

## 70 Organic Wastewater Compounds in Drinking Water, Wastewater Effluent, and the Big Sioux River, 2001–2004

**Table 13.** Statistical summaries for environmental matrix-spike samples.

[Bold text indicates suspected endocrine-disrupting compound (EDC). Analytical method number: 1, Cahill and others (2004); 3, Lee and others (2004); 4, Zaugg and others (2002). RSD, relative standard deviation]

Compound	Analytical method number	Footnote	Number of matrix spike samples	Minimum percent recovery	Median percent recovery	Maximum percent recovery	Percent recovery RSD
Human pharmaceutical compounds (HPCs)							
1,7-Dimethylxanthine, dissolved	1	1	10	42	60	71	16
Acetaminophen, dissolved	1	3	10	-9.3	40	52	46
Caffeine, dissolved	1	2	10	29	33	45	15
Caffeine, dissolved	4	1	3	67	110	120	29
Caffeine, whole water	3	1	3	89	94	100	7.7
Carbamazepine, dissolved	1	3	10	4.9	19	33	48
Cimetidine, dissolved	1	3	10	8.3	23	32	44
Codeine, dissolved	1	3	10	38	70	140	49
Cotinine, dissolved	1	2	10	31	41	56	23
Cotinine, dissolved	4	1	3	100	110	120	6.1
Cotinine, whole water	3	1	3	48	63	73	21
Dehydronifedipine, dissolved	1	2	10	39	46	81	27
Diltiazem, dissolved	1	3	10	5.9	12	30	60
Diphenhydramine, dissolved	1	3	10	8.2	11	29	55
<b>Fluoxetine</b> , dissolved	1	3	10	0	.22	20	250
Furosemide, dissolved	1	3	10	0	8.0	49	120
Gemfibrozil, dissolved	1	3	10	0	0	17	210
Ibuprofen, dissolved	1	3	10	0	0	35	320
Metformin, dissolved	1	3	10	0	1.5	9.3	120
Miconazole, dissolved	1	3	10	0	0	30	320
Ranitidine, dissolved	1	3	10	0	11	42	78
Salbutamol, dissolved	1	1	10	33	51	64	24
Thiabendazole, dissolved	1	3	10	0	7.7	22	83
Warfarin, dissolved	1	3	10	0	29	46	54
Human and veterinary antibiotic compounds (HVACs)							
Azithromycin, dissolved	1	3	10	0.0	3.3	16	110
Erythromycin, dissolved	1	3	10	0	9.6	46	120
Sulfamethoxazole, dissolved	1	3	10	0	11	42	92
Trimethoprim, dissolved	1	3	9	10	18	32	40
Major agricultural herbicides (MAHs)							
<b>Atrazine</b> , whole water	3	1	3	110	120	160	19
Metolachlor, dissolved	4	1	3	88	96	110	9.9
Metolachlor, whole water	3	1	3	53	69	82	21
Prometon, dissolved	4	1	3	100	110	120	7.2
Prometon, whole water	3	1	3	80	100	110	15
Household, industrial, and minor agricultural use compounds (HIACs)							
1,4-Dichlorobenzene, dissolved	4	1	3	69	69	84	12
1,4-Dichlorobenzene, whole water	3	3	3	23	23	45	42
<b>2,2',4,4'-Tetrabromodiphenyl ether</b> , whole water	3	1	3	58	72	72	12
3,4-Dichlorophenyl isocyanate, whole water	3	3	3	39	110	230	78

**Table 13.** Statistical summaries for environmental matrix-spike samples.—Continued

[Bold text indicates suspected endocrine-disrupting compound (EDC). Analytical method number: 1, Cahill and others (2004); 3, Lee and others (2004); 4, Zaugg and others (2002). RSD, relative standard deviation]

Compound	Analytical method number	Footnote	Number of matrix spike samples	Minimum percent recovery	Median percent recovery	Maximum percent recovery	Percent recovery RSD
Household, industrial, and minor agricultural use compounds (HIACs)—Continued							
3-Methyl-1H-indole (skatol), dissolved	4	1	3	95	97	100	5.2
3-Methyl-1H-indole (skatol), whole water	3	1	3	62	81	85	16
<b>3-tert-Butyl-4-hydroxy anisole (BHA)</b> , dissolved	4	1	3	84	87	92	4.9
<b>3-tert-Butyl-4-hydroxy anisole (BHA)</b> , whole water	3	3	3	3.0	7.2	63	140
<b>4-Cumylphenol</b> , dissolved	4	1	3	100	110	120	11
<b>4-Cumylphenol</b> , whole water	3	1	3	71	98	100	19
<b>4-normal-Octylphenol</b> , dissolved	4	1	3	71	100	110	21
<b>4-normal-Octylphenol</b> , whole water	3	1	3	84	85	98	8.9
<b>4-tert-Octylphenol</b> , dissolved	4	1	3	80	100	110	16
<b>4-tert-Octylphenol</b> , whole water	3	1	3	71	94	94	15
5-Methyl-1H-benzotriazole, dissolved	4	3	3	180	210	220	10
5-Methyl-1H-benzotriazole, whole water	3	2	3	130	140	200	23
<b>7-Acetyl-1,1,3,4,4,6-hexamethyl tetrahydronaphthalene (AHTN)</b> , dissolved	4	1	3	84	88	100	10
<b>7-Acetyl-1,1,3,4,4,6-hexamethyl tetrahydronaphthalene (AHTN)</b> , whole water	3	1	3	58	71	72	12
Acetophenone, dissolved	4	1	3	100	100	110	3.1
Acetophenone, whole water	3	1	3	67	81	98	20
Anthraquinone, dissolved	4	1	3	86	88	97	6.4
Anthraquinone, whole water	3	1	3	80	81	90	6.4
<b>Benzophenone</b> , dissolved	4	1	3	96	98	110	5.3
<b>Benzophenone</b> , whole water	3	1	3	67	85	90	15
Bis(2-ethylhexyl) phthalate, whole water	3	3	3	89	94	220	51
<b>Bisphenol-A</b> , dissolved	4	3	3	92	150	160	28
<b>Bisphenol-A</b> , whole water	3	1	3	93	120	130	17
Bromacil, dissolved	4	3	3	100	130	130	11
Bromacil, whole water	3	1	3	78	110	110	17
Camphor, dissolved	4	1	3	94	96	100	3.7
Camphor, whole water	3	1	3	62	81	94	20
<b>Carbaryl</b> , dissolved	4	1	3	78	83	96	11
<b>Carbaryl</b> , whole water	3	3	3	140	150	170	10
<b>Chlorpyrifos</b> , dissolved	4	1	3	63	87	97	21
<b>Chlorpyrifos</b> , whole water	3	1	3	44	63	72	23
N,N-Diethyl- <i>meta</i> -toluamide (DEET), dissolved	4	1	3	96	100	110	8.4
N,N-Diethyl- <i>meta</i> -toluamide (DEET), whole water	3	1	3	67	92	99	20
<b>Diazinon</b> , dissolved	4	1	3	96	96	100	3.1
<b>Diazinon</b> , whole water	3	1	3	62	81	90	18
Dichlorvos, dissolved	4	3	3	13	16	21	23
Dichlorvos, whole water	3	1	3	75	94	94	12
<b>Diethyl phthalate</b> , whole water	3	1	3	71	90	94	15

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Table 13. Statistical summaries for environmental matrix-spike samples.—Continued

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Compound	Analytical method number	Footnote	Number of matrix spike samples	Minimum percent recovery	Median percent recovery	Maximum percent recovery	Percent recovery RSD
Household, industrial, and minor agricultural use compounds (HIACs)—Continued							
D-Limonene, dissolved	4	3	3	42	43	46	4.8
D-Limonene, whole water	3	3	3	7.1	7.6	24	75
<b>1,3,4,6,7,8-Hexahydro-4,6,6,7,8,8-hexamethyl cyclopenta-g-2-benzopyran (HHCB)</b> , dissolved	4	1	3	71	93	110	20
<b>1,3,4,6,7,8-Hexahydro-4,6,6,7,8,8-hexamethyl cyclopenta-g-2-benzopyran (HHCB)</b> , whole water	3	1	3	53	79	81	22
Indole, dissolved	4	1	3	84	87	97	7.7
Indole, whole water	3	1	3	58	63	72	11
Isoborneol, dissolved	4	1	3	92	96	100	4.9
Isoborneol, whole water	3	1	3	62	81	90	18
Isophorone, dissolved	4	1	3	92	100	100	6.1
Isophorone, whole water	3	1	3	67	90	94	18
Isopropylbenzene (cumene), dissolved	4	3	3	46	46	59	15
Isopropylbenzene (cumene), whole water	3	3	3	10	10	26	57
Isoquinoline, dissolved	4	1	3	88	91	100	7.5
Isoquinoline, whole water	3	1	3	62	76	81	13
Menthol, dissolved	4	1	3	88	110	120	15
Menthol, whole water	3	1	3	67	81	85	13
Metalaxyl, dissolved	4	1	3	96	100	110	7.0
Metalaxyl, whole water	3	1	3	62	94	100	25
Methyl salicylate, dissolved	4	1	3	92	96	97	2.7
Methyl salicylate, whole water	3	1	3	58	76	85	19
<b>Nonylphenol diethoxylate (NP2EO)</b> , dissolved	4	1	3	84	120	120	20
<b>Nonylphenol diethoxylate (NP2EO)</b> , whole water	3	1	3	80	98	100	13
<b>Nonylphenol monoethoxylate (NP1EO)</b> , whole water	3	1	3	89	100	110	10
<b>Octylphenol diethoxylate (OP2EO)</b> , dissolved	4	1	3	78	100	110	17
<b>Octylphenol diethoxylate (OP2EO)</b> , whole water	3	1	3	72	84	91	12
<b>Octylphenol monoethoxylate (OP1EO)</b> , dissolved	4	1	3	60	95	100	27
<b>Octylphenol monoethoxylate (OP1EO)</b> , whole water	3	1	3	54	69	77	18
<i>para</i> -Cresol, dissolved	4	1	3	91	100	110	7.4
<i>para</i> -Cresol, whole water	3	1	3	75	85	85	6.9
<b><i>para</i>-Nonylphenol (NP)</b> , dissolved	4	1	3	77	96	100	16
<b><i>para</i>-Nonylphenol (NP)</b> , whole water	3	1	3	76	85	92	9.3
<b>Pentachlorophenol</b> , dissolved	4	1	3	83	88	93	5.6
<b>Pentachlorophenol</b> , whole water	3	1	3	83	85	85	1.7
Phenol, dissolved	4	1	3	93	100	110	8.6

**Table 13.** Statistical summaries for environmental matrix-spike samples.—Continued

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Compound	Analytical method number	Footnote	Number of matrix spike samples	Minimum percent recovery	Median percent recovery	Maximum percent recovery	Percent recovery RSD
Household, industrial, and minor agricultural use compounds (HIACs)—Continued							
Phenol, whole water	3	1	3	58	72	90	22
Tetrachloroethylene, dissolved	4	3	3	27	37	46	26
Tetrachloroethylene, whole water	3	3	3	5.8	6.3	17.5	67
Tributyl phosphate, dissolved	4	1	3	91	92	110	11
Tributyl phosphate, whole water	3	1	3	62	81	94	20
<b>Triclosan</b> , dissolved	4	1	3	92	110	110	11
<b>Triclosan</b> , whole water	3	1	3	110	110	120	4.9
Triethyl citrate (ethyl citrate), dissolved	4	1	3	110	110	130	7.9
Triethyl citrate (ethyl citrate), whole water	3	1	3	80	93	99	11
Triphenyl phosphate, dissolved	4	1	3	88	110	120	16
Triphenyl phosphate, whole water	3	1	3	71	90	110	20
Tri(2-butoxyethyl)phosphate, dissolved	4	1	3	120	120	130	6.5
Tri(2-butoxyethyl)phosphate, whole water	3	1	3	80	88	90	6.1
Tri(2-chloroethyl)phosphate, dissolved	4	1	3	100	110	120	5.2
Tri(2-chloroethyl)phosphate, whole water	3	1	3	80	100	100	14
Tri(dichloroisopropyl)phosphate, dissolved	4	1	3	110	120	120	4.9
Tri(dichloroisopropyl)phosphate, whole water	3	1	3	98	110	110	7.0
Polyaromatic hydrocarbons (PAHs)							
1-Methylnaphthalene, dissolved	4	1	3	86	89	92	3.6
1-Methylnaphthalene, whole water	3	3	3	44	49	72	26
2,6-Dimethylnaphthalene, dissolved	4	1	3	87	88	92	3.2
2,6-Dimethylnaphthalene, whole water	3	3	3	43	44	72	31
2-Methylnaphthalene, dissolved	4	1	3	86	90	92	3.8
2-Methylnaphthalene, whole water	3	3	3	44	45	76	33
<b>Anthracene</b> , dissolved	4	1	3	96	100	110	5.3
<b>Anthracene</b> , whole water	3	1	3	75	76	98	16
<b>Benzo[a]pyrene</b> , dissolved	4	1	3	67	82	88	14
<b>Benzo[a]pyrene</b> , whole water	3	1	3	53	63	67	12
Carbazole, dissolved	4	1	3	120	120	130	5.7
Carbazole, whole water	3	1	3	84	99	110	14
Fluoranthene, dissolved	4	1	3	82	99	110	13
Fluoranthene, whole water	3	1	3	71	75	95	16
Naphthalene, dissolved	4	1	3	75	77	80	3.4
Naphthalene, whole water	3	3	3	40	44	67	29
<b>Phenanthrene</b> , dissolved	4	1	3	90	95	100	5.5
<b>Phenanthrene</b> , whole water	3	1	3	70	71	87	13
<b>Pyrene</b> , dissolved	4	1	3	66	86	88	15
<b>Pyrene</b> , whole water	3	1	3	58	62	82	19
Sterol compounds (SCs)							
3- <i>beta</i> -Coprostanol, dissolved	4	1	3	70	92	95	16
3- <i>beta</i> -Coprostanol, whole water	3	1	3	73	100	100	20
<i>beta</i> -Sitosterol, dissolved	4	1	3	58	93	95	26

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**Table 13.** Statistical summaries for environmental matrix-spike samples.—Continued

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<b>Compound</b>	<b>Analytical method number</b>	<b>Footnote</b>	<b>Number of matrix spike samples</b>	<b>Minimum percent recovery</b>	<b>Median percent recovery</b>	<b>Maximum percent recovery</b>	<b>Percent recovery RSD</b>
Sterol compounds (SCs)—Continued							
<i>beta</i> -Sitosterol, whole water	3	2	3	140	160	210	21
<i>beta</i> -Stigmastanol, dissolved	4	1	3	53	78	91	26
<i>beta</i> -Stigmastanol, whole water	3	3	3	100	200	240	38
Cholesterol, dissolved	4	1	3	66	84	90	16
Cholesterol, whole water	3	1	3	82	90	120	21

<sup>1</sup>Median spike recovery within acceptable range (50–120 percent), and median spike recovery RSD acceptable (less than 40 percent); matrix-spike results judged to be acceptable.

<sup>2</sup>Median spike recovery outside acceptable range (50–120 percent), but median spike recovery RSD acceptable (less than 40 percent) and all other quality-assurance/quality-control results acceptable; matrix-spike results judged to be acceptable.

<sup>3</sup>Median spike recovery outside of acceptable range (50–120 percent), and/or median spike recovery RSD unacceptable (greater than 40 percent); compound excluded from analyses and discussion related to occurrence of organic wastewater compounds in Big Sioux River and wastewater effluents.