

**PROPOSED FORMAT FOR DESIGNATED CHEMICAL LIST
CALIFORNIA ENVIRONMENTAL CONTAMINANT BIOMONITORING PROGRAM**

**Materials for Scientific Guidance Panel Meeting
February 9, 2010**

Agenda Item: Overview of Updated Designated and Priority Chemical Lists

California Environmental Contaminant Biomonitoring Program (CECBP) Designated Chemicals

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 that are recommended by the CECBP's Scientific Guidance Panel (SGP). Designated chemicals are the pool of chemicals from which priority chemicals are selected for biomonitoring. Biomonitoring of chemicals involves measuring the parent chemical or an another appropriate target chemical in individuals tested.¹

Acrylamide

Acrylamide hemoglobin adducts
Glycidamide hemoglobin adducts

Antimicrobials used in Food Production²

Brominated and Chlorinated Organic Compounds used as Flame Retardants²

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-Ethylene-bis(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 (BDE183)
2,2',3,3',4, 4',5,5',6,6'-Decabromodiphenyl ether (BDE 209)

Cyclosiloxanes²

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

Diesel Exhaust³

Disinfection By-Products (Trihalomethanes)⁴

Bromodichloromethane
Dibromochloromethane
Tribromomethane (Bromoform)
Trichloromethane (Chloroform)

Environmental Phenols⁴

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

Metals⁴

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

Perfluorochemicals⁴

N-Ethylperfluorooctanesulfonamido acetic acid
N-Methylperfluorooctanesulfonamido acetic acid
Perfluorobutane sulfonic acid (PFBS)
Perfluorodecanoic acid (PFDeA)
Perfluorododecanoic acid (PFDoA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexane sulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)
Perfluorooctane sulfonamide (PFOSA)
Perfluorooctane sulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluoroundecanoic acid (PFUA)

Pesticides^{4,5}

Carbamate Insecticides⁴

Benfuracarb
 Carbofuranphenol
Carbaryl
 1-Hydroxynaphthalene
Carbofuran
 Carbofuranphenol
Carbosulfan
 Carbofuranphenol
Furathiocarb
 Carbofuranphenol

Propoxur
 2-Isopropoxyphenol

Fungicides⁴

Captafol
 Tetrahydrophthalimide
Captan
 Phthalimide
 Tetrahydrophthalimide
Chlorothalonil
Dichloran
Folpet
 Phthalimide
Iprodione
Mancozeb
 Ethylenethio urea (ETU)
Maneb
 Ethylenethio urea (ETU)
Metalaxyl
Metiram
 Ethylenethio urea (ETU)
Nabam
 Ethylenethio urea (ETU)
Pentachlorophenol
o-Phenylphenol (OPP)
Propineb
 Propylenethio urea (PTU)
Thiram
 Ethylenethio urea (ETU)
Ziram
 Ethylenethio urea (ETU)
Herbicides⁴
Acetochlor
 Acetochlor mercapturate
Alachlor
 Alachlor mercapturate
Atrazine
 Atrazine mercapturate
 Diaminochlorotriazine
 Desethylatrazine
 Desisopropylatrazine
 Hydroxyatrazine
Dacthal
2,4-Dichlorophenoxyacetic acid (2,4-D), salts and esters
 2,4-Dichlorophenoxyacetic acid
 2,4-Dichlorophenol
Metolachlor
 Metolachlor mercapturate
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), salts and esters
 2,4,5-Trichlorophenoxyacetic acid
Trifluralin

Herbicides - Substituted Ureas⁴

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

Organochlorine Pesticides⁴

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
Monohydroxy methoxychlor
Dihydroxy methoxychlor
Mirex
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol

Organophosphorus Insecticides⁴

Acephate
Azinphos methyl
Dimethyldithiophosphate (DMDTP)
Dimethylphosphate (DMP)
Dimethylthiophosphate (DMTP)
Chlorethoxyphos
Diethylphosphate (DEP)
Diethylthiophosphate (DETP)
Chlorpyrifos
3,5,6-Trichloro-2-pyridinol
Diethylphosphate
Diethylthiophosphate
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
2-Isopropyl-4-methyl-6-hydroxypyrimidine
Diethylphosphate
Diethylthiophosphate
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>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Dimethyldithiophosphate	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Dimethylphosphate	Cyhalothrin (including <i>gamma</i> -Cyhalothrin and <i>lambda</i> -Cyhalothrin)
Dimethylthiophosphate	Cypermethrin
Malathion dicarboxylic acid	3-Phenoxybenzoic acid
Methamidophos	<i>cis</i> -Cypermethrin
Methidathion	<i>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Dimethyldithiophosphate	<i>trans</i> -Cypermethrin
Dimethylphosphate	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Dimethylthiophosphate	Cyphenothrin
Methyl parathion	Deltamethrin
<i>p</i> -Nitrophenol	3-Phenoxybenzoic acid
Dimethylphosphate	<i>cis</i> -3-(2,2-Dibromovinyl)-2,2-dimethylcyclopropane carboxylic acid
Dimethylthiophosphate	Esbiothrin
Naled	Esfenvalerate
Dimethylphosphate	Etofenprox
Oxydemeton-methyl	Fenpropathrin
Dimethylphosphate	3-Phenoxybenzoic acid
Dimethylthiophosphate	Fenvalerate
Parathion	Imiprothrin
<i>p</i> -Nitrophenol	Metofluthrin
Diethylphosphate	Permethrin
Diethylthiophosphate	3-Phenoxybenzoic acid
Phorate	<i>cis</i> -Permethrin
Diethyldithiophosphate	<i>cis</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Diethylphosphate	<i>trans</i> -Permethrin
Diethylthiophosphate	<i>trans</i> -3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid
Phosmet (Imidan)	Phenothrin (sumithrin)
Dimethyldithiophosphate	Prallethrin
Dimethylphosphate	Pyrethrin 1
Dimethylthiophosphate	<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid
Pirimiphos-methyl	Resmethrin
2-(Diethylamino)-6-methylpyrimidin-4-ol/one	<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid
Dimethylphosphate	Tetramethrin
Dimethylthiophosphate	Tralomethrin
Sulfotepp	3-Phenoxybenzoic acid
Diethylphosphate	Other Pesticides
Diethylthiophosphate	N,N-Diethyl-3-methylbenzamide (DEET)
Temephos	Fipronil
Dimethylphosphate	Octhilinone
Dimethylthiophosphate	
Terbufos	
Diethyldithiophosphate	
Diethylphosphate	
Diethylthiophosphate	
Tetrachlorvinphos	
Dimethylphosphate	
Pyrethroid Pesticides²	
Allethrin	
<i>cis/trans</i> -Dimethylvinylcyclopropane carboxylic diacid	
Bifenthrin	
Cyfluthrin	
4-Fluoro-3-phenoxybenzoic acid	

Phthalates⁴

Benzylbutyl phthalate (BzBP)
 Mono-benzyl phthalate
Dibutyl phthalate (DBP)
 Mono-n-butyl phthalate
 Mono-isobutyl phthalate
Dicyclohexyl phthalate (DCHP)
 Mono-cyclohexyl phthalate
Diethyl phthalate (DEP)
 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 (DiNP)
 Mono(carboxyisononyl) phthalate
 Mono(hydroxyisononyl) phthalate
 Mono-isononyl phthalate
 Mono(oxoisononyl) phthalate
Dimethyl phthalate (DMP)
 Mono-methyl phthalate
Di-n-octyl phthalate (DOP)
 Mono-(3-carboxypropyl) phthalate
 Mono-n-octyl phthalate

Phytoestrogens⁴

Daidzein
O-Desmethylangolensin
Enterodiol
Enterolactone
Equol
Genistein

Polychlorinated Biphenyls, Dioxin-Like⁴

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, Non-Dioxin-Like⁴

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-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'-Decachlorobiphenyl (PCB 209)

Polychlorinated Dibenzo-p-dioxins⁴

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)
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)

Polychlorinated Dibenzofurans⁴

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)
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)
2,3,7,8-Tetrachlorodibenzofuran (TCDF)

Polycyclic Aromatic Hydrocarbons⁴

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 Production²

Melengestrol acetate
Trenbolone acetate
Zeranol

Tobacco Smoke

Nicotine
Cotinine

Volatile Organic Compounds⁴

Benzene
Carbon tetrachloride
Chlorobenzene
Dibromomethane
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dichlorobenzene (*o*-Dichlorobenzene)
1,3-Dichlorobenzene (*m*-Dichlorobenzene)
1,4-Dichlorobenzene (*p*-Dichlorobenzene)
 2,5 Dichlorophenol
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-*tert*-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 The target chemical(s) for measurement may be the parent chemical, metabolite(s), other biomarker(s), or relevant indicator chemicals (e.g., environmental degradation products) and may change as methods development proceeds. Metabolites, other biomarkers or relevant indicator chemicals are shown indented under the parent chemical.

² All members of the chemical class are designated chemicals, including, but not limited to, the chemicals shown

³ All components of diesel exhaust are designated chemicals.

⁴ All members of the chemical class are not designated chemicals; only the specific chemicals listed are designated chemicals.

⁵ Fungicides, herbicides, and insecticides are grouped under the general heading of "Pesticides", consistent with CDC.