

Estimation of Cesium in Sand and Soil Samples in the United States, 2012-2013

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Soil and sand samples were obtained between April 2012 and December of 2013 from a broad spectrum of areas ranging from almost every region in the continental United States. Each sample upon collection and/or receipt was placed in a standardized jar, labeled, weighed, tested with an Inspector Geiger counter and sealed. The samples were then stored for at least 3 weeks prior to testing with an NaI(Tl) scintillator and a GS1100A multichannel analyzer to determine the presence of radiation through gamma spectroscopy. The scintillator was calibrated with a cesium-137 NIST standardized checksource and a cobalt-60 checksource, then 48 samples were tested for 8 hours each with regular background tests performed between December 2013 and January 2014.

Up to 44 different energy levels were measured from each sample for analysis purposes. Measurements yielding statistically significant counts in the 661 keV range are listed as detections of Cesium-137 below in orange bold by sample region, collection date and location in Becquerels per kilogram including all known uncertainties with 95% confidence. Upper limits were mathematically calculated for measurements of that range found not statistically significant and are listed as “less than” numbers. These values serve as limits on potential presence under conditions of uncertainty or other processes and should be considered as non-detections. Measurements of energy levels used to determine presence of radionuclides other than those used for calibration, specifically Cesium-134, were estimated with the use of a calibration curve and reported in yellow bold as an average of the estimated activity of multiple statistically significant detections. For further information on process and procedure see The Notebook's Notes, Sample Analysis, Equipment and again the disclaimer on our main page.

Results: Twenty-two (22) of forty-eight (48) samples yielded statistically significant detections for Cesium-137. Of those, six (6) yielded statistically significant detections for Cesium-134. Considering sample collection and testing dates with respect to the Fukushima Daiichi NPP multiple meltdowns of March 11, 2011, those detections are strongly indicated as resulting from the same due to atmospheric deposition.

2012-2014 SOIL	Cs-137 DETECTION, 95% confidence	Cs-137 NON-DETECT, 95% confidence
PACIFIC		
San Gabriel Mtns., CA	10.0 +/- 0.6	
Greshem, OR	9.2 +/- 0.6	
Blue Mtns, OR	19.1 +/- 1.2	
Beaverton, OR	4.0 +/- 0.2	
MOUNTAIN		
Sonoran Desert, AZ	3.7 +/- 0.2	
Athol, ID	24.0 +/-1.5	
NORTHWEST CENTRAL		
Underwood, IA		< 7.3
Pipestone, MN	5.1 +/- 0.3	
Taylor's Falls, MN		< 6.0
Freemont, NE	5.7 +/- 0.3	
SOUTHWEST CENTRAL		
NORTHEAST CENTRAL		
Macon, IL		< 2.4
Oregon, IL		< 8.5
South Beloit, IL		< 5.5
Churubusco, IN	9.6 +/- 0.6	
Clinton, IN		< 10.3
New Paris, OH	4.9 +/- 0.3	
Whitehouse, OH	5.8 +/- 0.4	
Cornell, WI		< 6.5
SOUTHEAST CENTRAL		
Philadelphia, TN	11.1 +/- 0.7	
Maryville, TN	5.4 +/- 0.3	
NEW ENGLAND		
Otter Creek, ME (sand)	2.0 +/-0.1	
NORTH ATLANTIC		
Sinking Spring, PA	4.1 +/- 0.3	

SOUTH ATLANTIC		
Inwood, WV		< 11.5
Staunton, VA		< 5.7
Strasburg, VA	8.6 +/- 0.5	
Willis, VA		< 6.2
Halifax, NC		< 7.1
Georgetown, SC		< 5.5
Myrtle Beach, SC (sand)		< 10.9
Atlanta, GA		< 4.5
Amelia Island, FL (sand)		< 6.9
Oak Hill, FL		< 7.5