

**Risk of cancer following exposure Part II: recent evidence**

*11.1 Nuclear sites and their proximity*

In 1983, a TV company discovered the first of the nuclear site childhood cancer and leukaemia clusters at Seascale near the nuclear fuel reprocessing plant Sellafield (earlier 'Windscale') in West Cumbria. Following the confirmation of this by epidemiologists and after a government enquiry, the UK government set up two new committees to (a) develop epidemiological surveillance methods for small areas and (b) investigate the origin of the leukaemia excesses near nuclear sites. In the 15 years following the Sellafield leukaemia cluster, similar clusters were established near the other two reprocessing plants in Europe, Dounreay in Scotland and La Hague in northern France. In addition, childhood leukaemia clusters were reported for other nuclear sites which released radioisotopes to the environment, Aldermaston, Burghfield, Harwell and Hinkley Point and Chepstow in the UK, Krueffel in Germany and Barsebeck in Sweden. The sites which have been studied are given in Table 11.1.

The committee has examined the considerable weight of evidence relating to the existence of childhood cancer clusters near nuclear sites, including evidence from aggregations of nuclear sites in the UK and Germany and has concluded that it is exposure to internal radiation from discharges from the sites which is the cause of the illness. The arguments against this position are well summarised in reports from the UK National Radiological Protection Board, the various reports of COMARE, and the three French government Nord-Cotentin missions.

In addition, for Sellafield (Seascale) these arguments were rehearsed in a court case in 1993 in which the Judge found, on the scientific evidence presented, that the leukaemia cases could not have been caused by the radiation. However, the court in this instance was presented with the hypothesis that the cases were caused by the father's pre-conception irradiation, and little independent evidence to support this hypothesis was presented, owing to the unfortunate death of the chief witness, Martin Gardner. No examination was made by the court of the alternative hypothesis, which was that the risk factor calculations presented were based on external acute irradiation and were therefore unsafe.

This is a general concern of the committee. All the analyses of causality in the case of nuclear site clusters rely exclusively on the ICRP risk model to show that the calculated doses to the children or their parents were insufficient to have been the cause of the disease since the linear ICRP model did not predict the leukaemias or cancers. The approximate discrepancy between the doses and the observed cases of leukaemia in the various studies is given in Table 11.1.

**Table 11.1** Studies establishing excess leukaemia and cancer risk in children living near nuclear sites.

<b>Nuclear Site</b>	<b>Year</b>	<b>Defined ICRP risk multiplier</b>	<b>Notes</b>
<sup>a</sup> Sellafield/ Windscale, UK	1983	100-300	Well studied by COMARE: high level of discharge to atmosphere and sea
<sup>a</sup> Dounreay, UK	1986	100-1000	Well studied by COMARE: particle discharges to atmosphere and sea.
<sup>a</sup> La Hague, France	1993	100-1000	Particle discharges to atmosphere and sea: ecological and case control studies

<sup>c</sup> Aldermaston/ Burghfield, UK	1987	200-1000	Well studied by COMARE: particle discharges to atmosphere and rivers
<sup>b</sup> Hinkley Point, UK	1988	200-1000	Discharges to offshore mud bank
<sup>d</sup> Harwell	1997	200-1000	Discharges to atmosphere and river
<sup>b</sup> Kruemmel, Germany	1992	200-1000	Discharges to atmosphere and river
<sup>d</sup> Julich, Germany	1996	200-1000	Discharges to atmosphere and river
<sup>b</sup> Barsebaeck, Sweden	1998	200-1000	Discharges to atmosphere and sea
<sup>b</sup> Chepstow, UK	2001	200-1000	Discharges to offshore mud banks

*A Reprocessing plants discharging to sea;*

*B Nuclear power station discharging to sea or river;*

*C Atomic weapon and nuclear material fabrication plants; d Atomic research with discharges to local rivers*

Extracted from *2003 Recommendations of the ECRR The Health Effects of Ionising Radiation Exposure at Low Doses and Low Dose Rates for Radiation Protection Purposes: Regulators' Edition* Edited by Chris Busby with Rosalie Bertell, Inge Schmitz-Feuerhake, Molly Scott Cato and Alexei Yablokov Published on Behalf of the European Committee on Radiation Risk Comité Européen sur le Risque de l'Irradiation, Brussels by Green Audit, 2003.  
ISBN: 1 897761 24 4 [pp 103-4]