

PROPOSED NEW FORMAT FOR DESIGNATED AND PRIORITY CHEMICAL LISTS

BIOMONITORING CALIFORNIA

**Materials for Scientific Guidance Panel Meeting
May 24, 2010**

*Agenda Item: Implementation of New Format and Other Issues for Designated
and Priority Chemical Lists*

Biomonitoring California Designated Chemicals

The designated chemicals for Biomonitoring California^a are provided in this list. Designated chemicals consist of those substances that are included in the Centers for Disease Control and Prevention's biomonitoring studies^b and additional chemicals that are recommended by the Scientific Guidance Panel (SGP) for Biomonitoring California. Designated chemicals are the pool of chemicals from which the SGP can recommend priority chemicals for biomonitoring.

Targets for measurement in biomonitoring studies could include the parent chemical, metabolites or other breakdown products formed in the body, biological markers of exposure to a chemical, or chemicals produced when the parent is degraded in the environment. The approach for biomonitoring a chemical may change as methods development proceeds. In the list below, the parent chemical is provided and, for some parent chemicals, metabolites, biomarkers or other relevant indicator chemicals for biomonitoring are shown indented underneath.

Acrylamide

Acrylamide hemoglobin adducts
Glycidamide hemoglobin adducts

Antimicrobials used in Food Production¹

Brominated and Chlorinated Organic Compounds used as Flame Retardants¹

2,2-Bis(bromomethyl)-1,3-propanediol
2,2-Bis(chloromethyl)trimethylene bis[bis(2-chloroethyl)phosphate]
Bis(2-ethyl-1-hexyl)tetrabromophthalate
Bis(hexachlorocyclopentadieno)cyclooctane (Dechlorane Plus)
1,2-Bis(2,4,6-tribromophenoxy)ethane
1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane
2,3-Dibromopropyl-2,4,6-tribromophenyl ether
2-Ethyl-1-hexyl-2,3,4,5-tetrabromobenzoate
Chlorendic acid
Decabromodiphenylethane
Hexabromobenzene
2,2',4,4',5,5'-Hexabromobiphenyl (BB 153)
Hexabromocyclododecane (HBCD)
Hexachlorocyclopentadienyl-dibromocyclooctane
N,N'-Ethylenebis(tetrabromophthalimide)
Pentabromoethylbenzene
Pentabromotoluene
Short-chain chlorinated paraffins
Tetrabromobisphenol A (TBBPA)

Tetrabromobisphenol A bis(2,3-dibromopropyl) ether
Tetrabromobisphenol A bis(2-hydroxyethyl) ether
Tetrabromophthalic anhydride
Tetrakis(2-chloroethyl)dichloroisopentyl diphosphate
2,4,6-Tribromophenol
Tris(2-chloroethyl)phosphate
Tris(1-chloro-2-propyl)phosphate
Tris(1,3-dichloro-2-propyl)phosphate
Tris(2,3-dichloro-1-propyl)phosphate

Polybrominated diphenyl ethers (PBDEs)

2,2',4-Tribromodiphenyl ether (BDE 17)
2,4,4'-Tribromodiphenyl ether (BDE 28)
2,2',4,4'-Tetrabromodiphenyl ether (BDE 47)
2,3',4,4'-Tetrabromodiphenyl ether (BDE 66)
2,2',3,4,4'-Pentabromodiphenyl ether (BDE 85)
2,2',4,4',5-Pentabromodiphenyl ether (BDE 99)
2,2',4,4',6-Pentabromodiphenyl ether (BDE 100)
2,2',4,4',5,5'-Hexabromodiphenyl ether (BDE 153)
2,2',4,4',5,6'-Hexabromodiphenyl ether (BDE 154)
2,2',3,4,4',5,6'-Heptabromodiphenyl ether (BDE 183)
2,2',3,3',4,4',5,5',6,6'-Decabromodiphenyl ether (BDE 209)

Cyclosiloxanes¹

Decamethylcyclopentasiloxane (D5)
Dodecamethylcyclohexasiloxane (D6)
Octamethylcyclotetrasiloxane (D4)

Diesel Exhaust²

- a. California Environmental Contaminant Biomonitoring Program (also known as Biomonitoring California), codified at Health and Safety Code section 105440 et seq.
- b. Known collectively as the National Reports on Human Exposure to Environmental Chemicals program.

Disinfection By-Products (Trihalomethanes)³

Bromodichloromethane
Dibromochloromethane
Tribromomethane (Bromoform)
Trichloromethane (Chloroform)

Environmental Phenols³

Benzophenone-3 (2-Hydroxy-4-methoxybenzophenone)
Bisphenol A (2,2-Bis[4-hydroxyphenyl]propane)
4-*tert*-Octylphenol (4-[1,1,3,3-Tetramethylbutyl]phenol)
Parabens³
 Butylparaben (Butyl 4-hydroxybenzoate)
 Ethylparaben (Ethyl 4-hydroxybenzoate)
 Methylparaben (Methyl 4-hydroxybenzoate)
 Propylparaben (Propyl 4-hydroxybenzoate)
Triclosan (2,4,4'-Trichloro-2'-hydroxyphenyl ether)

Metals³

Antimony
Arsenic
 Arsenic (V) acid
 Arsenobetaine
 Arsenocholine
 Arsenous (III) acid
 Dimethylarsinic acid
 Monomethylarsonic acid
 Trimethylarsine oxide
Barium
Beryllium
Cadmium
Cesium
Cobalt
Lead
Mercury
Molybdenum
Platinum
Thallium
Tungsten
Uranium

Perchlorate

Perfluorochemicals³

2-(N-Ethyl-perfluorooctane sulfonamide) acetic acid
2-(N-Methyl-perfluorooctane sulfonamide) acetic acid
Perfluorobutane sulfonic acid
Perfluorodecanoic acid

Perfluorododecanoic acid
Perfluoroheptanoic acid
Perfluorohexane sulfonic acid
Perfluorononanoic acid
Perfluorooctane sulfonamide
Perfluorooctane sulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluoroundecanoic acid

Pesticides^{3,4}

Carbamate Insecticides³

Benfuracarb
 Carbofuranphenol
Carbaryl
 1-Hydroxynaphthalene⁵
 2-Hydroxynaphthalene⁵
Carbofuran
 Carbofuranphenol
Carbosulfan
 Carbofuranphenol
Furathiocarb
 Carbofuranphenol
Propoxur
 2-Isopropoxyphenol

Fungicides³

Captafol
 Tetrahydrophthalimide
Captan
 Phthalimide
 Tetrahydrophthalimide
Chlorothalonil
Dichloran
Folpet
 Phthalimide
Iprodione
Mancozeb
 Ethylene thiourea
Maneb
 Ethylene thiourea
Metalaxyl
Metiram
 Ethylene thiourea
Nabam
 Ethylene thiourea
Pentachlorophenol
o-Phenylphenol
Propineb
 Propylene thiourea
Thiram
 Ethylene thiourea
Ziram
 Ethylene thiourea

Herbicides - Substituted Ureas³

Bensulfuron-methyl
Chlorimuron-ethyl
Chlorsulfuron
Diuron
Ethametsulfuron-methyl
Foramsulfuron
Halosulfuron
Iodosulfuron
Linuron
Metsulfuron-methyl
Nicosulfuron
Primisulfuron-methyl
Prosulfuron
Rimsulfuron
Sulfometuron-methyl
Sulfosulfuron
Thifensulfuron-methyl
Triasulfuron
Triflusulfuron-methyl
Non-specific metabolites
 Dimethoxy pyrimidine
 Dimethyl pyrimidine
 Methyl methoxytriazine

Organochlorine Pesticides³

Aldrin
 Dieldrin
Chlordane
 trans-Nonachlor
 Oxychlordane
Dichlorodiphenyltrichloroethane (DDT) (including
p,p'-DDT and o,p'-DDT)
 p,p'-Dichlorodipenyldichloroethene (DDE)
Dieldrin
Endosulfan
 Endosulfan-ether
 Endosulfan-lactone
 Endosulfan-sulfate
Endrin
Heptachlor
 Heptachlor epoxide
Hexachlorobenzene
 Pentachlorophenol
 2,4,5-Trichlorophenol
 2,4,6-Trichlorophenol
Hexachlorocyclohexanes (HCH) (including beta-
HCH and gamma-HCH [lindane])
 Pentachlorophenol
 2,4,5-Trichlorophenol
 2,4,6-Trichlorophenol
Methoxychlor
 Dihydroxy methoxychlor
 Monohydroxy methoxychlor
Mirex

2,4,5-Trichlorophenol
2,4,6-Trichlorophenol

Organophosphate Insecticides³

Acephate
Azinphos methyl
 Dimethyldithiophosphate
 Dimethylphosphate
 Dimethylthiophosphate
Chlorethoxyphos
 Diethylphosphate
 Diethylthiophosphate
Chlorpyrifos
 Diethylphosphate
 Diethylthiophosphate
 3,5,6-Trichloro-2-pyridinol
Chlorpyrifos methyl
 Dimethylphosphate
 Dimethylthiophosphate
 3,5,6-Trichloro-2-pyridinol
Coumaphos
 3-Chloro-7-hydroxy-4-methyl-2H-chromen-2-
 one/ol
 Diethylphosphate
 Diethylthiophosphate
Diazinon
 Diethylphosphate
 Diethylthiophosphate
 2-Isopropyl-4-methyl-6-hydroxypyrimidine
Dichlorvos (DDVP)
 Dimethylphosphate
Dicrotophos
 Dimethylphosphate
Dimethoate
 Dimethyldithiophosphate
 Dimethylphosphate
 Dimethylthiophosphate
Disulfoton
 Diethyldithiophosphate
 Diethylphosphate
 Diethylthiophosphate
Ethion
 Diethyldithiophosphate
 Diethylphosphate
 Diethylthiophosphate
Fenitrothion
 Dimethylphosphate
 Dimethylthiophosphate
Fenthion
 Dimethylphosphate
 Dimethylthiophosphate
Isazophos-methyl
 5-Chloro-1,2-dihydro-1-isopropyl-[3H]-1,2,4-
 triazol-3-one
 Dimethylphosphate
 Dimethylthiophosphate

Malathion	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Dimethyldithiophosphate	4-Fluoro-3-phenoxybenzoic acid
Dimethylphosphate	Cyhalothrin
Dimethylthiophosphate	3-Phenoxybenzoic acid
Malathion dicarboxylic acid	Cypermethrin
Methamidophos	<i>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Methidathion	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Dimethyldithiophosphate	3-Phenoxybenzoic acid
Dimethylphosphate	Cyphenothrin
Dimethylthiophosphate	Deltamethrin
Methyl parathion	<i>cis</i> -3-(2,2-Dibromovinyl)-2,2-dimethylcyclopropane carboxylic acid
Dimethylphosphate	3-Phenoxybenzoic acid
Dimethylthiophosphate	Esbiothrin
<i>p</i> -Nitrophenol	Esfenvalerate
Naled	Etofenprox
Dimethylphosphate	Fenpropathrin
Oxydemeton-methyl	3-Phenoxybenzoic acid
Dimethylphosphate	Fenvalerate
Dimethylthiophosphate	Imiprothrin
Parathion (Ethyl parathion)	Metofluthrin
Diethylphosphate	Permethrin
Diethylthiophosphate	<i>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
<i>p</i> -Nitrophenol	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Phorate	3-Phenoxybenzoic acid
Diethyldithiophosphate	Phenothrin (sumithrin)
Diethylphosphate	Prallethrin
Diethylthiophosphate	Pyrethrin 1
Phosmet (Imidan)	<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid
Dimethyldithiophosphate	Resmethrin
Dimethylphosphate	<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid
Dimethylthiophosphate	Tetramethrin
Pirimiphos-methyl	Tralomethrin
2-(Diethylamino)-6-methylpyrimidin-4-ol/one	3-Phenoxybenzoic acid
Dimethylphosphate	<u>Other Herbicides</u>
Dimethylthiophosphate	Acetochlor
Sulfotepp	Acetochlor mercapturate
Diethylphosphate	Alachlor
Diethylthiophosphate	Alachlor mercapturate
Temephos	Atrazine
Dimethylphosphate	Atrazine mercapturate
Dimethylthiophosphate	Diaminochlorotriazine
Terbufos	Desethylatrazine
Diethyldithiophosphate	Desisopropylatrazine
Diethylphosphate	Hydroxyatrazine
Diethylthiophosphate	Dacthal
Tetrachlorvinphos	
Dimethylphosphate	
<u>Pyrethroid Pesticides</u> ¹	
Allethrin	
<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid	
Bifenthrin	
Cyfluthrin	
<i>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid	

2,4-Dichlorophenoxyacetic acid (2,4-D), salts and esters

2,4-Dichlorophenoxyacetic acid
2,4-Dichlorophenol

Metolachlor

Metolachlor mercapturate

Pendimethalin

2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), salts and esters

2,4,5-Trichlorophenoxyacetic acid

Trifluralin

Other Pesticides

1,4-Dichlorobenzene (*p*-Dichlorobenzene)

2,5 Dichlorophenol

N,N-Diethyl-3-methylbenzamide (DEET)

Fipronil

Octhilinone

Phthalates³

Benzylbutyl phthalate

Mono-benzyl phthalate

Dibutyl phthalate

Mono-*n*-butyl phthalate

Mono-isobutyl phthalate

Dicyclohexyl phthalate

Mono-cyclohexyl phthalate

Diethyl phthalate

Mono-ethyl phthalate

Di-2-ethylhexyl phthalate (DEHP)

Mono-(2-ethyl-5-carboxypentyl) phthalate

Mono-2-ethylhexyl phthalate

Mono-(2-ethyl-5-hydroxyhexyl) phthalate

Mono-(2-ethyl-5-oxohexyl) phthalate

Di-isononyl phthalate

Mono(carboxyisononyl) phthalate

Mono(hydroxyisononyl) phthalate

Mono-isononyl phthalate

Mono(oxoisononyl) phthalate

Dimethyl phthalate

Mono-methyl phthalate

Di-*n*-octyl phthalate

Mono-(3-carboxypropyl) phthalate

Mono-*n*-octyl phthalate

Phytoestrogens³

Daidzein

O-Desmethylangolensin

Enterodiol

Enterolactone

Equol

Genistein

Polychlorinated Biphenyls (PCBs), Dioxin-Like³

Coplanar PCBs⁴

3,4,4',5-Tetrachlorobiphenyl (PCB 81)

3,3',4,4',5-Pentachlorobiphenyl (PCB 126)

3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)

Mono-ortho-Substituted PCBs

2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)

2,3',4,4',5-Pentachlorobiphenyl (PCB 118)

2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)

2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)

2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)

2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)

Polychlorinated Biphenyls (PCBs), Non-Dioxin-Like³

2,2',5-Trichlorobiphenyl (PCB 18)

2,4,4'-Trichlorobiphenyl (PCB 28)

2,2',3,5'-Tetrachlorobiphenyl (PCB 44)

2,2',4,5'-Tetrachlorobiphenyl (PCB 49)

2,2',5,5'-Tetrachlorobiphenyl (PCB 52)

2,3',4,4'-Tetrachlorobiphenyl (PCB 66)

2,4,4',5-Tetrachlorobiphenyl (PCB 74)

2,2',3,4,5'-Pentachlorobiphenyl (PCB 87)

2,2',4,4',5-Pentachlorobiphenyl (PCB 99)

2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)

2,3,3',4',6-Pentachlorobiphenyl (PCB 110)

2,2',3,3',4,4'-Hexachlorobiphenyl (PCB 128)

2,2',3,4,4',5' and 2,3,3',4,4',6-Hexachlorobiphenyl
(PCB 138 & 158)

2,2',3,4,5,5'-Hexachlorobiphenyl (PCB 146)

2,2',3,4,5',6-Hexachlorobiphenyl (PCB 149)

2,2',3,5,5',6-Hexachlorobiphenyl (PCB 151)

2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)

2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB 170)

2,2',3,3',4,5,5'-Heptachlorobiphenyl (PCB 172)

2,2',3,3',4,5',6'-Heptachlorobiphenyl (PCB 177)

2,2',3,3',5,5',6-Heptachlorobiphenyl (PCB 178)

2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)

2,2',3,4,4',5',6-Heptachlorobiphenyl (PCB 183)

2,2',3,4,5,5',6-Heptachlorobiphenyl (PCB 187)

2,2',3,3',4,4',5,5'-Octachlorobiphenyl (PCB 194)

2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB 195)

2,2',3,3',4,4',5,6' and 2,2',3,4,4',5,5',6-Octa-
chlorobiphenyl (PCB 196 & 203)

2,2',3,3',4,5,5',6-Octachlorobiphenyl (PCB 199)

2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (PCB 206)

2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (PCB
209)

Polychlorinated Dibenzo-*p*-dioxins³

1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin
1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin
1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin
1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin
1,2,3,4,6,7,8,9-Octachlorodibenzo-*p*-dioxin
1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD)

Polychlorinated Dibenzofurans³

1,2,3,4,6,7,8-Heptachlorodibenzofuran
1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,4,7,8-Hexachlorodibenzofuran
1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8,9-Hexachlorodibenzofuran
2,3,4,6,7,8-Hexachlorodibenzofuran
1,2,3,4,6,7,8,9-Octachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzofuran
2,3,4,7,8-Pentachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzofuran

Polycyclic Aromatic Hydrocarbons (PAHs)³

Benz[a]anthracene
 1-Hydroxybenz[a]anthracene
 3-Hydroxybenz[a]anthracene
 9-Hydroxybenz[a]anthracene
Benzo[a]pyrene
 3-Hydroxybenzo[a]pyrene
Benzo[c]phenanthrene
 1-Hydroxybenzo[c]phenanthrene
 2-Hydroxybenzo[c]phenanthrene
 3-Hydroxybenzo[c]phenanthrene
Chrysene
 1-Hydroxychrysene
 2-Hydroxychrysene
 3-Hydroxychrysene
 4-Hydroxychrysene
 6-Hydroxychrysene
Fluoranthene
 3-Hydroxyfluoranthene
Fluorene
 2-Hydroxyfluorene
 3-Hydroxyfluorene
 9-Hydroxyfluorene
Naphthalene
 1-Hydroxynaphthalene
 2-Hydroxynaphthalene
Phenanthrene
 1-Hydroxyphenanthrene
 2-Hydroxyphenanthrene
 3-Hydroxyphenanthrene

4-Hydroxyphenanthrene
9-Hydroxyphenanthrene
Pyrene
 1-Hydroxypyrene

Synthetic Hormones used in Food Production¹

Melengestrol acetate
Trenbolone acetate
Zeranol

Tobacco Smoke

Nicotine
 Cotinine

Volatile Organic Compounds³

Benzene
Carbon tetrachloride
Chlorobenzene
Dibromomethane
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dichlorobenzene (*o*-Dichlorobenzene)
1,3-Dichlorobenzene (*m*-Dichlorobenzene)
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
Dichloromethane (Methylene chloride)
1,2-Dichloropropane
2,5-Dimethylfuran
Ethylbenzene
Hexachloroethane
Methyl-*t*-butyl ether (MTBE)
Nitrobenzene
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (Perchloroethylene)
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Toluene
m-Xylene
o-Xylene
p-Xylene

Notes

¹ All members of the chemical class are designated chemicals, including, but not limited to, the chemicals shown.

² Diesel exhaust is a complex mixture that contains many components, one or more of which may be useful as an indicator for biomonitoring.

³ All members of the chemical class are not designated chemicals; only the specific chemicals listed are designated chemicals.

⁴ Fungicides, herbicides, and insecticides are grouped under the general heading of "Pesticides."

⁵ 1-Hydroxynaphthalene is the metabolite of both carbaryl and naphthalene. To determine the percent of 1-hydroxynaphthalene attributable to carbaryl alone, 2-hydroxynaphthalene (which is only a metabolite of naphthalene) must also be measured.

Biomonitoring California Priority Chemicals

The following is a list of priority chemicals recommended by the Scientific Guidance Panel (SGP) for Biomonitoring California.^a Targets for measurement in biomonitoring studies could include the parent chemical, metabolites or other breakdown products formed in the body, biological markers of exposure to a chemical, or chemicals produced when the parent is degraded in the environment. The approach for biomonitoring a chemical may change as methods development proceeds. In the list below, the parent chemical is provided and, for some parent chemicals, metabolites, biomarkers or other relevant indicator chemicals for biomonitoring are shown indented underneath. Biomonitoring California determines the chemicals that are actually biomonitored and the appropriate targets for measurement.

Brominated and Chlorinated Organic Compounds used as Flame Retardants¹

2,2-Bis(bromomethyl)-1,3-propanediol
 2,2-Bis(chloromethyl)trimethylene bis[bis(2-chloroethyl)phosphate]
 Bis(2-ethyl-1-hexyl)tetrabromophthalate
 Bis(hexachlorocyclopentadieno)cyclooctane (Dechlorane Plus)
 1,2-Bis(2,4,6-tribromophenoxy)ethane
 1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane
 2,3-Dibromopropyl-2,4,6-tribromophenyl ether
 2-Ethyl-1-hexyl-2,3,4,5-tetrabromobenzoate
 Chlorendic acid
 Decabromodiphenylethane
 Hexabromobenzene
 2,2',4,4',5,5'-Hexabromobiphenyl (BB 153)
 Hexabromocyclododecane (HBCD)
 Hexachlorocyclopentadienyl-dibromocyclooctane
 N,N'-Ethylenebis(tetrabromophthalimide)
 Pentabromoethylbenzene
 Pentabromotoluene
 Short-chain chlorinated paraffins
 Tetrabromobisphenol A (TBBPA)
 Tetrabromobisphenol A bis(2,3-dibromopropyl) ether
 Tetrabromobisphenol A bis(2-hydroxyethyl) ether
 Tetrabromophthalic anhydride
 Tetrakis(2-chloroethyl)dichloroisopentyl diphosphate
 2,4,6-Tribromophenol
 Tris(2-chloroethyl)phosphate
 Tris(1-chloro-2-propyl)phosphate
 Tris(1,3-dichloro-2-propyl)phosphate
 Tris(2,3-dichloro-1-propyl)phosphate

Polybrominated diphenyl ethers (PBDEs)

2,2',4-Tribromodiphenyl ether (BDE 17)
 2,4,4'-Tribromodiphenyl ether (BDE 28)
 2,2',4,4'-Tetrabromodiphenyl ether (BDE 47)

2,3',4,4'-Tetrabromodiphenyl ether (BDE 66)
 2,2',3,4,4'-Pentabromodiphenyl ether (BDE 85)
 2,2',4,4',5-Pentabromodiphenyl ether (BDE 99)
 2,2',4,4',6-Pentabromodiphenyl ether (BDE 100)
 2,2',4,4',5,5'-Hexabromodiphenyl ether (BDE 153)
 2,2',4,4',5,6'-Hexabromodiphenyl ether (BDE 154)
 2,2',3,4,4',5',6-Heptabromodiphenyl ether (BDE 183)
 2,2',3,3',4,4',5,5',6,6'-Decabromodiphenyl ether (BDE 209)

Cyclosiloxanes¹

Decamethylcyclopentasiloxane (D5)
 Dodecamethylcyclohexasiloxane (D6)
 Octamethylcyclotetrasiloxane (D4)

Diesel Exhaust²

Environmental Phenols³

Bisphenol A (2,2-Bis[4-hydroxyphenyl]propane)
 Triclosan (2,4,4'-Trichloro-2'-hydroxyphenyl ether)

Metals³

Arsenic
 Arsenic (V) acid
 Arsenobetaine
 Arsenocholine
 Arsenous (III) acid
 Dimethylarsinic acid
 Monomethylarsonic acid
 Trimethylarsine oxide
 Cadmium
 Lead
 Mercury

Perchlorate

a. California Environmental Contaminant Biomonitoring Program, codified at Health and Safety Code section 105440 et seq.

Perfluorochemicals³

2-(N-Ethylperfluorooctanesulfonamido) acetic acid
2-(N-Methylperfluorooctanesulfonamido) acetic acid
Perfluorobutane sulfonic acid
Perfluorodecanoic acid
Perfluorododecanoic acid
Perfluoroheptanoic acid
Perfluorohexane sulfonic acid
Perfluorononanoic acid
Perfluorooctane sulfonamide
Perfluorooctane sulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluoroundecanoic acid

Pesticides^{3,4}

Herbicides³

2,4-Dichlorophenoxyacetic acid (2,4-D), salts and esters
2,4-Dichlorophenoxyacetic acid
2,4-Dichlorophenol

Organochlorine Pesticides³

Dichlorodiphenyltrichloroethane (DDT) (including p,p'-DDT and o,p'-DDT)
p,p'-Dichlorodiphenyldichloroethene (DDE)

Organophosphorus Insecticides³

Acephate
Azinphos methyl
Dimethyldithiophosphate
Dimethylphosphate
Dimethylthiophosphate
Chlorethoxyphos
Diethylphosphate
Diethylthiophosphate
Chlorpyrifos
Diethylphosphate
Diethylthiophosphate
3,5,6-Trichloro-2-pyridinol
Chlorpyrifos methyl
Dimethylphosphate
Dimethylthiophosphate
3,5,6-Trichloro-2-pyridinol
Coumaphos
3-Chloro-7-hydroxy-4-methyl-2H-chromen-2-one/ol
Diethylphosphate
Diethylthiophosphate
Diazinon
Diethylphosphate
Diethylthiophosphate
2-Isopropyl-4-methyl-6-hydroxypyrimidine

Dichlorvos (DDVP)
Dimethylphosphate
Dicrotophos
Dimethylphosphate
Dimethoate
Dimethyldithiophosphate
Dimethylphosphate
Dimethylthiophosphate
Disulfoton
Diethyldithiophosphate
Diethylphosphate
Diethylthiophosphate
Ethion
Diethyldithiophosphate
Diethylphosphate
Diethylthiophosphate
Fenitrothion
Dimethylphosphate
Dimethylthiophosphate
Fenthion
Dimethylphosphate
Dimethylthiophosphate
Isazophos-methyl
5-Chloro-1,2-dihydro-1-isopropyl-[3H]-1,2,4-triazol-3-one
Dimethylphosphate
Dimethylthiophosphate
Malathion
Dimethyldithiophosphate
Dimethylphosphate
Dimethylthiophosphate
Malathion dicarboxylic acid
Methamidophos
Methidathion
Dimethyldithiophosphate
Dimethylphosphate
Dimethylthiophosphate
Methyl parathion
Dimethylphosphate
Dimethylthiophosphate
p-Nitrophenol
Naled
Dimethylphosphate
Oxydemeton-methyl
Dimethylphosphate
Dimethylthiophosphate
Parathion (Ethyl parathion)
Diethylphosphate
Diethylthiophosphate
p-Nitrophenol
Phorate
Diethyldithiophosphate
Diethylphosphate
Diethylthiophosphate

Phosmet (Imidan)
Dimethyldithiophosphate
Dimethylphosphate
Dimethylthiophosphate
Pirimiphos-methyl
2-(Diethylamino)-6-methylpyrimidin-4-ol/one
Dimethylphosphate
Dimethylthiophosphate

Sulfotepp
Diethylphosphate
Diethylthiophosphate

Temephos
Dimethylphosphate
Dimethylthiophosphate

Terbufos
Diethyldithiophosphate
Diethylphosphate
Diethylthiophosphate

Tetrachlorvinphos
Dimethylphosphate

Pyrethroid Pesticides³

Allethrin
cis/trans-Dimethylvinylcyclopropane carboxylic diacid

Cyfluthrin
cis-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
trans-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
4-Fluoro-3-phenoxybenzoic acid

Cyhalothrin
3-Phenoxybenzoic acid

Cypermethrin
cis-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
trans-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
3-Phenoxybenzoic acid

Deltamethrin
cis-3-(2,2-Dibromovinyl)-2,2-dimethylcyclopropane carboxylic acid
3-Phenoxybenzoic acid

Fenpropathrin
3-Phenoxybenzoic acid

Permethrin
cis-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
trans-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
3-Phenoxybenzoic acid

Pyrethrin 1
cis/trans-Dimethylvinylcyclopropane carboxylic diacid

Resmethrin
cis/trans-Dimethylvinylcyclopropane carboxylic diacid
Tralomethrin
3-Phenoxybenzoic acid

Other Pesticides

1,4-Dichlorobenzene (*p*-Dichlorobenzene)
2,5 Dichlorophenol

Phthalates³

Benzylbutyl phthalate
Mono-benzyl phthalate
Dibutyl phthalate
Mono-*n*-butyl phthalate
Mono-isobutyl phthalate
Dicyclohexyl phthalate
Mono-cyclohexyl phthalate
Diethyl phthalate
Mono-ethyl phthalate
Di-2-ethylhexyl phthalate (DEHP)
Mono-(2-ethyl-5-carboxypentyl) phthalate
Mono-2-ethylhexyl phthalate
Mono-(2-ethyl-5-hydroxyhexyl) phthalate
Mono-(2-ethyl-5-oxohexyl) phthalate
Di-isononyl phthalate
Mono(carboxyisononyl) phthalate
Mono(hydroxyisononyl) phthalate
Mono-isononyl phthalate
Mono(oxoisononyl) phthalate
Dimethyl phthalate
Mono-methyl phthalate
Di-*n*-octyl phthalate
Mono-(3-carboxypropyl) phthalate
Mono-*n*-octyl phthalate

**Polychlorinated Biphenyls (PCBs),
Dioxin-Like³**

Coplanar PCBs³

3,4,4',5-Tetrachlorobiphenyl (PCB 81)
3,3',4,4',5-Pentachlorobiphenyl (PCB 126)
3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)

Mono-ortho-Substituted PCBs

2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)
2,3',4,4',5-Pentachlorobiphenyl (PCB 118)
2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)
2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)
2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)
2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)

**Polychlorinated Biphenyls (PCBs),
Non-Dioxin-Like³**

2,2',5'-Trichlorobiphenyl (PCB 18)
2,4,4'-Trichlorobiphenyl (PCB 28)
2,2',3,5'-Tetrachlorobiphenyl (PCB 44)
2,2',4,5'-Tetrachlorobiphenyl (PCB 49)
2,2',5,5'-Tetrachlorobiphenyl (PCB 52)
2,3',4,4'-Tetrachlorobiphenyl (PCB 66)
2,4,4',5-Tetrachlorobiphenyl (PCB 74)
2,2',3,4,5'-Pentachlorobiphenyl (PCB 87)
2,2',4,4',5-Pentachlorobiphenyl (PCB 99)
2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)
2,3,3',4',6-Pentachlorobiphenyl (PCB 110)
2,2',3,3',4,4'-Hexachlorobiphenyl (PCB 128)
2,2',3,4,4',5' and 2,3,3',4,4',6-Hexachlorobiphenyl
(PCB 138 & 158)
2,2',3,4',5,5'-Hexachlorobiphenyl (PCB 146)
2,2',3,4',5',6'-Hexachlorobiphenyl (PCB 149)
2,2',3,5,5',6-Hexachlorobiphenyl (PCB 151)
2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)
2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB 170)
2,2',3,3',4,5,5'-Heptachlorobiphenyl (PCB 172)
2,2',3,3',4,5',6'-Heptachlorobiphenyl (PCB 177)
2,2',3,3',5,5',6-Heptachlorobiphenyl (PCB 178)
2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)
2,2',3,4,4',5',6-Heptachlorobiphenyl (PCB 183)
2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB 187)
2,2',3,3',4,4',5,5'-Octachlorobiphenyl (PCB 194)
2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB 195)
2,2',3,3',4,4',5,6' and 2,2',3,4,4',5,5',6-Octa-
chlorobiphenyl (PCB 196 & 203)
2,2',3,3',4,5,5',6-Octachlorobiphenyl (PCB 199)
2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl (PCB 206)
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (PCB
209)

**Polycyclic Aromatic Hydrocarbons
(PAHs)^{3,5}**

3-Hydroxybenzo[a]pyrene
6-Hydroxychrysene
3-Hydroxyphenanthrene

Tobacco Smoke

Nicotine
Cotinine

Notes

¹ All members of the chemical class are priority chemicals, including, but not limited to, the chemicals listed.

² Diesel exhaust is a complex mixture that contains many components, one or more of which may be useful as an indicator for biomonitoring.

³ All members of the chemical class are not priority chemicals; only the specific chemicals listed are priority chemicals.

⁴ Fungicides, herbicides, and insecticides are grouped under the general heading of "Pesticides."

⁵ The SGP recommended the three hydroxy-PAHs listed as priority chemicals. The corresponding parent chemicals are benzo[a]pyrene, chrysene and phenanthrene, respectively.