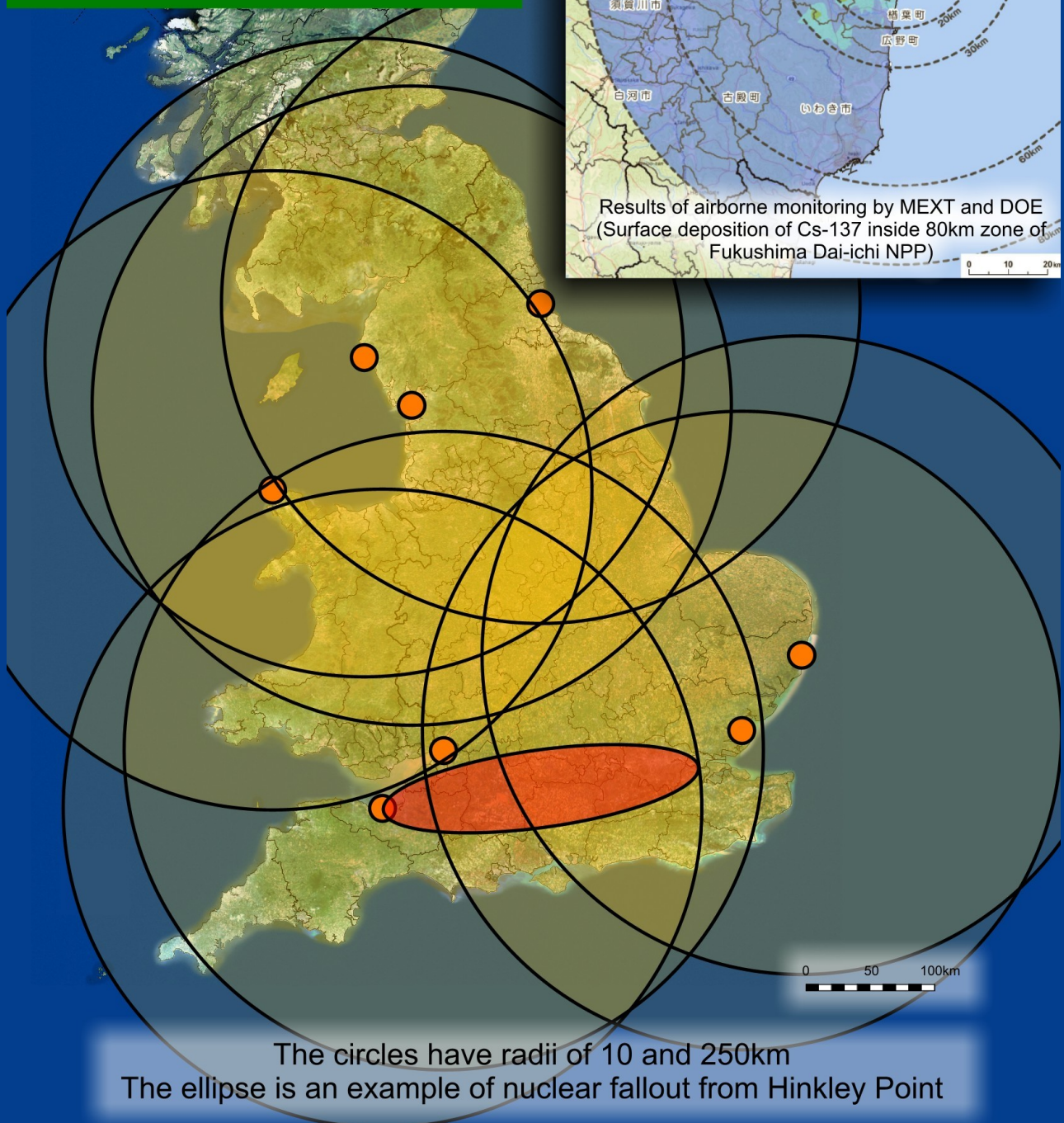
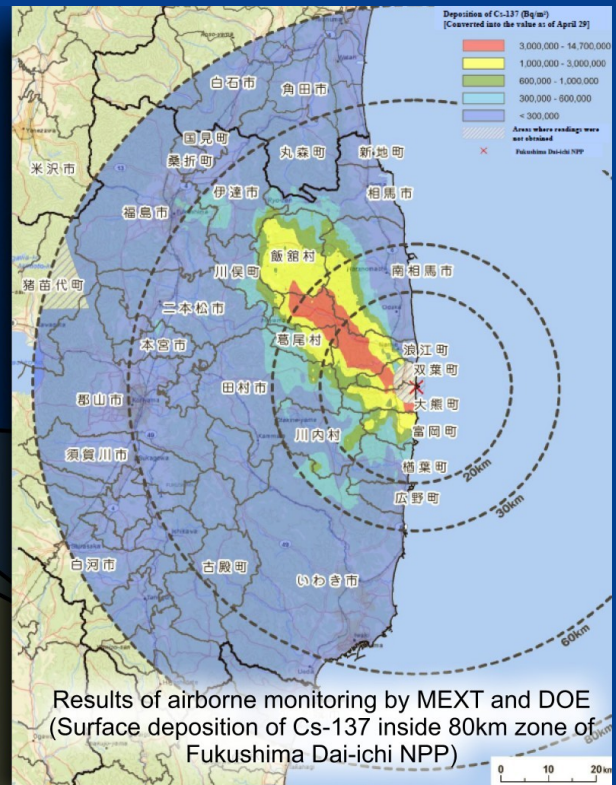


THE REAL LESSONS OF FUKUSHIMA

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SUMMARY

This study is based on evidence on the Fukushima disaster and its consequences, almost all from the internet. Many quantitative studies have been found, but no proper studies from the IAEA or the UK ONR. The fast-moving and highly dangerous events of such a disaster require decision support. Thermal models of the reactors and spent fuel pools are essential to predict their behaviour under Station Blackout and to evaluate possible counter-measures. Also plume (dispersion) models of possible radioactive releases are essential to inform decisions on the magnitude and direction of evacuations. The Japanese have such a plume model, but it was ignored until later. Also they had no instrument for airborne radioactivity measurements at hand and had to rely initially on aerial surveys carried out by the Japan-based US Emergency Response Centers. These deficiencies were omitted or downplayed in the reports of the IAEA Fact Finding Mission, but most were included in the report of the Hatamura Panel.

Following the disaster, nearly 15,000 workers have received radiation doses of up to 250 mSv. Including the general public and using widely accepted dose-effect models, the estimated excess cancer deaths are 350 to 3000, while with other dose-effect models they are 100,000 to 200,000, though all these should be reduced by evacuation. About 80,000 persons have been forced to evacuate parts of Fukushima prefecture and live elsewhere. For the public, the dose criterion for evacuation was set at 20 mSv/y. However, for the decontamination plan the target dose limit was set equal to the ICRP dose limit of 1 mSv/y. This also requires more evacuation.

The area of land contaminated with radioactive cesium to more than 10,000 Bq/m² is about 30,000 km², some 8% of Japan. Even with considerable decontamination, a significant area of Japan will remain uninhabitable for 10 to 20 years or more. Moreover, land is required for storing the huge volumes of radioactive waste.

The household and business compensation cost may be ¥ 3.6 trillion and the decontamination cost up to ¥ 10 trillion or more, for a total of ¥ 14 trillion (\$ 180 billion) or more. With insurance cover of only \$ 1.6 billion, the shortfall may be up to \$ 178 billion or more, which will have to be met by the taxpayers. This and other subsidies means that nuclear power can never be competitive. In any case, such consequences make it an ethical issue.

The Fukushima release source term is far less than the maximum possible and if it had fallen on a major city such as Tokyo, the consequences would have been even more horrific. The record shows that in severe accidents of INES 5 to 7, the contribution of human errors is 100%. Hence the worst case, with core meltdowns and the maximum physically possible release of radioactivity, must be considered. Germany, Switzerland and Italy have decided to join most other countries and phase out nuclear power. All the nuclear power plants in Japan will be shut down by the spring and the citizens may not allow any to be re-started. Economy minister Yukio Edano said he does not expect any nuclear power plant to be operating this summer, but thermal power and conservation efforts should be enough for the nation to get by.

The UK criteria for siting nuclear power plants consider only a small radioactive release and fallout reaching 30 km. Yet the Fukushima release was about 4000 times as much and the NII Fukushima 'reasonable worst-case scenario' release about 270,000 times as much. According to the Kondo Report worst case, the fallout would require evacuation to 170 or 250 km or more, e.g. from Hinkley Point to Birmingham or London. Also the compensation for the land and property losses and the decontamination costs would be far larger than for Fukushima, at roughly £ 1 trillion. So the UK siting criteria are wholly inadequate and almost all the citizens of Britain are threatened by the existing and proposed nuclear power plants. In the words of Dr John Gofman, this is 'licensing random premeditated murder'. Thus the former must be phased out forthwith and the latter abandoned.

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The Full Study, with Tables, Figures and References, may be downloaded from:
<http://www.energypolicy.co.uk/FukushimaRealLessons.pdf>