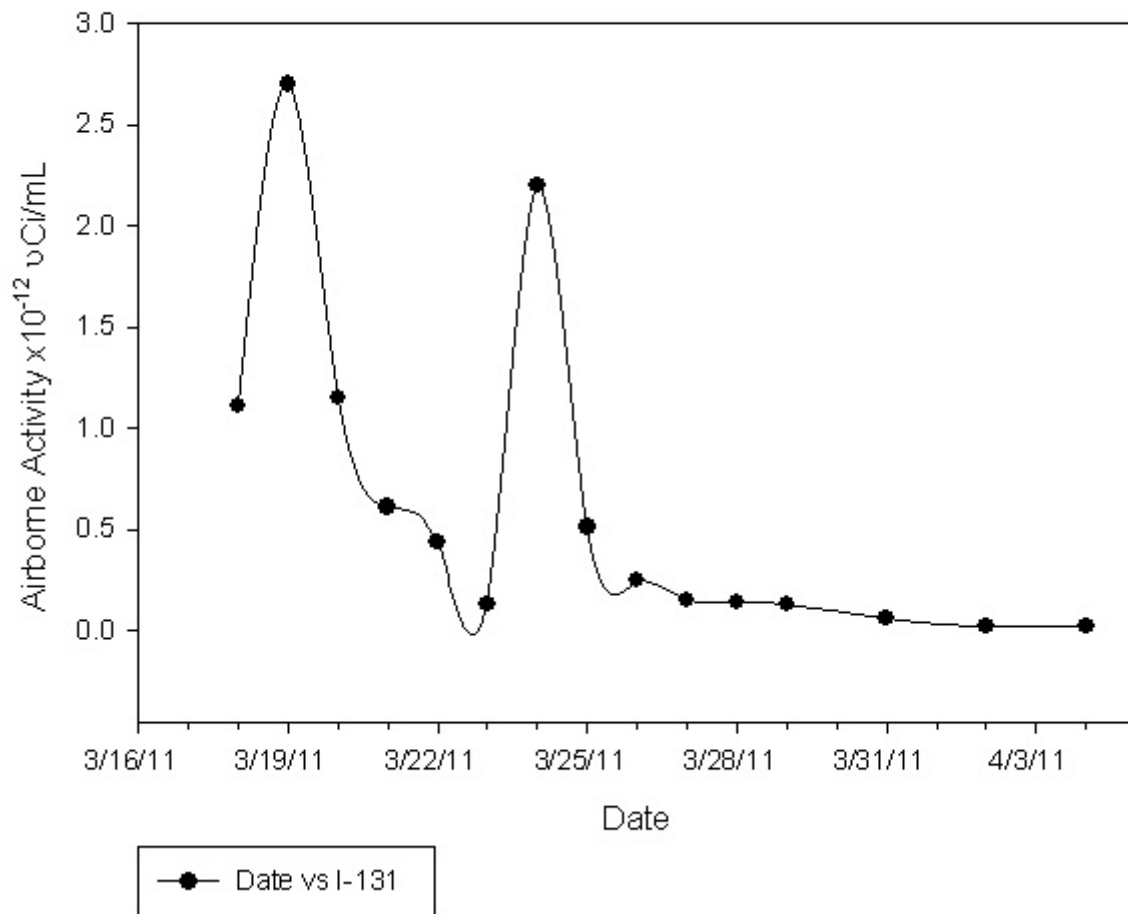


Air Monitoring Results - Chandler, Arizona

Air samples are being collected on medium and Hi-Vol samplers at our lab in Chandler. The samples are being collected on filter paper for particulates and TEDA impregnated charcoal for ^{131}I and are being analyzed by high resolution gamma spectroscopy. Results are reported daily in the plot and tables below (latest results first). Naturally occurring isotopes found in all air samples have been omitted. The radioiodine levels are observable, but not dangerous (see dose calculation at the end). The levels have dropped to background. Air sampling was terminated on April 5. Rainwater samples are still being reported below, although these have declined to background levels.

Airborne ^{131}I in Chandler, AZ



**Rainwater
Collected on April 9, 2011**

Location	¹³¹I ($\mu\text{Ci/L water}$)
Chandler	$<2.0 \times 10^{-5}$
Tempe	$<1.4 \times 10^{-5}$

Rain water concentrations of ¹³¹I have now declined to background levels.

**Rainwater
Collected on April 6, 2011**

Location	¹³¹I ($\mu\text{Ci/L water}$)
Chandler	$3.4 \times 10^{-5} \pm 18\%$
Tempe	$4.5 \times 10^{-5} \pm 13\%$

Rain water concentrations of ¹³¹I are over ten times lower than those found in the rainwater on March 21 (see table below). This reflects the much lower air concentrations present now.

**Air Sample No. 15
Start Date: April 3, 2011 9:05 AM
Stop Date: April 5, 2011 11:35 AM
Sample Volume: 242,400 liters of air**

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	¹³⁷ Cs	$<2.0 \times 10^{-14}$	6×10^{-8}	0%
Particulate	¹³⁴ Cs	$<2.0 \times 10^{-14}$	4×10^{-8}	0%
Particulate	¹³¹ I	$<2.4 \times 10^{-14}$	2×10^{-8}	0%
Vapor	¹³¹ I	$2.2 \times 10^{-14} \pm 17\%$	2×10^{-8}	0%

Air Sample No. 14
Start Date: April 1, 2011 7:40 AM
Stop Date: April 3, 2011 9:03 AM
Sample Volume: 232,240 liters of air

Type	Isotope	Activity ($\mu\text{Ci}/\text{mL air}$)	DAC* ($\mu\text{Ci}/\text{mL air}$)	% of limit
Particulate	^{137}Cs	$<1.8 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{134}Cs	$<1.8 \times 10^{-14}$	4×10^{-8}	0%
Particulate	^{131}I	$<2.0 \times 10^{-14}$	2×10^{-8}	0%
Vapor	^{131}I	$1.6 \times 10^{-14} \pm 23\%$	2×10^{-8}	0%

Air Sample No. 13
Start Date: March 30, 2011 7:11 AM
Stop Date: April 1, 2011 7:39 AM
Sample Volume: 232,240 liters of air

Type	Isotope	Activity ($\mu\text{Ci}/\text{mL air}$)	DAC* ($\mu\text{Ci}/\text{mL air}$)	% of limit
Particulate	^{137}Cs	$<3.4 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{134}Cs	$<3.5 \times 10^{-14}$	4×10^{-8}	0%
Particulate	^{131}I	$<4.1 \times 10^{-14}$	2×10^{-8}	0%
Vapor	^{131}I	$6.2 \times 10^{-14} \pm 12\%$	2×10^{-8}	0.0004%

Air Sample No. 12
Start Date: March 29, 2011 7:11 AM
Stop Date: March 30, 2011 7:14 AM
Sample Volume: 115,360 liters of air

Type	Isotope	Activity ($\mu\text{Ci}/\text{mL air}$)	DAC* ($\mu\text{Ci}/\text{mL air}$)	% of limit
Particulate	^{137}Cs	$<7.8 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{134}Cs	$<8.2 \times 10^{-14}$	4×10^{-8}	0%
Particulate	^{131}I	$4.8 \times 10^{-14} \pm 20\%$	2×10^{-8}	0.0002%
Vapor	^{131}I	$8.4 \times 10^{-14} \pm 12\%$	2×10^{-8}	0.0004%

Air Sample No. 11
Start Date: March 28, 2011 6:12 PM
Stop Date: March 29, 2011 7:09 AM
Sample Volume: 66,045 liters of air
Partial Day

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	^{137}Cs	$<7.8 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{134}Cs	$<8.2 \times 10^{-14}$	4×10^{-8}	0%
Particulate	^{131}I	$<8.0 \times 10^{-14}$	2×10^{-8}	0%
Vapor	^{131}I	$1.4 \times 10^{-13} \pm 12\%$	2×10^{-8}	0.0007%

Air Sample No. 10
Start Date: March 27, 2011 8:17 AM
Stop Date: March 28, 2011 8:17 AM
Sample Volume: 122,400 liters of air

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	^{137}Cs	$<3.3 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{134}Cs	$<3.2 \times 10^{-14}$	4×10^{-8}	0%
Particulate	^{131}I	$<2.7 \times 10^{-14}$	2×10^{-8}	0%
Vapor	^{131}I	$1.5 \times 10^{-13} \pm 10\%$	2×10^{-8}	0.0008%

Air Sample No. 9
Start Date: March 26, 2011 8:02 AM
Stop Date: March 27, 2011 8:16 AM
Sample Volume: 123,590 liters of air

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	^{137}Cs	$<3.5 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{134}Cs	$<3.4 \times 10^{-14}$	4×10^{-8}	0%
Particulate	^{131}I	$6.2 \times 10^{-14} \pm 16\%$	2×10^{-8}	0.0003%
Vapor	^{131}I	$1.9 \times 10^{-13} \pm 3\%$	2×10^{-8}	0.001%

Air Sample No. 8
Start Date: March 25, 2011 7:56 AM
Stop Date: March 26, 2011 8:01 AM
Sample Volume: 122,825 liters of air

Type	Isotope	Activity ($\mu\text{Ci}/\text{mL air}$)	DAC* ($\mu\text{Ci}/\text{mL air}$)	% of limit
Particulate	^{137}Cs	$<4.1 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{134}Cs	$<4.0 \times 10^{-14}$	4×10^{-8}	0%
Particulate	^{131}I	$1.3 \times 10^{-13} \pm 10\%$	2×10^{-8}	0.0007%
Vapor	^{131}I	$3.8 \times 10^{-13} \pm 5\%$	2×10^{-8}	0.002%

Air Sample No. 7
Start Date: March 24, 2011 8:01 AM
Stop Date: March 25, 2011 7:55 AM
Sample Volume: 121,890 liters of air

Type	Isotope	Activity ($\mu\text{Ci}/\text{mL air}$)	DAC* ($\mu\text{Ci}/\text{mL air}$)	% of limit
Particulate	^{137}Cs	$1.7 \times 10^{-13} \pm 8\%$	6×10^{-8}	0.0003%
Particulate	^{134}Cs	$1.6 \times 10^{-13} \pm 11\%$	4×10^{-8}	0.0004%
Particulate	^{131}I	$8.9 \times 10^{-13} \pm 4\%$	2×10^{-8}	0.004%
Vapor	^{131}I	$1.3 \times 10^{-12} \pm 3\%$	2×10^{-8}	0.006%

Air Sample No. 6
Start Date: March 23, 2011 8:26 AM
Stop Date: March 24, 2011 8:00 AM
Sample Volume: 120,190 liters of air

Type	Isotope	Activity ($\mu\text{Ci}/\text{mL air}$)	DAC* ($\mu\text{Ci}/\text{mL air}$)	% of limit
Particulate	^{137}Cs	$<6.2 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{131}I	$1.3 \times 10^{-13} \pm 14\%$	2×10^{-8}	0.0006%
Vapor	^{131}I	$<3.8 \times 10^{-14}$	2×10^{-8}	0%

Air Sample No. 5
Start Date: March 22, 2011 7:15 AM
Stop Date: March 23, 2011 8:25 AM
Sample Volume: 128,350 liters of air

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	^{137}Cs	$<6.2 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{131}I	$4.6 \times 10^{-14} \pm 35\%$	2×10^{-8}	0%
Vapor	^{131}I	$3.9 \times 10^{-13} \pm 6\%$	2×10^{-8}	0.002%

Air Sample No. 4
Start Date: March 21, 2011 7:32 AM
Stop Date: March 22, 2011 7:13 AM
Sample Volume: 120,785 liters of air
High Wind, Blowing Dust, and Rain

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	^{137}Cs	$<6.2 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{131}I	$1.2 \times 10^{-13} \pm 6\%$	2×10^{-8}	0.001%
Vapor	^{131}I	$4.9 \times 10^{-13} \pm 6\%$	2×10^{-8}	0.002%

Rainwater Samples
Collected on March 21, 2011

Location	^{131}I ($\mu\text{Ci/L water}$)	^{89}Sr ($\mu\text{Ci/L water}$)	^{90}Sr ($\mu\text{Ci/L water}$)	^3H ($\mu\text{Ci/L water}$)
Chandler	$6.7 \times 10^{-4} \pm 5\%$	$<1.3 \times 10^{-6}$	$<3.5 \times 10^{-7}$	$<2.5 \times 10^{-4}$
Tempe	$3.9 \times 10^{-4} \pm 5\%$	$<1.3 \times 10^{-6}$	$<3.5 \times 10^{-7}$	$<2.5 \times 10^{-4}$
Anthem	$2.3 \times 10^{-4} \pm 7\%$	--	--	$<2.5 \times 10^{-4}$

Wet Deposition: When an airborne plume of radioactive materials intersects with a rain storm, some of the radioactive materials in the plume is carried out with the rain. Known as rain-out, or wet deposition, the rain can produce localized areas of surface contamination. The levels noted above do not present any direct radiation hazard (indeed, they are not detectable with hand held survey meters), but can represent a pathway hazard should crops or milk be affected. The ARRA is now screening milk and leafy vegetables. See www.azecin.gov for results.

Air Sample No. 3
Start Date: March 20, 2011 8:05 AM
Stop Date: March 21, 2011 7:30 AM
Sample Volume: 119,425 liters of air

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	^{137}Cs	$<6.7 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{131}I	$7.5 \times 10^{-13} \pm 5\%$	2×10^{-8}	0.004%
Vapor	^{131}I	$4.0 \times 10^{-13} \pm 6\%$	2×10^{-8}	0.002%

Air Sample No. 2
Start Date: March 19, 2011 10:04 AM
Stop Date: March 20, 2011 8:03 AM
Sample Volume: 112,115 liters of air

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	^{137}Cs	$7.9 \times 10^{-14} \pm 17\%$	6×10^{-8}	0.0001%
Particulate	^{131}I	$1.4 \times 10^{-12} \pm 4\%$	2×10^{-8}	0.007%
Vapor	^{131}I	$1.3 \times 10^{-12} \pm 4\%$	2×10^{-8}	0.006%

Air Sample No. 1
Start Date: March 18, 2011 7:08 PM
Stop Date: March 19, 2011 10:00 AM
Sample Volume: 69,130 liters of air

Type	Isotope	Activity ($\mu\text{Ci/mL air}$)	DAC* ($\mu\text{Ci/mL air}$)	% of limit
Particulate	^{137}Cs	$<4.2 \times 10^{-14}$	6×10^{-8}	0%
Particulate	^{131}I	$4.9 \times 10^{-13} \pm 7\%$	2×10^{-8}	0.002%
Vapor	^{131}I	$6.2 \times 10^{-13} \pm 5\%$	2×10^{-8}	0.003%

***DAC= The Derived Air Concentration.** This is the occupational limit for airborne exposure to this isotope as found in Title 10 Code of Federal Regulations, Part 20. Exposure to this concentration in air for 2,000 hours will result in a dose of 5 rem (the occupational limit).

How to get from Air Activity to Dose: Exposure to 1 DAC for 2000 hours = 5 rem dose. So take the fraction (not percent) of a DAC from the charts above times the number of hours the plume has been present to get the DAC-hrs. Divide by 2000 and multiply by 5 rem to get the delivered dose in rem.

Example: It has been 10 days since the plume appeared and the I-131 concentration averaged 0.00002 of a DAC (add the I-131 vapor and particulate) . So, 240 hours times 0.00002 is 0.0048 DAC-hrs. Divide by 2000 and multiply by 5 and you get 1.2×10^{-5} rem, or 0.012 mrem, thus far. Background in the US is 600 mrem per year, including medical [See NCRP Publication 160 at <http://www.ncrppublications.org/Reports/160>]. So the dose is trivial thus far; a tiny fraction of background doses.