

## **APPENDIX E**

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### **TARGET ANALYTES ANALYZED IN NATIONAL OR REGIONAL MONITORING PROGRAMS**

**Table E-1. Target Analytes Analyzed in National or Regional Monitoring Programs Reviewed by the 1993 Fish Contaminant Workgroup**

Analyte	Monitoring program							
	a	b	c <sup>1</sup>	d	e	f	g	h
<b>Metals</b>								
Aluminum (Al)				●				●
Antimony (Sb)	●			●				●
Arsenic (As) (total)	●		●	●		●		●
Barium (Ba)								●
Beryllium (Be)	●							●
Cadmium (Cd)	●		●	●		●		●
Chromium (Cr)	●		●	●				●
Copper (Cu)	●		●	●		●		●
Cyanide	●							
Iron (Fe)				●				●
Lead (Pb)	●		●	●		●		●
Manganese (Mn)			●	●				●
Mercury (Hg)	●	●	●	●		●		●
Methylmercury	●							
Molybdenum								●
Nickel (Ni)	●			●				●
Selenium (Se)	●			●		●		●
Silicon (Si)				●				
Silver (Ag)	●			●				●
Thallium (Tl)	●			●				
Tin (Sn)				●				
Tributyltin								
Vanadium								●
Zinc (Zn)	●			●		●		●
<b>Pesticides</b>								
Aldrin	●		●	●		●	●	
Butachlor								●
Chlordane (cis & trans)	●	●	●	● <sup>2</sup>		●	●	●
Chlorpyrifos		●						
Danitol							●	

(continued)

Table E-1. (continued)

Analyte	Monitoring program							
	a	b	c <sup>1</sup>	d	e	f	g	h
DCPA (chlorthal)						●		
DDT (total)			●	●		●		
2,4'-DDD (2,4'-TDE)			●	●		●		●
4,4'-DDD (4,4'-TDE)	●		●	●		●	●	●
2,4'-DDE			●	●		●		●
4,4'-DDE	●	●	●	●		●	●	●
2,4'-DDT			●	●		●		●
4,4'-DDT	●		●	●		●	●	●
Demeton	●							
Dicofol		●					●	●
Dieldrin	●	●	●	●		●	●	●
Diphenyl disulfide		●						
Endosulfan								
$\alpha$ -Endosulfan (endosulfan I)	●							
$\beta$ -Endosulfan (endosulfan II)	●							
Endosulfan sulfate	●							
Endrin	●	●	●			●		●
Endrin aldehyde	●							
Ethyl-p-nitrophenylphenylphosphorothioate (EPN)							●	
Fonofos								
Guthion	●							
Heptachlor	●	●	●	●		●	●	●
Heptachlor epoxide	●	●		●		●	●	●
Hexachlorocyclohexane (HCH) also known as Benzene hexachloride (BHC)								
$\alpha$ -Hexachlorocyclohexane	●	●	●			●	●	●
$\beta$ -Hexachlorocyclohexane	●		●				●	●
$\delta$ -Hexachlorocyclohexane	●		●					●
$\gamma$ -Hexachlorocyclohexane (lindane)	●	●	●	●		●	●	●
Technical-hexachlorocyclohexane							●	
Hexachlorophene							●	
Isopropalin		●						●
Kepone								●

(continued)

Table E-1. (continued)

Analyte	Monitoring program							
	a	b	c <sup>1</sup>	d	e	f	g	h
Malathion	●							
Methoxychlor	●	●	●					●
Mirex	●	●	●	●		●	●	●
Nitrofen		●						
cis-Nonachlor		●				●		●
trans-Nonachlor		●		●		●		●
Oxychlorane		●				●		●
Parathion	●							
Toxaphene (mixture)	●		●			●	●	
Triazine herbicides								
Trichloronate								●
Trifluralin		●						●
<b>Base/Neutral Organic Compounds</b>								
Acenaphthene	●			●				●
Acenaphthylene	●			●				●
Anthracene	●			●				●
Benzidine	●							
Benzo(a)anthracene	●			●				●
Benzo(a)pyrene	●			●				●
Benzo(e)pyrene				●				
Benzo(b)fluoranthene	●			●				●
Benzo(k)fluoranthene	●			●				●
Benzo(g,h,i)perylene	●			●				●
Benzyl butyl phthalate	●							
Biphenyl		●		●				
4-Bromophenyl ether	●							
bis(2-Chloroethoxy)methane	●							
bis(2-Chloroethyl)ether	●							
bis(2-Chloroisopropyl)ether	●							
bis(2-Ethylhexyl)phthalate (BEHP)							●	
Chlorinated benzenes								
2-Chloronaphthalene	●							

(continued)

Table E-1. (continued)

Analyte	Monitoring program							
	a	b	c <sup>1</sup>	d	e	f	g	h
4-Chlorophenyl ether	●							
Chrysene	●			●				●
Dibenzo(a,h)anthracene	●			●				●
Di-n-butyl phthalate	●							
1,2-Dichlorobenzene	●							
1,3-Dichlorobenzene	●							
1,4-Dichlorobenzene	●							
3,3'-Dichlorobenzidine	●						●	
Diethyl phthalate	●							
2,6-Dimethylnaphthalene				●				●
2,3,5-Trimethylnaphthalene				●				
Dimethyl phthalate	●							
2,4-Dinitrotoluene	●							
2,6-Dinitrotoluene	●							
Di-n-octyl phthalate	●							
1,2-Diphenylhydrazine	●							
bis(2-Ethylhexyl) phthalate	●							
Fluoranthene	●			●				●
Fluorene	●			●				●
Heptachlorostyrene			●					
Hexachlorostyrene			●					
Hexachlorobenzene	●	●	●	●		●	●	●
Hexachlorobutadiene	●	●						
Hexachlorocyclopentadiene	●							●
Hexachloroethane	●							
Indeno(1,2,3-cd)pyrene	●			●				
Isophorone	●							
4,4'-Methylene bis(N,N'-dimethyl)aniline							●	
1-Methylnaphthalene				●				
2-Methylnaphthalene				●				
1-Methylphenanthrene				●				
Naphthalene	●			●				●

(continued)

Table E-1. (continued)

Analyte	Monitoring program							
	a	b	c <sup>1</sup>	d	e	f	g	h
Nitrobenzene	●							
N-Nitroso-di-n-butylamine							●	
N-Nitrosodimethylamine	●							
N-Nitrosodiphenylamine	●							
N-Nitrosodipropylamine	●							
Octachlorostyrene		●	●					●
PAHs (polycyclic aromatic hydrocarbons)								
PBBs (polybrominated biphenyls)			●					
PCBs (polychlorinated biphenyls)		●	●	●				●
Aroclor 1016 (mixture)	●						●	
Aroclor 1221 (mixture)	●						●	
Aroclor 1232 (mixture)	●						●	
Aroclor 1242 (mixture)	●					●	●	
Aroclor 1248 (mixture)	●					●	●	
Aroclor 1254 (mixture)	●					●	●	
Aroclor 1260 (mixture)	●					●	●	
Selected individual congeners				●				
Pentachloroanisole (PCA)		●				●		●
Pentachlorobenzene		●					●	●
Pentachloronitrobenzene (PCNB)		●						●
Pentachlorophenyl methyl ether								
Pentachlorophenyl methyl sulfide								
Pentachlorostyrene			●					
Perthane		●						●
Perylene				●				
Phenanthrene	●			●				●
Pyrene	●			●				●
Terphenyl			●					
1,2,3,4-Tetrachlorobenzene		●						●
1,2,3,5-Tetrachlorobenzene		●						●
1,2,4,5-Tetrachlorobenzene		●					●	●
1,2,3-Trichlorobenzene		●						

(continued)

Table E-1. (continued)

Analyte	Monitoring program							
	a	b	c <sup>1</sup>	d	e	f	g	h
1,2,4-Trichlorobenzene	●	●						●
1,3,5-Trichlorobenzene		●						●
Triphenyl phosphate								●
<b>Dioxins</b>								
1,2,3,7,8-Pentachlorodibenzodioxin (PeCDD)		●						●
2,3,7,8-Tetrachlorodibenzodioxin (TCDD)	●	●	●		●		●	●
1,2,3,4,6,7,8-Heptachlorodibenzodioxin (HpCDD)		●						●
1,2,3,4,7,8-Hexachlorodibenzodioxin (HxCDD)		●						●
1,2,3,6,7,8-Hexachlorodibenzodioxin (HxCDD)		●						●
1,2,3,7,8,9-Hexachlorodibenzodioxin (HxCDD)		●						●
<b>Dibenzofurans</b>								
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)		●						●
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)		●						●
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)		●						●
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)		●						●
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)		●						●
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)		●						●
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)		●						●
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)		●						●
2,3,7,8-Tetrachlorodibenzofuran (TCDF)		●						●
<b>Acidic Organic Compounds</b>								
Chlorinated phenols								
4-Chloro-3-cresol	●							
2-Chlorophenol	●							
2,4-Dichlorophenol	●							
2,4-Dimethylphenol	●							
4,6-Dinitro-2-cresol	●							
2-4-Dinitrophenol	●							
2-Nitrophenol	●							
4-Nitrophenol	●							
Pentachlorophenol (PCP)	●							●

(continued)

Table E-1. (continued)

Analyte	Monitoring program							
	a	b	c <sup>1</sup>	d	e	f	g	h
Phenol	●							
2,4,6-Trichlorophenol	●							
<b>Volatile Organic Compounds</b>								
Acrolein	●							
Acrylonitrile	●							
Benzene	●							
Bromodichloromethane	●							
Bromoform	●							
Bromomethane	●							
Carbon tetrachloride	●							
Chlorobenzene	●							
Chloroethane	●							
2-Chloroethylvinyl ether	●							
Chloroform	●							
Chloromethane	●							
Dibromochloromethane	●							
1,1-Dichloroethane	●							
1,2-Dichloroethane	●							
1,1-Dichloroethene	●							
trans-1,2-Dichloroethene	●							
1,2-Dichloropropane	●							
cis-1,3-Dichloropropene	●							
trans-1,3-Dichloropropene	●							
Ethylbenzene	●							
Methylene chloride	●							
1,1,2,2-Tetrachloroethane	●							
Tetrachloroethene	●							
Toluene	●							
1,1,1-Trichloroethane	●							
1,1,2-Trichloroethane	●							
Trichloroethene	●							
Vinyl chloride	●							

(continued)



Table E-1. (continued)

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- <sup>1</sup> Contaminants listed were monitored by at least one Great Lakes state. NOTE: Contaminants monitored exclusively by the Canadian Province of Ontario were not included.
- <sup>2</sup> Only the *cis*-isomer is monitored.
- <sup>a</sup> 301(h) Monitoring Program. Source: U.S. EPA. 1985. *Bioaccumulation Monitoring Guidance: 1. Estimating the Potential for Bioaccumulation of Priority Pollutants and 301(h) Pesticides Discharged into Marine and Estuarine Waters*. EPA 503/3-90-001. Office of Marine and Estuarine Protection, Washington, DC.
- <sup>b</sup> National Study of Chemical Residues in Fish. Source: U.S. EPA. 1992. *National Study of Chemical Residues in Fish*. Volumes I and II. EPA 823/R-92-008a and 008b. Office of Science and Technology, Washington, DC.
- <sup>c</sup> Great Lakes Sport Fish Contaminant Advisory Program. Source: Hesse, J. L. 1990. *Summary and Analyses of Existing Sportfish Consumption Advisory Programs in the Great Lakes Basin—the Great Lakes*. Fish Consumption Advisory Task Force, Michigan Department of Health, Lansing, MI.
- <sup>d</sup> NOAA Status and Trends Program. Source: NOAA. 1989. *National Status and Trends Program for Marine Environmental Quality--Progress Report: A Summary of Selected Data on Tissue Contamination from the First Three Years (1986-1988) of the Mussel Watch Project*. NOAA Technical Memorandum NOS OMA 49. U.S. Department of Commerce, Rockville, MD.
- <sup>e</sup> EPA National Dioxin Study. Source: U.S. EPA. 1987. *National Dioxin Study. Tiers 3, 5, 6 and 7*. EPA 440/4-87-003. Office of Water Regulations and Standards, Washington, DC.
- <sup>f</sup> U.S. Fish and Wildlife Service National Contaminant Biomonitoring Program. Sources: C. J. Schmitt, J. L. Zajicek, and P. H. Peterman. 1990. National Contaminant Biomonitoring Program: Residues of organochlorine chemicals in U.S. freshwater fish, 1976-1984. *Arch. Environ. Contam. Toxicol.* 19:748-781; and T. P. Lowe, T. W. May, W. G. Brumbaugh, and D. A. Kane. 1985. National Contaminant Biomonitoring Program: Concentrations of seven elements in freshwater fish, 1978-1981. *Arch. Environ. Contam. Toxicol.* 14:363-388.
- <sup>g</sup> U.S. EPA. 1991. *Assessment and Control of Bioconcentratable Contaminants in Surface Waters*. Draft. Office of Water, Office of Research and Development, Washington, DC.
- <sup>h</sup> U.S. Geological Survey National Water-Quality Assessment Program. Source: J.K. Crawford and S.N. Luoma. 1993. *Guidelines for Studies of Contaminants in Biological tissues for the National Water-Quality Assessment Program*. USGS Open-File Report 92-494. U.S. Geological Survey, Lemoyne, PA.