

California Environmental Contaminant Biomonitoring Program (CECBP)
Designated Chemicals
March 2009

Designated chemicals consist of those chemicals that are included in the Centers for Disease Control and Prevention's (CDC's) National Biomonitoring Program, as well as additional chemicals, meeting certain criteria, that are recommended by the CECBP's Scientific Guidance Panel (SGP). Designated chemicals are the pool of chemicals from which the highest priority chemicals are selected for biomonitoring.

Parent Chemicals	Target Chemical for Measurement¹
Metals^{2,3}	
Antimony	
Barium	
Beryllium	
Cadmium	
Cesium	
Cobalt	
Lead	
Mercury	
Molybdenum	
Platinum	
Thallium	
Tungsten	
Uranium	
Arsenic	
Arsenous (III) acid	
Arsenic (V) acid	
Monomethylarsonic acid	
Dimethylarsinic acid	
Arsenobetaine	
Arsenocholine	
Trimethylarsine oxide	
Diesel Exhaust⁴	
Tobacco Smoke	
Nicotine	Cotinine
Phthalates²	
Benzylbutyl phthalate (BzBP)	Mono-benzyl phthalate
	Mono-2-ethylhexyl phthalate
	Mono-(2-ethyl-5-oxohexyl) phthalate
	Mono-(2-ethyl-5-hydroxyhexyl) phthalate
Di-2-ethylhexyl phthalate (DEHP)	Mono-(2-ethyl-5-carboxypentyl) phthalate
	Mono-n-butyl phthalates
	Mono-isobutyl phthalate
Dibutyl phthalate (DBP)	Mono-cyclohexyl phthalate
Dicyclohexyl phthalate (DCHP)	Mono-methyl phthalate
Dimethyl phthalate (DMP)	Mono-ethyl phthalate
Diethyl phthalate (DEP)	Monoisononyl phthalate
Di-isononyl phthalate (DiNP)	Mono(hydroxyisononyl) phthalate
	Mono(carboxyisononyl) phthalate
	Mono(oxoisononyl) phthalate
Di-n-octyl phthalate (DOP)	Mono-n-octyl phthalate
	Mono-(3-carboxypropyl) phthalate

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Phytoestrogens²	
Daidzein	
Enterodiol	
Enterolactone	
Equol	
Genistein	
O-Desmethylangolensin	
Environmental Phenols²	
Bisphenol A	
2-Hydroxy-4-methoxybenzophenone (Benzophenone-3)	
4-tert-Octyl phenol	
2,4,4'-Trichloro-2'-hydroxyphenyl ether (Triclosan)	
Polycyclic Aromatic Hydrocarbons²	
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

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Organochlorine Pesticides²	
Aldrin	Aldrin
	Dieldrin
Chlordane	Oxychlordane
	<i>trans</i> -Nonachlor
DDT	<i>p,p'</i> -DDT
	<i>o,p'</i> -DDT
	<i>p,p'</i> -DDE
Dieldrin	Dieldrin
Endrin	Endrin
Methoxychlor	Monohydroxy methoxychlor
	Dihydroxy methoxychlor
Endosulfan	Endosulfan-ether
	Endosulfan-lactone
	Endosulfan-sulfate
Heptachlor	Heptachlor epoxide
Hexachlorobenzene	Pentachlorophenol
	2,4,5-Trichlorophenol
	2,4,6-Trichlorophenol
Hexachlorocyclohexanes	Beta-hexachlorocyclohexane
	Gamma-hexachlorocyclohexane
	Pentachlorophenol
	2,4,5-Trichlorophenol
Mirex	2,4,6-Trichlorophenol
	Mirex
Pentachlorophenol	Pentachlorophenol
Trichlorophenols (2,4,5-Trichlorophenol and 2,4,6-Trichlorophenol)	2,4,5-Trichlorophenol
	2,4,6-Trichlorophenol
Organophosphate Insecticides: Dialkyl Phosphate Metabolites and Specific Metabolites²	
Acephate	
Azinphos Methyl	Dimethylphosphate
	Dimethylthiophosphate
	Dimethyldithiophosphate
Chlorethoxyphos	Diethylphosphate
	Diethylthiophosphate
Chlorpyrifos	3,5,6-Trichloro-2-pyridinol
	Diethylphosphate
	Diethylthiophosphate
Chlorpyrifos Methyl	3,5,6-Trichloro-2-pyridinol
	Dimethylphosphate
	Dimethylthiophosphate

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Coumaphos	3-Chloro-7-hydroxy-4-methyl-2H-chromen-2-one/ol
	Diethylphosphate
	Diethylthiophosphate
Diazinon	2-Isopropyl-4-methyl-6-hydroxypyrimidine
	Diethylphosphate
	Diethylthiophosphate
Dichlorvos (DDVP)	Dimethylphosphate
Dicrotophos	Dimethylphosphate
	Dimethylphosphate
	Dimethylthiophosphate
Dimethoate	Dimethylthiophosphate
	Dimethyldithiophosphate
	Diethylphosphate
Disulfoton	Diethylthiophosphate
	Diethylthiophosphate
	Diethyldithiophosphate
Ethion	Diethylphosphate
	Diethylthiophosphate
	Diethyldithiophosphate
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	Malathion dicarboxylic acid
	Dimethylphosphate
	Dimethylthiophosphate
	Dimethyldithiophosphate
Methamidophos	
Methidathion	Dimethylphosphate
	Dimethylthiophosphate
	Dimethyldithiophosphate
Methyl parathion	<i>para</i> -Nitrophenol
	Dimethylphosphate
Naled	Dimethylthiophosphate
	Dimethylphosphate
Oxydemeton-methyl	Dimethylphosphate
	Dimethylthiophosphate
Parathion	<i>para</i> -Nitrophenol
	Diethylphosphate
	Diethylthiophosphate
Phorate	Diethylphosphate
	Diethylthiophosphate
	Diethyldithiophosphate

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Phosmet (Imidan)	Dimethylphosphate
	Dimethylthiophosphate
	Dimethyldithiophosphate
Pirimiphos-methyl	2-(Diethylamino)-6-methylpyrimidin-4-ol/one
	Dimethylphosphate
Sulfotepp	Dimethylthiophosphate
	Diethylphosphate
Temephos	Diethylthiophosphate
	Dimethylphosphate
Terbufos	Dimethylthiophosphate
	Diethylphosphate
	Diethylthiophosphate
Tetrachlorvinphos	Diethyldithiophosphate
Pyrethroid Pesticides²	
Allethrin	<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid
Cyfluthrin	4-Fluoro-3-phenoxybenzoic acid
	<i>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Cypermethrin	3-Phenoxybenzoic acid
<i>cis</i> -Cypermethrin	<i>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
<i>trans</i> -Cypermethrin	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Deltamethrin	3-Phenoxybenzoic acid
	<i>cis</i> -3-(2,2-Dibromovinyl)-2,2-dimethylcyclopropane carboxylic acid
Permethrin	3-Phenoxybenzoic acid
<i>cis</i> -Permethrin	<i>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
<i>trans</i> -Permethrin	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Pyrethrin 1	<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid
Resmethrin	<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid
Carbamates²	
Benfuracarb	Carbofuranphenol
Carbofuran	Carbofuranphenol
Carbosulfan	Carbofuranphenol
Furathiocarb	Carbofuranphenol
Propoxur	2-Isopropoxyphenol
Other Pesticides	
N,N-Diethyl-3-methylbenzamide (DEET)	
<i>para</i> -dichlorobenzene	2,5 Dichlorophenol

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Fungicides²	
Captafol	Tetrahydrophthalimide
Captan	Phthalimide
	Tetrahydrophthalimide
Chlorothalonil	
Dichloran	
Folpet	Phthalimide
Mancozeb	Ethylenethio urea (ETU)
Maneb	Ethylenethio urea (ETU)
Metalaxyl	
Metiram	Ethylenethio urea (ETU)
Nabam	Ethylenethio urea (ETU)
<i>Ortho</i> -phenylphenol (OPP)	
Propineb	Propylenethio urea (PTU)
Thiram	Ethylenethio urea (ETU)
Ziram	Ethylenethio urea (ETU)

Herbicides: Substituted Ureas²

Bensulfuron-methyl
Chloroimuron ethyl
Chlorsulfuron
Dimethoxy pyrimidine (isomers unspecified)
Dimethyl pyrimidine (isomers unspecified)
Diuron
Ethametsulfuron-methyl
Foramsulfuron
Halosulfuron
Iodosulfuron
Linuron
Methyl methoxytriazine
Metsulfuron-methyl
Nicosulfuron
Primisulfuron-methyl
Prosulfuron
Rimsulfuron
Sulfometuron-methyl
Sulfosulfuron
Thifensulfuron-methyl
Triasulfuron
Triflusulfuron-methyl

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Other Herbicides²	
Salts and esters of 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)
Salts and esters of 2,4-Dichlorophenoxyacetic acid (2,4-D)	2,4-Dichlorophenoxyacetic acid 2,4-Dichlorophenol (minor)
Acetochlor	Acetochlor mercapturate
Alachlor	Alachlor mercapturate
Atrazine	Atrazine mercapturate
	Diaminochlorotriazine
	Desethylatrazine
	Desisopropylatrazine
Dacthal	Hydroxyatrazine
Metolachlor	Metolachlor mercapturate
Trifluralin	

Other Chemicals

Acrylamide
Glycidamide
Perchlorate

**Polychlorinated Dibenzo-p-dioxins, Dibenzofurans,
Coplanar and Mono-Ortho-Substituted Biphenyls²**

1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)
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)
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)
2,3,7,8-Tetrachlorodibenzofuran (TCDF)
2,4,4'-Trichlorobiphenyl (PCB 28)
2,3',4,4'-Tetrachlorobiphenyl (PCB 66)
2,4,4',5-Tetrachlorobiphenyl (PCB 74)
3,4,4',5-Tetrachlorobiphenyl (PCB 81)
2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)
2,3,3',4',6-Pentachlorobiphenyl (PCB 110)

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2,3',4,4',5-Pentachlorobiphenyl (PCB 118)
3,3',4,4',5-Pentachlorobiphenyl (PCB 126)
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)
3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)
2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)

Non-Dioxin-Like Polychlorinated Biphenyls²

2,2',5-Trichloro biphenyl (PCB 18)
2,2',3,5'-Tetrachloro biphenyl (PCB 44)
2,2',4,5'-Tetrachloro biphenyl (PCB 49)
2,2',5,5'-Tetrachlorobiphenyl (PCB 52)
2,2',3,4,5'-Pentachlorobiphenyl (PCB 87)
2,2',4,4',5-Pentachlorobiphenyl (PCB 99)
2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)
2,2',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-Octachlorobiphenyl (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'-Decachloro biphenyl (PCB 209)

**Brominated and Chlorinated Organic Compounds Used as
Flame Retardants⁵**

1,2-Bis(2,4,6-tribromophenoxy)ethane (BTBPE)
1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane (TBECH)
2, 4, 6-Tribromophenol
2,2-Bis(bromomethyl)-1,3-propanediol
2,2-Bis(chloromethyl)trimethylene bis[bis(2-chloroethyl)phosphate]

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2,3-Dibromopropyl-2,4,6-tribromophenyl ether (DPTE)	
2-Ethyl-1-hexyl-2,3,4,5-tetrabromobenzoate (TBB)	
Bis(2-ethyl-1-hexyl) tetrabromophthalate (TBPH)	
Bis(2-hydroxyethyl ether) TBBPA	
Bis(hexachlorocyclopentadieno)cyclooctane (Dechlorane Plus)	
Chlorendic acid	
Decabromodiphenylethane (DBDPE)	
Hexabromobenzene (HBB)	
Hexabromocyclododecane (HBCD)	
Hexachlorocyclopentadienyl-dibromocyclooctane	
N-N-Ethylene-bis(tetrabromophthalimide)	
Pentabromoethylbenzene (PBEB)	
Pentabromotoluene (PBT)	
Short-chain chlorinated paraffins	
Tetrabromobisphenol A (TBBPA)	
Tetrabromobisphenol A bis(2,3)dibromopropyl ether	
Tetrabromophthalic anhydride	
Tetrakis(2-chloroethyl)dichloroisopentyldiphosphate	
Tris(1,3-dichloro-2-propyl)phosphate	
Tris(1-chloro-2-propyl)phosphate (TCPP)	
Tris(2,3-dichloro-1-propyl)phosphate	
Tris(2-chloroethyl)phosphate	
Polybrominated Diphenyl Ethers (PBDEs)⁶	
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',4,4',5,5'-Hexabromobiphenyl (BB 153)	
Perfluorinated Compounds²	
Perfluorooctanoic acid	
Perfluorooctane sulfonic acid	
Perfluorohexane sulfonic acid	
N-Ethyl-perfluorooctane sulfonamide	2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid
N-Methyl-perfluorooctane sulfonamide	2-(N-Methyl-perfluorooctane sulfonamido) acetic acid
Perfluorodecanoic acid	
Perfluorobutane sulfonic acid	

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Perfluoroheptanoic acid
Perfluorononanoic acid
Perfluorooctane sulfonamide
Perfluoroundecanoic acid
Perfluorododecanoic acid

Volatile Organic Compounds²

1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2-dibromo-3-chloropropane
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2,5-Dimethylfuran
Benzene
Bromodichloromethane
Bromoform
Carbon tetrachloride
Chlorobenzene
Chloroform
cis-1,2-Dichloroethene
Dibromochloromethane
Dibromomethane
Ethylbenzene
Hexachloroethane
m/p-Xylene
Methylene chloride
Methyl-*tert*-butyl ether (MTBE)
Nitrobenzene
o-Xylene
Styrene
Tetrachloroethene
Toluene
trans-1,2-Dichloroethene
Trichloroethene

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Cyclosiloxanes⁵

Octamethylcyclotetrasiloxane (D4)

Decamethylcyclopentasiloxane (D5)

Dodecamethylcyclohexasiloxane (D6)

Synthetic Hormones used in Food Production⁵

Zeranol

Trenbolone Acetate

Melengestrol Acetate

Antimicrobials used in Food Production⁵

Notes

¹ Parent chemical is measured unless otherwise noted. Target chemical for measurement may change as method development proceeds.

² All members of the chemical class are not designated chemicals; only the specific chemicals listed are designated chemicals.

³ The Centers for Disease Control and Prevention measures various forms of metals. CECBP will determine the most appropriate way to measure levels of the target metal in individuals tested.

⁴ All components of diesel exhaust are designated chemicals

⁵ All members of the chemical class are designated chemicals, including but not limited to, the chemicals shown.

⁶ PBDEs are members of the designated class "brominated and chlorinated organic compounds used as flame retardants."