

# Measuring radioactive dust in northern Japan

## Fukushima Daiichi isotopes in home and auto air filters and in children's shoes

**Hypothesis:** Residents of northern Japan are currently exposed to dusts containing radioactive isotopes released by the Fukushima Daiichi nuclear accidents.

**Materials and methods:** Automobile air filters, household air cleaner filters, and children's shoes were collected and analyzed by autoradiography on X-ray sensitive film, germanium-lithium gamma spectrometry, and scanning electron microscopy / energy dispersive X-ray analysis. The Japanese samples came from as far north as Sapporo in Hokkaido Prefecture and as far south as Tokyo, a range of 780 km. Fifty nine samples of dust from Japan were analyzed. A larger set of US and Canada samples was analyzed in the same fashion. Sample collection was crowd sourced, using volunteers belonging to the Tokyo-based organization, SAFecast. Volunteers received training in sampling and shipping procedures.

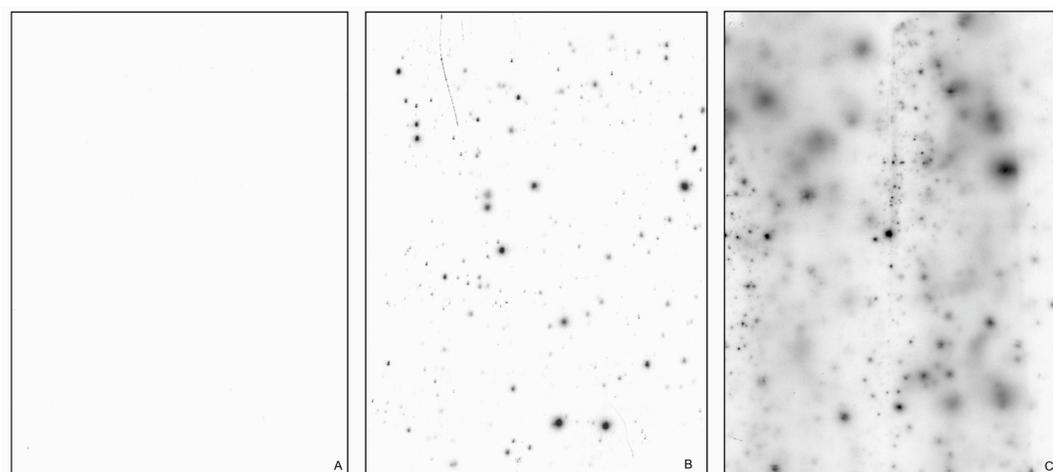
**Results:** Radioisotopes specific to the Fukushima Daiichi accidents, including Cs134, Cs137, and Co60 were detected in dust samples taken throughout Northern Japan, including areas more than 200 km outside of the accident exclusion zone. Cs134 was detected at all of the Japanese sites tested. Cs134 has a 2 year half life, and is diagnostic for recent releases from nuclear reactors. Of the more than 100 USA and Canada dust and soil samples examined, Cs134 was found in only 3 soil samples. Japanese samples analyzed in the first month after the accident also contained I131 and Am241. The I131 decayed away in the course of the study. From April 2011 to December 2011, the total activity in samples of Japanese airborne dusts has decreased by an order of magnitude.



**Conclusion:** Radioactive dust has become a ubiquitous part of life in northern Japan, but has only an isolated and limited impact on radioactivity in US and Canadian soils and dusts.

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### X-ray film autoradiographs of car air filters

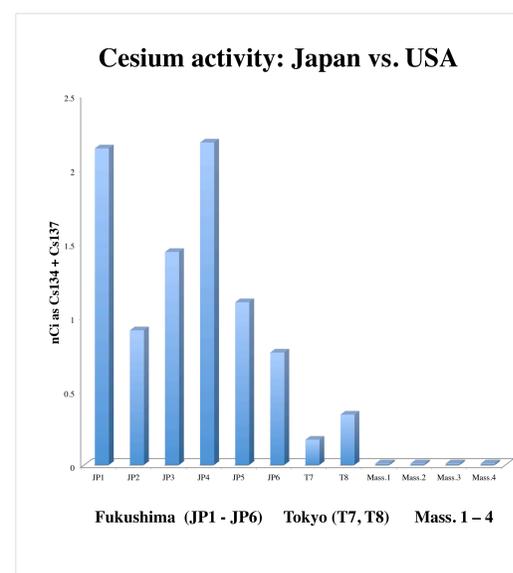


Seattle, WA, n = 17  
Mean uR/hr. = 12.1  
SD = 0.9  
Blank = 11.2 uR/hr.  
6000 km from F. Daiichi

Tokyo, Japan, n = 12  
Mean uR/hr. = 15.3  
SD = 6.5  
Blank = 11.2 uR/hr.  
200 km from F. Daiichi

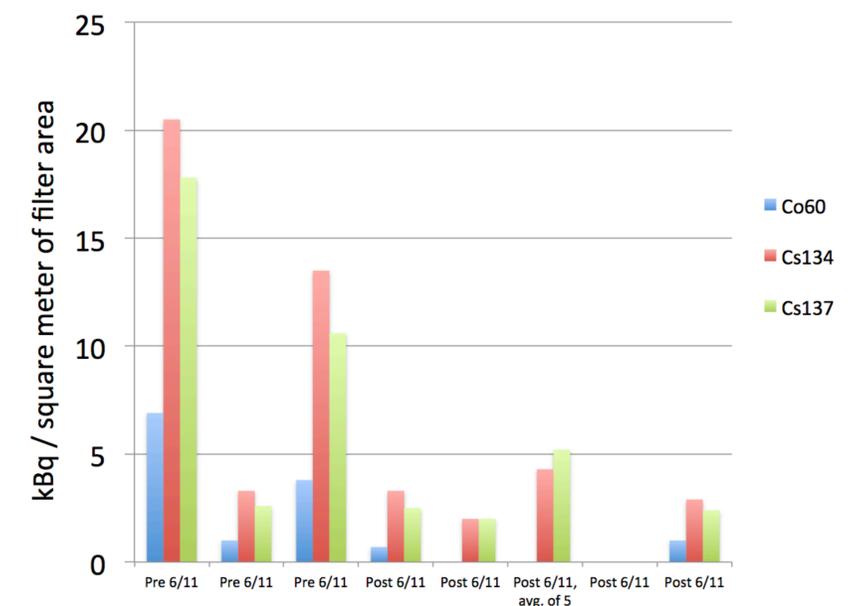
Fukushima City, Japan, n = 5  
Mean uR/hr. = 127  
SD = 208  
Blank = 11.2 uR/hr.  
65 km from F. Daiichi

### Cs134 and Cs137 on children's shoes



Japan average pCi = 1,180, SD = 790  
USA average pCi = < 10 pCi, SD = NA

### Co60, Cs134 and Cs137 in indoor air filters



Pre June 2011 mean = 26.7 kBq/m², SD = 19  
Post June 2011 mean = 7.1 kBq/m², SD = 4.5