COMARE is a committee of independent experts which advises Government on the health effects of ionising and non-ionising radiation found in the general environment. Childhood leukaemia has been central to the work of COMARE since its inception in 1985. COMARE was formed following a recommendation of the Black Advisory Group which investigated the allegation in a Yorkshire TV programme that there was a cluster of childhood cancer, predominantly leukaemia, close to the nuclear establishment at Sellafield. Subsequent investigations showed that the cluster was centred on the village of Seascale, the closest village to the site. Radioactive contamination was an obvious explanation, but extremely thorough investigations have found no evidence for exposure of children of sufficient magnitude to explain the cluster which has persisted for over three decades and which includes cancers other than leukaemia in children and young people. A case-control study by Martin Gardner and his colleagues led them to suggest that occupational exposure of fathers prior to conception of their children could explain the leukaemia cluster. Other studies of the Sellafield workforce have produced similar results, although, since they include Gardner’s cases, they cannot be regarded as providing independent confirmation. A number of other studies worldwide have failed to find any effect of paternal preconceptional irradiation, however, and this hypothesis is not considered to have any general validity. Even at the time of its publication, many geneticists made the point that the radiation doses received by fathers could not, on the basis of current knowledge, produce enough mutations to pass on to their children and cause leukaemia. Other causes of childhood leukaemia have been postulated, such as Kinlen’s population mixing hypothesis, and COMARE’s current view is that whatever drives the population mixing effect may be plausibly considered to be responsible for much of the cluster in Seascale. However, COMARE has always been concerned that there may be multiple factors and that they may interact with one another. So far as classical mutations are concerned, there still could not be enough resulting from paternal exposure at Sellafield to make a significant contribution to synergistic interaction. However, we noted in our 4th report in 1996, that there was preliminary evidence that some events in the male germ line could occur at a frequency far greater than that predicted by classical experiments. I will review subsequent evidence that has confirmed this and will conclude by removing my Chairman’s hat and making some personal speculations about possible implications for leukaemogenesis in Seascale.