

USEPA/USGS Collaboration on
Emerging Contaminants in Drinking Water: Phase II
Personnel, Methodology, and Analyte Listing

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Published Methods to be Used:

Cahill, J. D.; Furlong, E. T.; Burkhardt, M. R.; Kolpin, D.; Anderson, L. G., Determination of pharmaceutical compounds in surface- and ground-water samples by solid-phase extraction and high-performance liquid chromatography-electrospray ionization mass spectrometry. *Journal of Chromatography A* 2004, 1041, (1-2), 171-180.

Furlong, E.T., Werner, S.L., Anderson, B.D., Cahill, Jeffery D., 2008, Determination of Human-Health Pharmaceuticals in Filtered Water by Chemically Modified Styrene-Divinylbenzene Resin-Based Solid-Phase Extraction and High-Performance Liquid Chromatography/Mass Spectrometry, U.S. Geological Survey Techniques and Methods, book 5, sec. B, chap. B5, 56 p.

Zaugg, S.D., Smith, S.G., Schroeder, M.P., Barber, L.B., and Burkhardt, M.R., 2006, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of wastewater compounds by polystyrene-divinylbenzene solid-phase extraction and capillary-column gas chromatography/mass spectrometry: U.S. Geological Survey Water-Resources Investigations Report 01-4186, 37 p.

Schultz, M. M.; Furlong, E. T., Trace analysis of antidepressant pharmaceuticals and their select degradates in aquatic matrixes by LC/ESI/MS/MS. *Analytical Chemistry* 2008, 80, (5), 1756-1762.

Batt, A. L.; Kostich, M. S.; Lazorchak, J. M., Analysis of ecologically relevant pharmaceuticals in wastewater and surface water using selective solid-phase extraction and UPLC-MS/MS. *Analytical Chemistry* 2008, 80, (13), 5021-5030.

Shoemaker J.A.; Grimmett P.E.; Boutin B.K., 2008, Method 537. Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) EPA Document #: EPA/600/R-08/092, 50 p.

Haugland, R. A.; Varma, M.; Wymer, L. J.; Vesper, S. J., Quantitative PCR analysis of selected *Aspergillus*, *Penicillium* and *Paecilomyces* species. *Systematic and Applied Microbiology* 2004, 27, (2), 198-210.

Covert, T.C.;Rodgers, M.R.; Reyes, A.L.; Stelma, Jr G.N. Occurrence of nontuberculous mycobacteria in environmental samples. *Appl Environ Microbiol.* 1999, 65, 2492-2496.

USEPA, 2005, Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA EPA Document #: EPA 815-R-05-002, 76 p.

Standard Methods 9260. Method for Isolation of *Campylobacter*

Table 1. Chemical Analytes in Published Methods Used in USEPA/USGS Sampling Project

Compound	CAS Number
1,4-dichlorobenzene	106-46-7
1,7-dimethylxanthine	611-59-6
10-hydroxy-amitriptyline	64520-05-4
1-methylnaphthalene	90-12-0
2,6-dimethylnaphthalene	581-42-0
2-hydroxy-ibuprofen	51146-55-5
2-methylnaphthalene	91-57-6
4-cumylphenol	599-64-4
4-n-octylphenol	1806-26-4
4-nonylphenol diethoxylate	NA
4-octylphenol diethoxylate	NA
4-octylphenol monoethoxylate	NA
4-tert-octylphenol	140-66-9
5-methyl-1H-benzotriazole	136-85-6
acetaminophen	103-90-2
acetophenone	98-86-2
albuterol	18559-94-9
alprazolam	28981-97-7
amitriptyline	549-18-8
amlodipine	111470-99-6
amphetamine	51-63-8
anthracene	120-12-7
anthraquinone	84-65-1
atenolol	29122-68-7
atrovastatin	134523-00-5
benzo(a)pyrene	50-32-8
benzophenone	119-61-9
benztropine	86-13-5
betamethasone	378-44-9
bisphenol A	80-05-7
bromacil	314-40-9
bromoform	75-25-2
bupropion	34841-39-9
butylated hydroxyanisole (BHA)	25013-16-5
caffeine	58-08-2
camphor	76-22-2
carbamazepine	298-46-4
carbaryl	63-25-2
carbazole	86-74-8
chlorpyrifos	2921-88-2
cholesterol	57-88-5
cimetidine	51481-61-9
citalopram	59729-33-8

clonidine	4205-91-8
codeine	76-57-3
coprostanol	360-68-9
cotinine	486-56-6
cumene	98-82-8
dehydronifedipine	67035-22-7
desmethyldiltiazem	130606-60-9
desmethylsertraline	79902-63-9
diazinon	333-41-5
diltiazem	42399-41-7
diltiazem	33286-22-5
diphenhydramine	58-73-1
d-limonene	5989-27-5
duloxetine	116539-59-4
enalipril	76095-16-4
ethyl citrate	77-93-0
fluocinonide	356-12-7
fluoranthene	206-44-0
fluoxetine	54910-89-3
fluoxetine	59333-67-4
fluticasone	80474-14-2
fluvoxamine	54739-18-3
furosemide	54-31-9
galaxolide (HHCB)	1222-05-5
gemfibrozil	25812-30-0
glipizide	29094-61-9
glyburide	10238-21-8
hydrochlorothiazide	58-93-5
hydrocodone	143-71-5
hydrocortisone	50-23-7
ibuprofen	15687-27-1
indole	120-72-9
isoborneol	124-76-5
isophorone	78-59-1
isoquinoline	119-65-3
menthol	1490-04-6
metalaxyl	57837-19-1
methyl salicylate	119-36-8
methylprednisolone	83-43-2
metolachlor	51218-45-2
metoprolol	56392-17-7
n,n-diethyltoluamide (DEET)	134-62-3
naphthalene	91-20-3
norethindrone	68-22-4
norfluoxetine	83891-03-6
norverapamil	67814-42-4

oxycodone	124-90-3
para-cresol	106-44-5
para-nonylphenol-total	84852-15-3
paroxetine	61869-08-7
paroxetine	110429-35-1
pentachlorophenol	87-86-5
perfluorobutanesulfonic acid (PFBS)	375-73-5
perfluorobutanoic acid (PFBA)	375-22-4
perfluorodecanesulfonic acid (PFDS)	335-77-3
perfluorodecanoic acid (PFDA)	335-76-2
perfluorododecanoic acid (PFDoDA)	307-55-1
perfluoroheptanoic acid (PFHpA)	375-85-9
perfluorohexadecanoic acid (PFHxDA)	67905-19-5
perfluorohexanesulfonic acid (PFHxS)	355-46-4
perfluorohexanoic acid (PFHxA)	307-24-4
perfluorononanoic acid (PFNA)	375-95-1
perfluorooctadecanoic acid (PFOcDA)	16517-11-6
perfluorooctanesulfonic acid (PFOS)	1763-23-1
perfluorooctanoic acid (PFOA)	335-67-1
perfluoropentanoic acid (PFPeA)	2706-90-3
perfluorotetradecanoic acid (PFTeDA)	376-06-7
perfluorotridecanoic acid (PFTrDA)	72629-94-8
perfluoroundecanoic acid (PFUnDA)	2058-94-8
phenanthrene	85-01-8
phenol	108-95-2
prednisolone	50-24-8
prednisone	53-03-2
progesterone	57-83-0
promethazine	58-33-3
prometon	1610-18-0
propanolol	318-98-9
propoxyphene	1639-60-7
pyrene	129-00-0
ranitidine	66357-35-5
salbutamol	18559-94-9
sertraline	79617-96-2
sertraline	79559-97-0
simvastatin	79902-63-9
sitosterol	83-46-5
skatol	83-34-1
stigmastanol	19466-47-8
sulfamethoxazole	723-46-6
testosterone	58-55-9
tetrachloroethylene	127-18-4
theophylline	58-55-9
thiabendazole	148-79-8

tonalide (AHTN)	1506-02-1
Tri(2-butoxyethyl) phosphate	78-51-3
tri(2-chloroethyl)phosphate	115-96-8
tri(dichlorisopropyl)phosphate	13674-87-8
triamterene	396-01-0
tributylphosphate	126-73-8
triclosan	3380-34-5
trimethoprim	738-70-5
triphenyl phosphate	115-86-6
valsartan	396-01-0
venlafaxine	93413-69-5
verapamil	137862-53-4
warfarin	81-81-2

Table 2. Microbial Analytes in USEPA/USGS Sampling Project

Microorganism
<i>Aspergillus fumigatus</i>
<i>Aspergillus terreus</i>
<i>Fusarium solani</i>
Cryptosporidia
Giardia
<i>Mycobacterium avium</i>
<i>M. avium subspecies paratuberculosis</i>
<i>M. intracellulare</i>
Campylobacter
Enteric viruses
Adenoviruses