

**Radiation Exposure to the Population
in Japan After the Earthquake**

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The Fukushima nuclear accident dispersed airborne dusts that are contaminated with radioactive particles. When inhaled or ingested, these particles can have negative effects on human health which are different from those caused by exposure to external or uniform radiation fields. A field sampling effort was undertaken to characterize the form and concentration of radionuclides in the air, and in environmental media which can accumulate fallout. Samples were collected from Fukushima City, Japan, Greater Tokyo, and the Western United States. Samples included settled dusts, surface wipes, used filter masks, used air filters, dusty footwear, and surface soils. These materials were analyzed by gamma spectrometry, autoradiography, and scanning electron microscopy with energy dispersive X-ray analysis, (SEM-EDS). Particles were collected from used motor vehicle air filters and standard 0.45 micron membrane air filters. Soils and settled dusts were collected from outdoor surfaces, interior surfaces, and from used childrens' shoes. The Japanese filters contained cesium 134 and 137, as well as cobalt 60 at levels as high as 3 nCi total activity per sample. Materials collected during April 2011 from Japan also contained Iodine 131. This short-lived nuclide was not observed in later samples. US air filter and dusts samples did not contain hot particles, except for air samples collected from Seattle, WA during the month of April 2011. The samples of Japanese childrens' shoes were found to have relatively high radiocesium contamination levels in the 1 to 4 nanoCurie range, on both the shoe uppers and on soles. Isolated US soil samples contained up to 8 nanoCuries per Kg of radiocesium, while control samples showed no detectable radiocesium. Dusts containing radioactive cesium were found at levels orders of magnitude above background more than 100 miles from the accident site, and were detectable on the US west coast. These data show that inhalable radioactive contamination exists outside of the 12 mile Fukushima Daiichi evacuation radius. The US Nuclear Regulatory Commission's existing 10 mile radius emergency planning zone for inhalation hazards would not be adequate to protect public health if a similar accident occurred in the US.