared to the existing Sizewell B PWR of about 1,100MWe capacity, a single EPR is rated at 1,600MWe 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 (about double current fuel burn-up) levels and also of being fuelled with plutonium based fuel (MOX).

In 1982 the then National Radiological Protection Board (now part of the Health Protection Agency) published the results of its comprehensive analysis into a radiological incident at the then proposed Sizewell B PWR nuclear power station. For NRPB assumed that a severely damaging incident would rupture the reactor containment dome (*containment failure*) giving rise to a 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 very much 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 but for this study, obviously to offset public alarm associated with 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 extent of radioactive release to a *containment bypass* for which no early or longer-term deaths were projected.

According to AREVA, the designer of the EPR, the EdF nuclear plant will be 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° 4 reactor, it is reliably estimated that at least 30% to 50% of the total reactor fission product radioactivity released uncontrolled into the atmosphere. The equivalent worst-case reactor incident from one of the operational EPRs at Sizewell would, according to AREVA and EdF, result in no more than (6 x 0.03%) 0.18% release of the total the radioactive inventory.

In his illustrated presentation John Large challenges AREVA's assurances of a failsafe reactor containment design and, in doing so, he provides an up to date prediction of the radiological consequences of a severely damaging incident involving a future EPR nuclear power station at Sizewell, 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, or similar Generation III reactors, will be commissioned at Sizewell C, 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 the Chernobyl accident of 1986. The modelling 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 Sizewell, 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 Sizewell 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*).

JOHN LARGE is the Chief Executive of Large & Associates, a company of consulting engineers based in London that specializes in the nuclear field. He is a Chartered Engineer, a Fellow of the Institution of Mechanical Engineers, a Graduate Member of the Institution of Civil Engineers, a Member of the British Nuclear Energy Society, Member of the Institution of Nuclear Engineers and a Fellow of the Royal Society of Arts. Prior to founding Large & Associates, from the late 1960s through to the early 1990s, John Large was a full time member of the research and teaching academic staff of Brunel University, where he undertook research for the United Kingdom Atomic Energy Authority (UKAEA) on reactor systems, high temperature reactor fuel, moderator core coolant flows and aspects of other nuclear topics and devices. For Large & Associates he has presented evidence to the UK parliament select committees on Environment and Energy, given evidence at the Court of Human Rights in Strasbourg on the dose exposure to HM services personnel exposed during the Christmas Island nuclear tests, and been involved in investigating nuclear programmes in South Africa, Taiwan, Japan, Korea and, most recently, Iran. John Large was personally responsible for selecting and heading up the team of specialists, engineers and scientists that undertook the nuclear and radiological assessments of the reactors and weapons systems on board the sunken submarine *Kursk* throughout the world-first salvage operation of 2001, being awarded a commemorative medal for his contribution from the authorities of the Russian Federation.

John Large and Large & Associates have completed a number of investigations and analyses relating to the PWR EPR plants at Olkiluoto in Finland and at Flamanville in France, and on the current situation at Chernobyl, all of which can be accessed at:

Terrorist Threat at the Flamanville EP <http://www.largeassociates.com/3155%20Jersey/R3155-3.pdf> - <http://www.largeassociates.com/3155-R1%20-%20Draft%2031%20July%202006.pdf>
Potential Radiological Consequences <http://www.largeassociates.com/3150%20Flamanville/r3150-final-1.pdf>
EPR at Olkiluoto, Finland <http://www.largeassociates.com/3149%20Olkiluoto/R3149-A1%20Final%20Issue.pdf> - <http://www.largeassociates.com/R3123-a2%20final%20Issue.pdf>
Chernobyl: 20 Years On <http://www.largeassociates.com/3143%20Chernobyl/R3143-A3%2022%20April%202006.pdf>.