
Report on Input from State Public Health and Environmental Programs

Gail Krowech, OEHHA
California Environmental
Contaminant Biomonitoring
Program

Programs Contacted

- Air Resources Board
- Air Quality Management Districts
- Bureau of Home Furnishings and Thermal Insulation
- Department of Pesticide Regulation
- Water Resources Control Board
 - S.F. Estuary Institute
 - South Coast Water Research Project
- Regional Water Quality Control Boards
- Integrative Waste Management Boards
- Department of Toxic Substances Control
- California Department of Public Health
- OEHHA

Questions to State Staff

1. **Chemicals of most concern to program;**
2. **Chemicals seen as an emerging concern;**
3. Chemicals where CA exposures higher;
4. Chemicals to biomonitor to assess program effectiveness;
5. **Chemicals to biomonitor based on individual staff expertise;**
6. Exposure information on identified chemicals;
7. Information on chemical markers;
8. Criteria for selecting chemicals to biomonitor.

Input from State Staff

- Most contacted staff, or a colleague from their program, participated.
- Input primarily from telephone interviews
 - Some group discussions/pooled responses;
 - Some interviews with two or three staff members.
- Responses in writing
 - Some staff also provided written comments;
 - Some staff passed along the questions, and we received other written comments or suggestions.

General Comments on Input

- Staff answered the questions in different ways
 - CDC categories
 - General categories (e.g., solvents)
 - Classes of chemicals
 - Individual chemicals
- Chemical grouping presented here reflect this input
 - overlapping categories
 - highlight chemicals/categories mentioned by multiple programs
- Technical feasibility of biomonitoring not taken into account in this presentation

CDC Categories Mentioned Most Frequently

- Phthalates
- Polybrominated Diphenyl Ethers (PBDEs)
- Perfluorinated Compounds
- Pesticides
- Metals
- Polycyclic Aromatic Hydrocarbons (PAHs)

Other Frequently Mentioned Categories

- Endocrine Disrupting Chemicals
- Air Contaminants
- Solvents
- Nanoparticles

Specific Chemicals emphasized by several departments

- Bisphenol A[◆]
- Perchlorate[◆]
- Triclosan[◆] (and similar antimicrobials, e.g., triclocarban)
- Cotinine[◆]

[◆] indicates a chemical or class of chemicals on the 2003-2004 CDC List

Phthalates

- Phthalates prominent in indoor air
 - Di-ethylhexyl (DEHP)[◆], Diethyl (DEP)[◆] Di-n-butyl (DnBP)[◆],
 - Di-isobutyl (DiBP)[◆], Benzyl butyl (BzBP)[◆], Dipropyl
 - Other Phthalates
 - Di-isononyl (DINP)[◆], an additional metabolite recommended for DINP, Di-isodecyl (DIDP)
 - Di-n-hexyl (DnHP), Di-n-octyl (DnOP)[◆]
-
- Non-Phthalate Plasticizers
 - Adipates: di-2-ethylhexyladipate (DEHA)
 - DINCH (Di-isononyl cyclohexane-1,2-dicarboxylate)

Flame Retardants

PBDEs

- PBDEs found in indoor air and dust
 - BDE 47 ✦
 - BDE 99 ✦
 - BDE 100 ✦
 - BDE 153 ✦
 - BDE 154 ✦
 - BDE 181
 - BDE 183 ✦
 - PDE 190
 - BDE 209

Other Flame Retardants

PBDE replacements

- Brominated Flame Retardants
 - ✦ Tetrabromobisphenol A (TBBPA)
 - ✦ Hexabromocyclododecane (HBCD)
 - ✦ Bis(2-ethylhexyl)tetrabromophthalate
 - Primary replacement for pentaBDE in polyurethane foam
 - ✦ Others:
 - 1,2-dibromo-4-(1,2-dibromoethyl)cyclohexane
 - 1,2-bis(2,4,6-tribromophenoxy)ethane
 - Decabromodiphenylethane
- Chlorinated Flame Retardants
 - ✦ Chlorinated paraffins
 - ✦ Dechlorane Plus
 - ✦ Chlorinated Tris (1,3-dichloro-2-propyl phosphate)

Metals

- Metals of greatest concern
 - Lead[♦], Mercury[♦], Cadmium[♦], Arsenic[♦], Manganese, and Chromium VI
- Other suggested metals
 - Aluminum, Antimony[♦], Boron, Fluoride, Nickel, Radium, Selenium, Uranium[♦], Vanadium

Pesticides

- Organochlorine pesticides
 - DDT, DDE, DDD; lindane, dieldrin, chlordane, toxaphene
 - Current use – endosulfan, dicofol
- Organophosphate pesticides
 - Chlorpyrifos, diazinon, malathion
- Pyrethroid Pesticides
- Fumigant pesticides
 - 1,2-dibromo-3-chloropropane (DBCP)
 - 1,3-dichloropropene, methyl isothiocyanate (MITC), chloropicrin, methyl bromide

Pesticides [continued]

- Fungicides
 - Imazalil, thiabendazole and salts, vinclozolin
- Herbicides
 - 2,4-Dichlorophenoxyacetic acid♦
 - 2,4,5-Trichlorophenoxyacetic acid♦
 - Atrazine♦
 - Simazine♦
- Other Pesticides:
 - N,N-Diethyl-3-methylbenzamide (DEET)♦
 - Avermectin
- Emerging concerns
 - Fiprols and Neonicitinoids

Endocrine Disruptors named by staff

- Staff from multiple departments named endocrine disruptors without naming specific chemicals.
- Previously mentioned chemicals/categories of chemicals that are endocrine disruptors:
 - Phthalates
 - PBDEs
 - Other brominated flame retardants
 - (e.g., Hexabromocyclododecane)
 - Bisphenol A
 - Perchlorate
 - Triclosan and triclocarban
 - Some Metals
 - Some Pesticides

Endocrine Disruptors named by staff

- PCBs ✦
- Parabens
- Artificial musks
- Methyl siloxanes
 - e.g. Octamethyl cyclotetrasiloxane (D4),
Decamethylcyclopentasiloxane (D5)
- Sunscreens
 - (e.g., oxybenzone, octyl-methoxycinnamate (OMC))
- Nonylphenols and nonylphenol ethoxylates
- Phytoestrogens ✦

Contaminants in Air

- Traffic-related air contaminants
- PAHs ✦
 - Naphthalene ✦
 - 1-Hydroxypyrene ✦
 - 1-Nitropyrene
- Volatile organic compounds (VOCs) ✦
- Other: Asbestos, crystalline silica

Traffic-Related Air Contaminants

- Air pollutants related to diesel and gasoline
- Individual fuel-related pollutants
 - Acetaldehyde
 - Acrolein
 - Benzene ✦
 - 1,3-Butadiene
 - Formaldehyde
 - Naphthalene ✦
 - Nitrobenzene ✦
 - PAHs ✦
 - Styrene ✦
 - Criteria air pollutants
- Biodiesel exhaust

Indoor Air Concerns

- Phthalates[♦], PBDEs[♦], PAHs[♦], VOCs[♦], environmental tobacco smoke (cotinine[♦])
- Acrylonitrile
- Formaldehyde and acetaldehyde
- Triclosan and other antimicrobials
- d-Limonene and a-pinene
- Nanoparticles
 - titanium dioxide, silver oxide

Solvents/VOCs

- Carbon tetrachloride ♦
- 1,4-Dichlorobenzene ♦
- Dichloroethane ♦
- Dichloroethylene ♦
- Ethylene glycol monobutyl ether
- Methylene chloride ♦
- Perchloroethylene (PERC) ♦
- Styrene ♦
- Trichloroethylene (TCE) ♦
- 1,2,3-Trichloropropane
- Vinyl chloride (PERC and TCE degradation product)

Water Disinfectants and disinfectant by-products

- Trihalomethanes
 - Bromodichloromethane ✦
 - Bromoform ✦
 - Chloroform ✦
 - Dibromochloromethane ✦
- Haloacetic acids
- N-Nitrosodimethylamine (NDMA)
- Chloramine

Other Concerns in Water and Food

- Other water concerns
 - Pharmaceuticals and personal care products
 - Nitrates
 - 1,4-Dioxane
 - Methyl-tert-butyl ether (MTBE) ✦
 - Microcystin
- Food
 - Dioxins and furans ✦
 - Growth hormones/pharmaceuticals from animal sources
 - Acrylamide ✦
 - Caffeine

Conclusions

- Certain chemicals or chemical classes were a concern across many programs.
- Some staff identified chemicals that may be emerging concerns
 - Exposures to chemical alternatives
 - e.g., PBDE and phthalate replacements, methylsiloxanes
 - New data about persistence, bioaccumulation, toxicity
 - e.g., PBDEs, phthalates, perfluorinated compounds, Bisphenol A
- State staff generously offered suggestions, thoughts and time.