

10 Effects of Surface Applications of Biosolids near Deer Trail, Colorado, 1999–2003

Table 1. Comparison of data for biosolids and samples collected near Deer Trail, Colorado, 1999–2003.

[ppm, parts per million, which is equivalent to mg/kg for soil, sediment, or rock and equivalent to mg/L for ground water; %, percent; NA, not applicable; ±, plus indicates concentrations naturally in the environment generally were at least one order of magnitude greater than biosolids concentrations; the color yellow indicates concentrations generally were about two orders of magnitude greater than concentrations naturally in the environment]

Sample type	Sample site (fig. 1)	Depth of sample below land surface, in feet	Sample description	Number of samples analyzed	Arsenic, ppm	Bismuth, ppm
Biosolids						
Biosolids samples from MWRD	MWRD plant in Denver, Colorado	NA	Mean value for the biosolids samples for 1999–2003 ±2 standard deviations	41	2.0±1.7	31±6
Aged biosolids sample from the field	About 1.75 miles northwest of DTX2	0	Biosolids applied to soil surface about 7–10 months before sampled on 6/6/01	1	6.0	22.4
Soil						
Soil samples with no biosolids applied	Soil site in Arapahoe County	0–1.2	Mean value for composited samples from control fields 1999–2003 ±2 standard deviations	6	7.2±1.3	0.21±0.10
Soil samples with biosolids applied	Soil site in Arapahoe County	0–1.2	Mean value for composited samples from biosolids-applied field 1999–2003 ±2 standard deviations	3	7.2±1.6	0.20±0.01
Soil samples with no biosolids applied	Soil site in Elbert County	0–1.2	Mean value for composited samples from control fields 1999–2003 ±2 standard deviations	6	13.4±4.1	0.27±0.10
Soil samples with biosolids applied	Soil plot in Elbert County	0–1.2	Mean value for composited samples from biosolids-applied field 1999–2003 ±2 standard deviations	3	15.5±2.5	0.37±0.12
Rock						
Rock core	D6A	14–28	Median value for February 2002 core samples ±2 standard deviations	5	13±20	0.10±0.02
Rock core	D9	32–59.5	Median value for February 2002 core samples ±2 standard deviations	5	6±15	<0.08±0
Rock core	D25A	14.5–20.5	Median value for February 2002 core samples ±2 standard deviations	5	8.4±9.0	<0.08±0
Streambed sediment						
Runoff-deposited sediment, biosolids applied	Basin near DTX2	0–0.06	Median value for the runoff-deposited samples for 1999–2003 ±2 standard deviations	Variable (number of samples analyzed in parentheses)	3.96±7.91 (10)	--
Runoff-deposited sediment, no biosolids applied	Control basin, about 3 miles northeast of DTX2	0–0.06	Median value for the runoff-deposited samples for 1999–2003 ±2 standard deviations	Variable (number of samples analyzed in parentheses)	5.1±6.3 (9)	--
Ground water						
Ground water	D6	12–22	Median value for quarterly samples from 1999–2003 ±2 standard deviations	20	0.003±0.004	--
Ground water	D25	10–20	Median value for quarterly samples from 1999–2003 ±2 standard deviations	20	0.003±0.001	--
Ground water	All	4–169	Median value for quarterly samples from 1999–2003 ±2 standard deviations	279	<0.002±0.002	--
Crops						
Crop samples with no biosolids applied	Soil site in Arapahoe County	NA	Mean value for composited wheat-grain samples from control fields 1999–2003 ±2 standard deviations	Variable (number of samples analyzed in parentheses)	<0.05 (3)	0.001±0.000 (2)
Crop samples with biosolids applied	Soil site in Arapahoe County	NA	Mean value for composited wheat-grain samples from control fields 1999–2003 ±2 standard deviations	Variable (number of samples analyzed in parentheses)	<0.05 (2)	0.003 (1)
Crop samples with no biosolids applied	Soil site in Elbert County	NA	Mean value for composited wheat-grain samples from control fields 1999–2003 ±2 standard deviations	Variable (number of samples analyzed in parentheses)	<0.05 (4)	0.003±0.002 (2)
Crop samples with biosolids applied	Soil site in Elbert County	NA	Mean value for composited wheat-grain samples from control fields 1999–2003 ±2 standard deviations	Variable (number of samples analyzed in parentheses)	<0.05 (2)	0.004 (1)