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# Unregulated Chemicals

There are more than 84,000 chemicals in commercial use in the USA, and an additional 2,000 are introduced into the stream of commerce every year. The US EPA and various State agencies are charged with developing drinking water and groundwater clean-up standards for those chemicals that pose a threat to human health and the environment. Various standards exist at the State level (e.g. public health goals, notification level, action level), and these can eventually lead to the development of an enforceable Federal or State maximum contamination level (MCL). However, to date, the US EPA has developed MCLs for 80 chemicals. That is, 99.9% of the chemicals in use in the USA are not regulated with respect to drinking water contamination.

US EPA has also placed 103 chemicals on the contaminant candidate list (CCL) (see table at right). Over time (usually many years), a subset of chemicals on the CCL will eventually have a MCL. On average, MCLs are only developed for two to ten chemicals per year. This is less than one-half of one percent of the new chemicals that are introduced into the stream of commerce each year. Thus, the number of chemicals that are unregulated increases every year.

Increasingly, water utilities are having to address contamination of source waters by chemicals for which there are no Federal MCLs. This includes some of the most common groundwater contaminants in the news today: 1,4-dioxane, 1,2,3-trichloropropane (1,2,3-TCP), methyl tertiary butyl ether (MTBE), n-nitrosodimethylamine (NDMA), and perchlorate (all of which are on the CCL).

MTBE provides an example as to how long it takes to develop an MCL for a chemical. The first noted drinking water impact by MTBE was reported in 1981 and the first widely publicized impact was reported in 1996 in Santa Monica, California. Widespread testing of groundwater for MTBE was mandated by 1997, and it was added to the CCL in 1998. MTBE use in gasoline was phased out across most of the USA by 2008. As of 2013, there is still no Federal MCL for MTBE.

Aside from those chemicals on the CCL, there is toxicological evidence that additional chemicals pose a threat to human health and the environment. This includes the following groups of compounds:

- Phthalates in soaps, detergents, oils, solvents, including di-2-ethylhexyl phthalate (DEHP) and bis(2-ethylhexyl) phthalate (BEHP)
- Organophosphate pesticides, including malathion, parathion, diazinon, dimethoate
- Herbicides, including di- and trichlorophenols, and dichlorophenoxyacetic acids
- Brominated flame retardants, including Hexabromocyclododecane (HBCD or HBCDD) and Tetrabromobisphenol A (TBBPA)
- Fluoropolymer (teflon) products, such as polytetrafluoroethylene (PTFE), perfluoroalkoxy polymer (PFA), fluorinated ethylene-propylene (FEP)
- Pharmaceuticals such as cholesterol, erectile dysfunction, analgesic, narcotic, cancer-treatment and other medications

There is no indication that MCLs for these chemicals will be developed anytime in the next decade. Therefore, water utilities will need to decide how to address a detection of any of these chemicals in a water source with limited or no regulatory guidance.

# US EPA Contaminant Candidate List

Substance Name	Use	Substance Name	Use
1,1,1,2-Tetrachloroethane	used in the production of other substances	Halon 1011 (bromochloromethane)	used as a fire-extinguishing fluid and to suppress explosions, as well as a solvent in the manufacturing of pesticides. May also occur as a disinfection by-product in drinking water
1,1-Dichloroethane	used as a solvent	HCFC-22	used as a refrigerant, as a low-temperature solvent, and in fluorocarbon resins, especially in tetrafluoroethylene polymers
1,2,3-Trichloropropane	used in the manufacture of paints	Hexane	used as a solvent and is a naturally-occurring chemical
1,3-Butadiene	used in rubber production	Hydrazine	used in the production of other substances, such as rocket propellants, and as an oxygen and chlorine scavenging compound
1,3-Dinitrobenzene	used in the production of other substances	Mestranol	used in veterinary and human pharmaceuticals and as an estrogenic hormone
1,4-Dioxane	used as a solvent or solvent stabilizer in the manufacture and processing of paper, cotton, textile products, automotive coolant, cosmetics and shampoos	Methamidophos	used as an insecticide
17-alpha-estradiol	used in pharmaceuticals and as an estrogenic hormone	Methanol	used as an industrial solvent, a gasoline additive, and also as anti-freeze
1-Butanol	used in the production of other substances, as a paint solvent, and a food additive	Methyl bromide	has been used as a fumigant as a fungicide
2-Methoxyethanol	used in consumer products, such as synthetic cosmetics, perfumes, fragrances, hair preparations, and skin lotions	MTBE	used as an octane booster in gasoline, in the manufacture of isobutene, and as an extraction solvent
2-Propen-1-ol	used in the production of other substances, such as flavorings and perfumes	Metolachlor	used as a herbicide for weed control on agricultural crops
3-Hydroxycarbofuran	a degradation product of carbofuran, an insecticide	Metolachlor ethanesulfonic acid (ESA)	a degradation product of the acetanilide pesticide metolachlor, used as an herbicide for weed control on agricultural crops
4,4'-Methylenedianiline	used in the production of other substances, as a corrosion inhibitor, and as a curing agent for polyurethanes	Metolachlor oxanilic acid (OA)	a degradation product of the acetanilide pesticide metolachlor, used as an herbicide for weed control on agricultural crops
Acephate	used as an insecticide	Molinate	used as an herbicide
Acetaldehyde	used in the production of other substances, as a pesticide, and as a food additive	Molybdenum	a naturally-occurring element and is commonly used as molybdenum trioxide as a chemical reagent
Acetamide	used as a solvent, solubilizer, plasticizer, and stabilizer	Nitrobenzene	used in the production of aniline, and also as a solvent in the manufacture of paints, shoe polishes, floor polishes, metal polishes, explosives, dyes, pesticides, and pharmaceuticals (such as acetaminophen)
Acetochlor	used as an herbicide for weed control on agricultural crops	Nitroglycerin	used in pharmaceuticals, in the production of explosives, and in rocket propellants
Acetochlor ethanesulfonic acid (ESA)	A degradation product of the acetanilide pesticide acetochlor, and used as an herbicide for weed control on agricultural crops	N-Methyl-2-pyrrolidone	a solvent in the chemical industry, and is used for pesticide application and in food packaging materials
Acetochlor oxanilic acid (OA)	A degradation product of the acetanilide pesticide acetochlor, and used as an herbicide for weed control on agricultural crops	N-nitrosodiethylamine (NDEA)	used as an additive in gasoline and in lubricants, as an antioxidant, as a stabilizer in plastics, and also may be a disinfection byproduct
Acrolein	used as an aquatic herbicide, rodenticide, and industrial chemical.	N-nitrosodimethylamine (NDMA)	formerly used in the production of rocket fuels, and currently used as an industrial solvent and an anti-oxidant, and may also be a disinfection byproduct
Alachlor ethanesulfonic acid (ESA)	a degradation product of the acetanilide pesticide alachlor, and used as an herbicide for weed control on agricultural crops	N-nitroso-di-n-propylamine (NDPA)	may be a disinfection byproduct
Alachlor oxanilic acid (OA)	a degradation product of the acetanilide pesticide alachlor, and used as an herbicide for weed control on agricultural crops	N-Nitrosodiphenylamine	used as a rubber and polymer additive and may be a disinfection byproduct
alpha-Hexachlorocyclohexane	a component of benzene hexachloride (BHC) and was formerly used as an insecticide	N-nitrosopyrrolidine (NPYR)	used as a research chemical and may be a disinfection byproduct
Aniline	used as an industrial chemical, as a solvent, in the synthesis of explosives, rubber products, and in isocyanates	Norethindrone (19-Norethisterone)	used in pharmaceuticals as a progesterone hormone
Bensulide	used as an herbicide	n-Propylbenzene	used in the manufacture of methylstyrene, in textile dyeing, as a printing solvent, and is a constituent of asphalt and naphtha.
Benzyl chloride	used in the production of other substances, such as plastics, dyes, lubricants, gasoline and pharmaceuticals	o-Toluidine	used in the production of other substances, such as dyes, rubber, pharmaceuticals, and pesticides
Butylated hydroxyanisole	used as a food additive (antioxidant)	Oxirane, methyl-	used in the production of other substances
Captan	used as a fungicide	Oxydemeton-methyl	used as an insecticide
Chlorate	used in agriculture as defoliant or desiccants and may occur in drinking water related to use of disinfectants such as chlorine dioxide	Oxyfluorfen	used as an herbicide
Chloromethane	used as a foaming agent and in the production of other substances	Perchlorate	a naturally occurring and man-made chemical used to manufacture fireworks, explosives, flares, and rocket propellant
Clethodim	used as an herbicide	Perfluorooctane sulfonic acid (PFOS)	used in fire fighting foams and various surfactant uses; few of which are still ongoing because no alternatives are available.
Cobalt	a naturally-occurring element and was formerly used as cobaltus chloride in medicines and as a germicide	Perfluorooctanoic acid (PFOA)	used in the manufacture of fluoropolymers, substances which provide non-stick surfaces on cookware and waterproof and breathable membranes for clothing
Cumene hydroperoxide	used in the production of other substances	Permethrin	used as an insecticide
Cyanotoxins	Toxins naturally produced and released by cyanobacteria ("blue-green algae"). Studies suggest three cyanotoxins for consideration: Anatoxin-a, Microcystin-LR, and Cylindrospermopsin	Profenofos	used as an insecticide and an acaricide
Dicrotophos	used as an insecticide	Quinoline	used in the production of other substances, and as a pharmaceutical (anti-malarial) and flavoring agent
Dimethipin	used as an herbicide and plant growth regulator	RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine)	used as an explosive
Dimethoate	used as an insecticide on field crops, (such as cotton), orchard crops, vegetable crops, in forestry and for residential purposes	sec-Butylbenzene	used as a solvent for coating compositions, in organic synthesis, as a plasticizer, and in surfactants.
Disulfoton	used as an insecticide	Strontium	a naturally-occurring element and is used as strontium carbonate in pyrotechnics, in steel production, as a catalyst, and as a lead scavenger
Diuron	used as an herbicide	Tebuconazole	used as a fungicide
Equilenin	used in pharmaceuticals and as an estrogenic hormone	Tebufenozide	used as an insecticide
Equilin	used in pharmaceuticals and as an estrogenic hormone	Tellurium	a naturally-occurring element and is commonly used as sodium tellurite in bacteriology and medicine
Erythromycin	used in pharmaceutical formulations as an antibiotic	Terbufos	used as an insecticide
Estradiol (17-beta estradiol)	used in pharmaceuticals and as an estrogenic hormone	Terbufos sulfone	a degradation product of the phosphorodithioate pesticide terbufos, used as an insecticide
Estrilol	used in veterinary pharmaceuticals and as an estrogenic hormone	Thiodicarb	used as an insecticide
Estrone	used in veterinary and human pharmaceuticals and as an estrogenic hormone	Thiophanate-methyl	used as a fungicide
Ethinyl Estradiol (17-alpha ethynyl estradiol)	used in veterinary and human pharmaceuticals and as an estrogenic hormone	Toluene diisocyanate	used in the manufacture of plastics
Ethoprop	used as an insecticide	Tribufos	used as an insecticide and as a cotton defoliant
Ethylene glycol	used as an antifreeze, in textile manufacture, and is a cancelled pesticide	Triethylamine	used in the production of other substances, and as a stabilizer in herbicides and pesticides, in consumer products, in food additives, in photographic chemicals, and in carpet cleaners
Ethylene oxide	used as a fungicidal and insecticidal fumigant	Triphenyltin hydroxide (TPTH)	used as a pesticide
Ethylene thiourea	used in the production of other substances, such as for vulcanizing polychloroprene (neoprene) and polyacrylate rubbers, and as a pesticide	Urethane	used as a paint ingredient
Fenamiphos	used as an insecticide	Vanadium	a naturally-occurring element and is commonly used as vanadium pentoxide in the production of other substances and as a catalyst
Formaldehyde	has been used as a fungicide, may be a disinfection byproduct, and can occur naturally	Vinclozolin	used as a fungicide
Germanium	a naturally-occurring element and is commonly used as germanium dioxide in phosphors, transistors and diodes, and in electroplating	Ziram	used as a fungicide.