

What would have happened to the fallout if a Tsunami
damaged Hinkley Point on 11th March 2011?
Air modelling of fallout plume

Chris Busby, Dai Williams and Cecily Collingridge



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Introduction

The recent events at Fukushima in Japan bring into stark focus the extreme dangers associated with siting nuclear reactors on the sea coast. Apart from the continuous releases to the sea which cause on-going contamination of coastal sediment and biota, and the associated exposure of those living nearby, there is the sensitivity of the locations to coastal geophysical effects including tidal waves. In the case of Hinkley Point and the other Bristol Channel and Severn estuary nuclear sites there was an 8 metre flood in 1607, possibly the result of a tsunami,(1) and suggestions that another is possible or even imminent.(2) Whatever the truth of such a prediction, it does represent a possible scenario for a Fukushima type catastrophe at Hinkley Point, causing damage with loss of coolant and a meltdown. It is not enough to say that there are many levels of safety constraints, or that Chernobyl type disasters cannot occur in western reactor designs. The same was said about Fukushima. The question addressed in this note is what would happen to the releases from the plant? In the case of Fukushima, located on the eastern seaboard of Japan, the prevailing winds are (as at Hinkley) westerly. Therefore large amounts of the release went out to sea (although there were local recurvatures of air masses that resulted in serious contamination of Tokyo and Ibaraki prefecture).

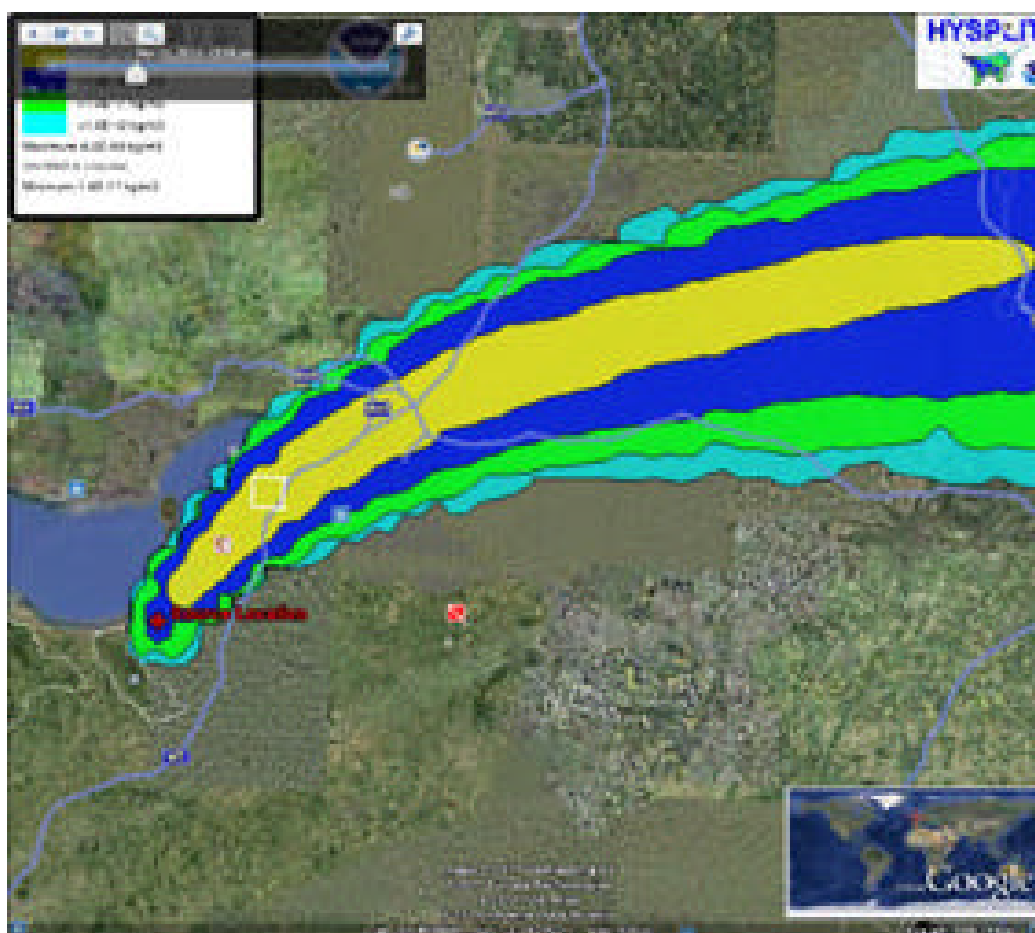
Green Audit has employed the NOAA HYSPLIT program available for use from the USA Air Resources Laboratory (3) to determine the direction of unit radioactivity (Caesium-137, Iodine-131, Plutonium-239, etc) release from Hinkley Point assuming a catastrophic accident following a tsunami incident on the same day as that which occurred in Japan.

Results and conclusions

Fig 1 below shows the precipitation (deposition) plume from the source assuming a 6hr release on 11th May at 0600am of 10,000kg. This value is not meant to represent a real quantity but is used as if it were 10,000 units of radioactivity and is scalable to any amount that was released. Dispersion concentration and deposition animations have also been created and are available on the website of llrc.org and stophinkley.org (4). What is clear from all these calculations is that radioactivity at the levels being released from Fukushima would contaminate the home counties and London and would rapidly make the south of England uninhabitable.

Recent conservative calculations of the cancer yield from the Fukushima releases and deposition inside 200km from the plant are based on the risk model of the European Committee on Radiation Risk and also on the measured increases in Sweden following the Chernobyl fallout exposures (5). Based on the population of about 10 million in the 200km radius from the Fukushima site the number of cancer cases predicted was between 200,000 and 400,000 (10 years and 50 years, two different methods). The population in England and Wales which would be exposed in the present hypothetical Hinkley Point scenario is in excess of 20 million and therefore the cancer yield would be in excess of 400,00- to 800,000 in those exposed.

Fig 1. Radioactivity plume from Hinkley Point releases for 6 hrs on 11th March 2011 generated by NOAA HYSPLIT programme.



References:

- (1) Ward, S. N. & Day, S. J.; 2001. Cumbre Vieja Volcano; potential collapse and tsunami at La Palma, Canary Islands. *Geophys. Res. Lett.* 28-17, 3397-3400.
- (2) Bryant, Edward; Haslett, Simon (2007). "Catastrophic Wave Erosion, Bristol Channel, United Kingdom: Impact of Tsunami?". *Journal of Geology* 115 (3): 253–270.
- (3) Draxler, R.R. and Rolph, G.D. (2011) HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY Website (<http://ready.arl.noaa.gov/HYSPLIT.php>). NOAA Air Resources Laboratory, Silver Spring, MD.
- (4) Chris Busby, Dai Williams and Cecily Collingridge (2011) NOAA HYSPLIT results for Hinkley Point. Dispersion concentration and deposition animations of releases from Hinkley Point on 11 March 2011 (www.llrc.org; www.stophinkley.org)
- (5) Chris Busby (2011) The health outcome of the Fukushima catastrophe Initial analysis from risk model of the European Committee on Radiation Risk ECRR Green Audit; Occasional Paper 2011/7 Aberystwyth UK, 30th March 2011 (www.llrc.org ; www.bsrrw.org)

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