

Sewage Sludge Contents / Tip of Iceberg

Heavy Metals, Pathogens, Synthetic Chemicals, Hydrocarbons, Petrochemicals & Organochlorines, Pharmaceuticals, Steroids & Hormones.

This list of contents represents only the "tip of the iceberg" of toxics concentrated in sewage sludge. Federal and most state and local land application regulations limit concentrations of only nine heavy metals and one "indicator" pathogen in land applied sewage sludge (in **BOLD**).

Heavy Metals

Aluminum,	Dysprosium,	MERCURY,	Tantalum,
Antimony,	Erbium,	MOLYBDENUM,	Tellurium,
ARSENIC,	Europium,	NICKEL,	Terbium,
Barium,	Gadolinium,	Niobium,	Thallium
Beryllium,	Germanium,	Palladium,	Thorium,
Bismuth,	Gold,	Praseodymium,	Thulium,
Boron,	Hafnium,	Rhodium,	Tin,
Bromine,	Holmium,	Rubidium,	Titanium,
CADMIUM,	Iron,	Ruthenium,	Tungsten,
Cerium,	Lanthanum,	Samarium,	Uranium,
Cesium,	Lutetium,	Scandium,	Vanadium,
Chromium,	LEAD,	SELENIUM,	Yttrium,
COPPER,	Magnesium,	Silver,	Ytterbium,
Cobalt,	Manganese,	Strontium,	ZINC

Pathogens

Bacteria		
FECAL COLIFORM,	Enteropathogenic E. coli,	Mycobacteria, Aeromonas,
Salmonella (2,000 types),	Yersinia enterocolitica,	Legionella, Burkholderia,
Shigella (4 spp.),	Campylobacter jejuni,	Endotoxins,
E. coli 0157:H7,	Vibrio cholera, Leptospira,	antibiotic resistant bacteria,
Staphylococcus aureus,	Listeria, Helicobacter,	
Viruses		
Adenovirus, Astrovirus,	Coxsackie A, Coxsackie B,	Hepatitis E virus,
Calicivirus, Coronavirus,	Echovirus, Enterovirus 68-	Norwalk virus,
Enterovirus (Poliovirus,	72), Hepatitis A virus,	Reovirus, Rotavirus
Protozoa		
Cryptosporidium,	Giardia lamblia,	Toxoplasma gondii
Entamoeba histolytica,	Balantidium coli,	
Helminths (Parasites)		
Ascaris lumbricoides	Tainia saginata (tapeworm),	Toxocara canis,
(roundworm),	Trichuris (whipworm),	Taenia solium,
Ancylostoma duodenale	Toxocara (roundworm),	Hymenolepis nana
(hookworm), Necator	Strongyloides (threadworm),	
americanus (hookworm),	Ascaris suum,	
Fungi		
Aspergillus fumigatus,	Epidermophyton spp.,	Phialophora spp.,
Candida albicans,	Trichophyton spp.,	
Cryptococcus neoformans,	Trichosporon spp.,	
Prions (spongiform encephalopathy)		

Hydrocarbons, Petrochemicals, Organochlorines

PCBs, PCT, PBB, PBT,
Anthracene,
Pentachlorophenol,
Benzo(g,h,i)perylene,
Benzene, Benzene,
C14-C24-branched,
Polyethylbenzene
residue, Octane,
Hexachlorobenzene,
Ethylbenzene,

Chlorinated Benzenes,
Naphtha (petroleum),
turpentine-oil,
Hydrotreated kerosene,
Hydrocarbon oils,
Hydrocarbons, C10 and
C12, Distillates
(petroleum), Fuel oil,
Creosols, P-Cresol, O-
Cresol,

2-(2H-Benzotriazol-2-yl)-p-cresol,
Hexachlorobutadiene,
N-Nitrosodimethylamine,
Toxaphene, Trichloroethane,
Tetrachloroethane, Hexachloroethane,
Carbon Tetrachloride, Dichloroethylene,
Trichloroethylene, Tetrachloroethylene,
Xylene,

Pharmaceuticals

1,7-Dimethylxanthine,
4-Epianhydrochlortetracycline,
4-Epianhydrotetracycline,
4-Epichlortetracycline,
4-Epioxytetracycline,
4-Epitetracycline,
Acetaminophen,
Albuterol,
Anhydrochlortetracycline,
Anhydrotetracycline,
Azithromycin,
Caffeine,
Carbadox,
Carbamazepine,
Cefotaxime,
Chlortetracycline,
Cimetidine,
Ciprofloxacin,
Clarithromycin,
Clinafloxacin,
Cloxacillin,
Codeine,
Cotinine,
Dehydronifedipine,
Demeclocycline,
Digoxigenin,

Digoxin,
Diltiazem,
Diphenhydramine,
Doxycycline,
Enrofloxacin,
Erythromycin-Total,
Flumequine,
Fluoxetine,
Gemfibrozil,
Ibuprofen,
Isochlortetracycline,
Lincomycin,
Lomefloxacin,
Metformin,
Miconazole,
Minocycline,
Naproxen,
Norfloxacin,
Norgestimate,
Ofloxacin,
Ormetoprim,
Oxacillin,
Oxolinic Acid,
Oxytetracycline,
Penicillin G,
Penicillin V,

Ranitidine,
Roxithromycin,
Sarafloxacin,
Sulfachloropyridazine,
Sulfadiazine,
Sulfadimethoxine,
Sulfamerazine,
Sulfamethazine,
Sulfamethizole,
Sulfamethoxazole,
Sulfanilamide,
Sulfathiazole,
Tetracycline,
Thiabendazole,
Triclocarban,
Triclosan,
Trimethoprim,
Tylosin,
Virginiamycin,
Warfarin,

Steroids & Hormones

17 Alpha-Dihydroequilin,
17 Alpha-Estradiol,
17 Alpha-Ethinyl-Estradiol,
17 Beta-Estradiol,
Androstenedione,
Androsterone,
Beta Stigmastanol,
Campesterol,
Cholestanol,

Cholesterol,
Coprostanol,
Desmosterol,
Epicoprostanol,
Equilenin,
Ergosterol,
Estriol,
Estrone,
Ethinylestradiol,

Norethindrone,
Norgestrel,
Progesterone,
Stigmasterol, Sitostanol,
Beta-Estradiol 3-Benzoate,
Beta-Sitosterol,
Equilin,
Testosterone,

While Federal law and regulations limit none of contents below, they allow localities to set more restrictive limits on sewage sludge and soil contamination. Some states do so &/or permit precautionary local control, and others do neither.

Once spread on land, the contaminants above and below persist for centuries - to decades - to months affecting soil, water, plants, air, animals and people.

Unlike pesticides (distinct chemicals subject to specific analysis), sewage sludge is a very complex, variable and concentrated mixture of the vast multitude of unstudied and unregulated hazardous wastes dumped into sewer systems.

Synthetic Chemicals

Dioxins & Furans

Dioxins,

Octachlorodibenzo-P-Dioxin,

1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin,

Octachlorodibenzo Furan, 1,2,3,4,6,7,8-

Heptachlorodibenzo-

Furan (71), 2,3,7,8-Tetrachlorodibenzo-Furan,

1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin,

1,2,3,4,7,8-Hexachlorodibenzo-Furan,

1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin,

1,2,3,6,7,8-

Hexachlorodibenzo-Furan,

"Organics" (carbon-based)

Acetone, Chloroform,

Cyclohexanone,

Bis(2-ethylhexyl) Phthalate,

Bis(2-ethylhexyl)

tetrabromophthalate,

Di-n-undecyl phthalate,

Alkyl benzyl Phthalate, Di-(2-

Ethylhexyl) Phthalate

(DEHP), Butyl Benzyl

Phthalate, Toluene,

2-Propanone,

Methylene Chloride,

Hexanoic Acid,

2-Butanone, Methyl Ethyl

Ketone, Alcohol Ethoxylate,

Alkylphenolethoxylates,

Phenol, Nonylphenol,

Pesticides & Insecticides

Aldrin, Chlordane,

Cyclohexane, Heptachlor,

Endosulfan, Endosulfan-II,

Lindane, Dieldrin, Endrin,

DDT, DDD, DDE, 2,4,5-

Trichlorophenoxyacetic Acid,

PCBs (PolyChlorinated Biphenyls)

PCB-1016,

PCB-1221,

PBDEs (PolyBrominated Diphenyl Ethers)

BDE-28,

BDE-47,

BDE-66,

2,2'-methylenebis[4-methyl-

6- nonyl-Phenol, p-

Nonylphenol, 4,4'-

butylidenebis[2-(1,1-

dimethylethyl)-5-methyl-

4-Methylphenol,

Phenol, 4,4'-(1-

methylethylidene)bis[2-(1,1-

dimeth,

Phenol, 4,4'-(1-

methylethylidene)bis[2-(1,1-

dimeth,

2,4-dicumylphenol,

p-Dodecylphenol, 2,4,5-

Trichlorophenol,

N-Hexacosane,

N-Tetracosane, N-Dodecane,

Acetic Acid (2,4-

Dichlorophenoxy),

2,4,5-

Trichlorophenoxypropionic

Acid,

2,3,4,6,7,8- Hexachlorodibenzo-Furan,

1,2,3,4,7,8,9-Heptachlorodibenzo-Furan,

2,3,4,7,8-Pentachlorodibenzo-Furan,

1,2,3,4,7,8- Hexachlorodibenzo-P-Dioxin,

1,2,3,7,8- Pentachlorodibenzo-Furan,

1,2,3,7,8- Pentachlorodibenzo-P-Dioxin,

1,2,3,7,8,9- Hexachlorodibenzo-Furan,

2,3,7,8- Tetrachlorodibenzo-P-Dioxin,

Polychlorinated Dibenzodioxin/Polychlorinated Di-

benzofuran (PCDD/PCDF), Tetrahydrofuran, 2,4-

D, 2,4,5-T, dioxin (TCDD),

N-Tetradecane,

N-Triacontane,

N-Eicosane, N-Hexadecane,

N-Octacosane,

Carbon Disulfide,

N-Decane, N-Docosane,

N-Octadecane, P-Cymene,

Benzo(B)fluranthene,

Fluoranthene,

P-Chloroaniline,

Pyrene, Tetrachloromethane,

Trichlorofluoromethane, 2-

Hexanone,

2-Methylnaphthalene,

4-Chloroaniline,

Benzo(a)pyrene

Pentachloronitrobenzene,

Chlorobenzilate, Beta-BHC,

Kepone, Mirex,

Methoxychlor,

PCB-1248,

PCB-1254,

BDE-138,

BDE-153,

BDE-154,

PCB-1260

BDE-183,

BDE-209,

"Acceptable" levels of exposure to sewage sludge contaminants are based on obsolete and faulty scientific data and processes. In 2002 and 2010, the National Academy of Sciences and National Institutes of Health established those facts [3, 1].

The risk assessments upon which these levels are based neglected dietary impacts on children; multi-pathway exposure; synergistic impacts; infectious organism exposure; ecological, wildlife, food chain, soil microorganism & forest soil impacts; long-term heavy metal accumulation; and used a cancer risk safety factor 100 times less protective than used for air and water pollution.

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