

## **Appendixes 1–4**

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## Appendix 1—Pesticide compounds analyzed in NAWQA samples.

**Table A.** Pesticide compounds analyzed in NAWQA water samples.

[Pesticide compounds include pesticides, degradates, and manufacturing by-products. Pesticide compounds are grouped by pesticide class. Common synonyms are listed in parentheses in column 1. The cited references are listed by number at the end of Appendix 1. CAS, Chemical Abstracts Service; GCMS, gas chromatography/mass spectrometry; HPLC, high performance liquid chromatography; Parameter code, the number used to identify a pesticide in the U.S. Geological Survey National Water Information System and the U.S. Environmental Protection Agency Data Storage and Retrieval System; µg/L, micrograms per liter.]

Pesticide compound (synonym)	Type of pesticide compound (parent pesticide, if degradate)	CAS number	Parameter code	Analytical method	Long-term method detection level <sup>1</sup> (µg/L)
Amides					
Acetochlor	Herbicide	34256-82-1	49260	GCMS	0.003
Alachlor	Herbicide	15972-60-8	46342	GCMS	0.002
2,6-Diethylaniline	Degradate (Alachlor)	579-66-8	82660	GCMS	0.003
Metolachlor	Herbicide	51218-45-2	39415	GCMS	0.006
Napropamide	Herbicide	15299-99-7	82684	GCMS	0.003
Pronamide (Propyzamide)	Herbicide	23950-58-5	82676	GCMS	0.002
Propachlor	Herbicide	1918-16-7	04024	GCMS	0.005
Propanil	Herbicide	709-98-8	82679	GCMS	0.005
Carbamates					
Aldicarb	Insecticide	116-06-3	49312	HPLC	0.100
Aldicarb sulfone	Degradate (Aldicarb)	1646-88-4	49313	HPLC	0.100
Aldicarb sulfoxide	Degradate (Aldicarb)	1646-87-3	49314	HPLC	0.140
Butylate	Herbicide	2008-41-5	04028	GCMS	0.001
Carbaryl	Insecticide	63-25-2	82680	GCMS	0.021
Carbofuran	Insecticide	1563-66-2	82674	GCMS	0.010
EPTC	Herbicide	759-94-4	82668	GCMS	0.001
3-Hydroxycarbofuran	Degradate (Carbofuran)	16655-82-6	49308	HPLC	0.050
Methiocarb	Insecticide	2032-65-7	38501	HPLC	0.030
Methomyl	Insecticide	16752-77-5	49296	HPLC	0.240
Molinate	Herbicide	2212-67-1	82671	GCMS	0.001
Oxamyl	Insecticide	23135-22-0	38866	HPLC	0.080
Pebulate	Herbicide	1114-71-2	82669	GCMS	0.002
Propham	Herbicide	122-42-9	49236	HPLC	0.110
Propoxur (Baygon)	Insecticide	114-26-1	38538	HPLC	0.060
Thiobencarb	Herbicide	28249-77-6	82681	GCMS	0.002
Triallate	Herbicide	2303-17-5	82678	GCMS	0.001
Chlorobenzoic acid esters					
Dacthal (DCPA) <sup>2</sup>	Herbicide	1861-32-1	82682	GCMS	0.002
Dacthal monoacid	Degradate (Dacthal)	887-54-7	49304	HPLC	0.040
Chlorophenoxy acids					
2,4-D	Herbicide	94-75-7	39732	HPLC	0.080
2,4-DB	Herbicide	94-82-6	38746	HPLC	0.130
Dichlorprop	Herbicide	120-36-5	49302	HPLC	0.060

**Table A.** Pesticide compounds analyzed in NAWQA water samples.—Continued

[Pesticide compounds include pesticides, degradates, and manufacturing by-products. Pesticide compounds are grouped by pesticide class. Common synonyms are listed in parentheses in column 1. The cited references are listed by number at the end of Appendix 1. CAS, Chemical Abstracts Service; GCMS, gas chromatography/mass spectrometry; HPLC, high performance liquid chromatography; Parameter code, the number used to identify a pesticide in the U.S. Geological Survey National Water Information System and the U.S. Environmental Protection Agency Data Storage and Retrieval System; µg/L, micrograms per liter.]

Pesticide compound (synonym)	Type of pesticide compound (parent pesticide, if degradate)	CAS number	Parameter code	Analytical method	Long-term method detection level <sup>1</sup> (µg/L)
MCPA	Herbicide	94-74-6	38482	HPLC	0.100
MCPB	Herbicide	94-81-5	38487	HPLC	0.130
2,4,5-T	Herbicide	93-76-5	39742	HPLC	0.040
2,4,5-TP (Silvex)	Herbicide	93-72-1	39762	HPLC	0.030
Dinitroanilines					
Benfluralin	Herbicide	1861-40-1	82673	GCMS	0.005
Ethalfuralin	Herbicide	55283-68-6	82663	GCMS	0.005
Oryzalin	Herbicide	19044-88-3	49292	HPLC	0.140
Pendimethalin	Herbicide	40487-42-1	82683	GCMS	0.011
Trifluralin	Herbicide	1582-09-8	82661	GCMS	0.005
Miscellaneous					
Bentazon	Herbicide	25057-89-0	38711	HPLC	0.030
Norflurazon	Herbicide	27314-13-2	49293	HPLC	0.021
Miscellaneous acids					
Acifluorfen	Herbicide	50594-66-6	49315	HPLC	0.040
Chloramben methyl ester	Herbicide	7286-84-2	61188	HPLC	0.110
Clopyralid	Herbicide	1702-17-6	49305	HPLC	0.210
Dicamba	Herbicide	1918-00-9	38442	HPLC	0.050
Picloram	Herbicide	1918-02-1	49291	HPLC	0.040
Nitrophenols					
Dinoseb	Herbicide	88-85-7	49301	HPLC	0.040
DNOC	Herbicide	534-52-1	49299	HPLC	0.130
Organochlorines					
Chlorothalonil	Fungicide	1897-45-6	49306	HPLC	0.070
<i>p,p'</i> -DDE	Degradate ( <i>p,p'</i> -DDT)	72-55-9	34653	GCMS	0.001
Dichlobenil	Herbicide	1194-65-6	49303	HPLC	0.050
Dieldrin	Insecticide, Degradate (Aldrin)	60-57-1	39381	GCMS	0.002
<i>alpha</i> -HCH	Degradate ( <i>gamma</i> -HCH), By-product in technical lindane <sup>3</sup>	319-84-6	34253	GCMS	0.002
<i>gamma</i> -HCH (Lindane)	Insecticide	58-89-9	39341	GCMS	0.002
Triclopyr	Herbicide	55335-06-3	49235	HPLC	0.040
Organophosphates					
Azinphos-methyl (Guthion)	Insecticide	86-50-0	82686	GCMS	0.020
Chlorpyrifos	Insecticide	2921-88-2	38933	GCMS	0.003
Diazinon	Insecticide	333-41-5	39572	GCMS	0.003

**Table A.** Pesticide compounds analyzed in NAWQA water samples.—Continued

[Pesticide compounds include pesticides, degradates, and manufacturing by-products. Pesticide compounds are grouped by pesticide class. Common synonyms are listed in parentheses in column 1. The cited references are listed by number at the end of Appendix 1. CAS, Chemical Abstracts Service; GCMS, gas chromatography/mass spectrometry; HPLC, high performance liquid chromatography; Parameter code, the number used to identify a pesticide in the U.S. Geological Survey National Water Information System and the U.S. Environmental Protection Agency Data Storage and Retrieval System; µg/L, micrograms per liter.]

Pesticide compound (synonym)	Type of pesticide compound (parent pesticide, if degradate)	CAS number	Parameter code	Analytical method	Long-term method detection level <sup>1</sup> (µg/L)
Disulfoton	Insecticide	298-04-4	82677	GCMS	0.011
Ethoprop (Ethoprophos)	Insecticide	13194-48-4	82672	GCMS	0.002
Fonofos	Insecticide	944-22-9	04095	GCMS	0.001
Malathion	Insecticide	121-75-5	39532	GCMS	0.014
Parathion (Ethyl parathion)	Insecticide	56-38-2	39542	GCMS	0.005
Parathion-methyl (Methyl parathion)	Insecticide	298-00-0	82667	GCMS	0.003
Phorate	Insecticide	298-02-2	82664	GCMS	0.006
Terbufos	Insecticide	13071-79-9	82675	GCMS	0.009
Phenols					
Bromoxynil	Herbicide	1689-84-5	49311	HPLC	0.030
Pyrethroids					
<i>cis</i> -Permethrin <sup>2</sup>	Insecticide	54774-45-7	82687	GCMS	0.003
Sulfite esters					
Propargite	Acaricide	2312-35-8	82685	GCMS	0.011
Triazines					
Atrazine	Herbicide	1912-24-9	39632	GCMS	0.004
Cyanazine	Herbicide	21725-46-2	04041	GCMS	0.009
Deethylatrazine	Degradate (Atrazine)	6190-65-4	04040	GCMS	0.003
Metribuzin	Herbicide	21087-64-9	82630	GCMS	0.003
Prometon	Herbicide	1610-18-0	04037	GCMS	0.007
Simazine	Herbicide	122-34-9	04035	GCMS	0.006
Uracils					
Bromacil	Herbicide	314-40-9	04029	HPLC	0.040
Terbacil	Herbicide	5902-51-2	82665	GCMS	0.017
Ureas					
Diuron	Herbicide	330-54-1	49300	HPLC	0.060
Fenuron	Herbicide	101-42-8	49297	HPLC	0.030
Fluometuron	Herbicide	2164-17-2	38811	HPLC	0.030
Linuron	Herbicide	330-55-2	82666	GCMS	0.018
Neburon	Herbicide	555-37-3	49294	HPLC	0.030
Tebuthiuron	Herbicide	34014-18-1	82670	GCMS	0.008

<sup>1</sup> The long-term method detection level (reference 1) is calculated annually. The value reported in the table is the maximum long-term method detection level for the period 1992–2001.

<sup>2</sup> This pesticide also can be considered an organochlorine pesticide because it is an organic pesticide with multiple chlorine substituents.

<sup>3</sup> Prior to 1977, *alpha*-HCH was a manufacturing by-product in technical lindane, which is a mixture of several isomers of hexachlorocyclohexane (reference 2).

**Table B.** Pesticide compounds analyzed in NAWQA bed-sediment or whole-fish samples.

[Pesticide compounds include pesticides, degradates, and manufacturing by-products. Pesticide compounds are grouped by pesticide class. Common synonyms are listed in parentheses in column 1. The cited references are listed by number at the end of Appendix 1. CAS, Chemical Abstracts Service; Parameter code, the number used to identify a pesticide in the U.S. Geological Survey National Water Information System and the U.S. Environmental Protection Agency Data Storage and Retrieval System; µg/kg dw, micrograms per kilogram dry weight; µg/kg ww, micrograms per kilogram wet weight; —, not analyzed.]

Pesticide compound (synonym)	Type of pesticide compound (parent pesticide, if degradate)	CAS number	Bed sediment		Whole fish	
			Parameter code	Reporting level (µg/kg dw)	Parameter code	Reporting level (µg/kg ww)
Chlorobenzoic acid esters						
Dacthal (DCPA) <sup>1</sup>	Herbicide	1861-32-1	49324	5	49378	5
Organochlorines						
Aldrin	Insecticide, Component of total dieldrin <sup>2</sup>	309-00-2	49319	1	49353	5
<i>cis</i> -Chlordane	Insecticide, Component of total chlordane <sup>3</sup>	5103-71-9	49320	1	49380	5
<i>trans</i> -Chlordane	Insecticide, Component of total chlordane <sup>3</sup>	5103-74-2	49321	1	49379	5
Chloroneb	Insecticide	2675-77-6	49322	5	—	—
<i>o,p'</i> -DDD	Degradate ( <i>o,p'</i> -DDT), Component of total DDT <sup>4</sup>	53-19-0	49325	1	49374	5
<i>p,p'</i> -DDD ( <i>p,p'</i> -TDE)	Insecticide, Degradate ( <i>p,p'</i> -DDT), Component of total DDT <sup>4</sup>	72-45-8	49326	1	49375	5
<i>o,p'</i> -DDE	Degradate ( <i>o,p'</i> -DDT), Component of total DDT <sup>4</sup>	3424-82-6	49327	1	49373	5
<i>p,p'</i> -DDE	Degradate ( <i>p,p'</i> -DDT), Component of total DDT <sup>4</sup>	72-55-9	49328	1	49372	5
<i>o,p'</i> -DDT	By-product in technical DDT, Component of total DDT <sup>4</sup>	789-02-6	49329	2	49377	5
<i>p,p'</i> -DDT	Insecticide, Component of total DDT <sup>4</sup>	50-29-3	49330	2	49376	5
Dieldrin	Insecticide, Degradate (Aldrin), Component of total dieldrin <sup>2</sup>	60-57-1	49331	1	49371	5
Endosulfan I ( <i>alpha</i> -Endosulfan)	Insecticide	959-98-8	49332	1	—	—
Endrin	Insecticide	72-20-8	49335	1	49370	5
<i>alpha</i> -HCH	Degradate ( <i>gamma</i> -HCH), By-product in technical lindane, Component of total HCH <sup>5</sup>	319-84-6	49338	1	49366	5
<i>beta</i> -HCH	By-product in technical lindane, Component of total HCH <sup>5</sup>	319-85-7	49339	1	49365	5
<i>gamma</i> -HCH (Lindane)	Insecticide, Component of total HCH <sup>5</sup>	58-89-9	49345	1	49363	5
<i>delta</i> -HCH	Degradate ( <i>gamma</i> -HCH), By-product in technical lindane, Component of total HCH <sup>5</sup>	319-86-8	—	—	49364	5
Heptachlor	Insecticide, Component of total heptachlor <sup>6</sup>	76-44-8	49341	1	49369	5
Heptachlor epoxide	Degradate (Heptachlor), Component of total heptachlor <sup>6</sup>	1024-57-3	49342	1	49368	5
Hexachlorobenzene	Insecticide	118-74-1	49343	1	49367	5
Isodrin	Insecticide	465-73-6	49344	1	—	—
<i>o,p'</i> -Methoxychlor	Insecticide, Component of total methoxychlor <sup>7</sup>	30667-99-3	49347	5	49362	5
<i>p,p'</i> -Methoxychlor	Insecticide, Component of total methoxychlor <sup>7</sup>	72-43-5	49346	5	49361	5
Mirex	Insecticide	2385-85-5	49348	1	49360	5
<i>cis</i> -Nonachlor	By-product in technical chlordane, Component of total chlordane <sup>3</sup>	5103-73-1	49316	1	49359	5

**Table B.** Pesticide compounds analyzed in NAWQA bed-sediment or whole-fish samples.—Continued

[Pesticide compounds include pesticides, degradates, and manufacturing by-products. Pesticide compounds are grouped by pesticide class. Common synonyms are listed in parentheses in column 1. The cited references are listed by number at the end of Appendix 1. CAS, Chemical Abstracts Service; Parameter code, the number used to identify a pesticide in the U.S. Geological Survey National Water Information System and the U.S. Environmental Protection Agency Data Storage and Retrieval System; µg/kg dw, micrograms per kilogram dry weight; µg/kg ww, micrograms per kilogram wet weight; —, not analyzed.]

Pesticide compound (synonym)	Type of pesticide compound (parent pesticide, if degradate)	CAS number	Bed sediment		Whole fish	
			Parameter code	Reporting level (µg/kg dw)	Parameter code	Reporting level (µg/kg ww)
<i>trans</i> -Nonachlor	By-product in technical chlordane, Component of total chlordane <sup>3</sup>	39765-80-5	49317	1	49358	5
Oxychlordane	Degradate (Chlordane), Component of total chlordane <sup>3</sup>	27304-13-8	49318	1	49357	5
Pentachloroanisole	Degradate (Pentachlorophenol)	1825-21-4	49460	1	49356	5
Toxaphene	Insecticide, Technical mixture	8001-35-2	49351	200	49355	200
Pyrethroids						
<i>cis</i> -Permethrin <sup>1</sup>	Insecticide, Component of total permethrin <sup>8</sup>	52774-45-7	49349	5	—	—
<i>trans</i> -Permethrin <sup>1</sup>	Insecticide, Component of total permethrin <sup>8</sup>	51877-74-8	49350	5	—	—

<sup>1</sup> This pesticide also can be considered an organochlorine pesticide because it is an organic pesticide with multiple chlorine substituents.

<sup>2</sup> The pesticide group “total dieldrin” refers to the summed concentrations of aldrin and dieldrin.

<sup>3</sup> The pesticide group “total chlordane” refers to the summed concentrations of *cis*-chlordane, *trans*-chlordane, *cis*-nonachlor, *trans*-nonachlor, and oxychlordane. Chlordane was applied as a technical-grade mixture of over 140 compounds, including nonachlor isomers and other manufacturing by-products.

<sup>4</sup> The pesticide group “total DDT” refers to the summed concentrations of *o,p'*-DDT, *p,p'*-DDT, *o,p'*-DDD, *p,p'*-DDD, *o,p'*-DDE, and *p,p'*-DDE. Technical DDT contained *p,p'*-DDT (the active ingredient) and *o,p'*-DDT (a manufacturing by-product).

<sup>5</sup> The pesticide group “total HCH” refers to the summed concentrations of *alpha*-HCH, *beta*-HCH, *gamma*-HCH, and *delta*-HCH. Technical lindane is a mixture of several isomers of hexachlorocyclohexane; *gamma*-HCH is the active ingredient, and the other isomers are manufacturing by-products. In 1977, USEPA cancelled inclusion of *alpha*- and *beta*-HCH in technical-grade lindane (reference 2).

<sup>6</sup> The pesticide group “total heptachlor” refers to the summed concentrations of heptachlor and heptachlor epoxide.

<sup>7</sup> The pesticide group “total methoxychlor” refers to the summed concentrations of *o,p'*-methoxychlor and *p,p'*-methoxychlor.

<sup>8</sup> The pesticide group “total permethrin” refers to the summed concentrations of *cis*-permethrin and *trans*-permethrin.

## References—Appendix 1

- Oblinger Childress, C.J., Foreman, W.T., Conner, B.F., and Maloney, T.J., 1999, New reporting procedures based on long-term method detection levels and some considerations of interpretations of water-quality data provided by the U.S. Geological Survey National Water Quality Laboratory: U.S. Geological Survey Open-File Report 99-193, 19 p.
- U.S. Environmental Protection Agency, 1992, National study of chemical residues in fish: U.S. Environmental Protection Agency, Office of Science and Technology, EPA-823-R-92-008b, v. 2, variously paged.

