

Overview:

The enclosed Volatile/Semi-volatile library scans have indicated that there are few, if any, pharmaceutical compounds entering the POTW. The scans indicate that the influent is made up mostly of components of biodegradable personal care products and food. The overwhelming majority of the compounds found in the influent scans are removed by the plant processes.

One exception is the most recent scan, taken in March 2012, which indicated infiltration of components of engine fuel. This infiltration and its compounds seem to be the result of the combination of an extended drought and a recent rain.

As a rule from historical data the POTW seems to be able to remove all compounds found in the library scans.

River Road 3/7-3/8-00

Most compounds seem to be from either food or personal care products.

Thiobis methane (Cabbage extract; Food flavoring)	5.05	ND	100%
1-Methyl-4-(1-methylethyl) cyclohexene (Tobacco component)	9.66	ND	100%
2,2-Dimethyl-1-dimethylamino 3-hexyne	20	ND	100%
Tetradecanoic acid (Myristic acid; Used as carrier in topical ointments and creams)	32	ND	100%
1-Hexadecanol (Shampoos, skin creams, lotions)	22	ND	100%
Caffeine (Stimulant in beverages)	35	ND	100%
1-Hexadecanol (Shampoos, skin creams, lotions)	39	ND	100%
Hexadecanoic acid (Palmitic acid; Used in soap and as filler in processed foods)	342	ND	100%
Nonylphenoxyethanol	20	ND	100%
1-Tetradecanol (Cold cream; emollient)	33	ND	100%
(Z)-9-Octadecanoic acid (From olive oil; Omega 9 fatty acid; "good" fat; fat substitute)	190	ND	100%
Octadecanoic acid (Oleic acid) (From olive oil; Omega 9 fatty acid; "good" fat; fat substitute)	147	ND	100%
3,6,9,12-Tetraoxahexadecan-1-ol	26	ND	100%
2,6,10,14,18,22-Tetracosahexene,2 (Squalene; Shark liver oil; fish oil)	65	ND	100%
Dihydrocholesterol	102	ND	100%
(3.beta.)-Cholset-5-en-3-ol (Cholesterol; From animal fats)	125	ND	100%
Eicosyl ester oleic acid	21	10.8	49%
Acetone (Solvent)	37.7	ND	100%
Benzyl alcohol (Analgesic, fragrance)	7.7	ND	100%
4-Methyl phenol (Component in human sweat)	7.8	ND	100%

Effluent only:

2,4,4-Trimethyl-2-pentene (Anti-knock agent, replacement for MTBE)	ND	11.7	Negative
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River Road 1/08

A mixture of personal care products and food chemicals. A surprise with an oil field chemical and a pesticide carrier.

Hexamethyl cyclotrisiloxane (From solid deodorant)	8.93	ND	100%
1,3,5,7-Cycloocta tetraene (Flavor/fragrance)	2.67	ND	100%
1-Ethyl-2,4-dimethyl benzene (Aircraft pesticide carrier, used by United Airlines)	1.67	ND	100%
N,N-Dimethyl 1-dodecanamine (Acid stable emulsifier)	111.30	ND	100%
Tetrabutylphenol (Oil field chemical injected in wells)	8.11	ND	100%
Nonyl phenol (Commercial surfactant)	6.64	ND	100%
Tetradecanoic acid (Myristic acid; Used as carrier in topical ointments and creams)	5.27	ND	100%
Cyclotetradecane (Fragrance)	8.00	ND	100%
1-Heptadeanol (Carrier for cosmetics and cleaners)	2.73	ND	100%
9-Octadecanoic acid (Stearic acid; most common saturated fatty acid)	55.21	ND	100%
Squalene (Shark liver oil; fish oil)	37.02	ND	100%
Cholastanol (Sterol in human feces)	51.62	ND	100%
Cholasterol (Animal fats)	16.40	ND	100%

River Road 10/08

A mixture of personal care products and food chemicals. The high value of an oil field chemical again points to possible oil field mud dumping.

Hexamethyl cyclotrisiloxane (From solid deodorant)	20.51	ND	100%
1,3,5,7-Cycloocta tetraene (Flavor/fragrance)	11.09	ND	100%
1-Ethyl-2,4-dimethyl benzene (Aircraft pesticide carrier, used by United Airlines)	10.72	ND	100%
N,N-Dimethyl 1-dodecanamine (Acid stable emulsifier)	19.20	ND	100%
Tetrabutylphenol (Oil field chemical injected in wells)	1041	ND	100%
Nonyl phenol (Commercial surfactant)	2.40	ND	100%
Tetradecanoic acid (Myristic acid; Used as carrier in topical ointments and creams)	7.27	ND	100%
Cyclotetradecane (Fragrance)	18.25	ND	100%
1-Heptadeanol (Carrier for cosmetics and cleaners)	3.91	ND	100%
9-Octadecanoic acid (Stearic acid; most common saturated fatty acid)	9.42	ND	100%
Squalene (Shark liver oil; fish oil)	32.84	ND	100%
Cholastanol (Sterol in human feces)	26.30	ND	100%
Cholasterol (Animal fats)	19.70	ND	100%
n-Hexadecanic acid (Palmitic acid; Used in soap and as filler in processed foods)	14.66	ND	100%

Effluent only

2-Methyl-4-pentanal (aka 2-Methyl valeraldehyde; flavoring agent, perfume)	ND	12.98	Negative
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River Road 4/26-4/27/09

The main compounds seem to be fats and cholesterol related compounds. There does seem to be some personal care and cleaning products. There really doesn't seem to be any pharmaceuticals.

(In ug/l)

	Inf	Eff	Removal
5-.beta.-Cholestan-3-one, oxime, TMS # 1	101	ND	100%
1-Butanol (Base for perfumes)	47.3	ND	100%
1-Hexadecanol (Shampoos, skin creams, and lotions)	16.6	ND	100%
1-Hexadecene (Lubricant)	20.0	ND	100%
9-Octadecenoic acid (Oleic acid) (From olive oil)	16.8	ND	100%
Benzeneacetic acid (Perfume: honey odor)	20.2	ND	100%
Caffeine (Stimulant)	13.3	ND	100%
Cholesterol (Sterol in human feces)	74.4	ND	100%
Diethyltoluamide (DEET)	33.6	23.7	29%
Limonene (Odor in Pinesol)	14.3	ND	100%
n-Hexadecanoic acid (Palmitic acid) (From palm oil)	613	ND	100%
Octadecanoic acid (Stearic acid) (Most common saturated fat)	341	ND	100%
Squalene (Shark liver oil; Fish oil)	38.6	ND	100%
Tetradecanoic acid (Myristic acid) (from nutmeg butter; Used as carrier in lotions and creams)	50.1	ND	100%

In Effluent only

It is possible the Amylene hydrate, or amyl alcohol, was produced by in-plant fermentation.

2,5,5,trimethyl-2-hexene (Perfume: grapefruit odor)	ND	12.0	Negative
Amylene hydrate (Active ingredient in beer)	ND	10.6	Negative

River Road 11/8-11/9-09

The main constituent seems to be fatty acids used in soaps. Otherwise there does seem to be some pollution from engine fuel, especially diesel. The Narcotics Division of the Wichita Falls Police Department was informed of the Phenylpropanedioic acid hit.

Cyclohexane (Solvent, cleaner, contact lens cleaner)	3.02	ND	100%
1-Methyl-4-cyclohexane (aka d-limonene; citrus based "green" cleaner)	4.17	ND	100%
Dimethyl disulphide (aka DMDS; flavor enhancer, specifically garlic flavor)	12.6	ND	100%
Indane (musk fragrance)	3.07	ND	100%
1-Decane (C-10 component of gasoline (C4-C12))	7.60	ND	100%
1-Hexadecane (C-16 component of diesel fuel (C-13 to C-23))	8.10	ND	100%
1-Octadecane (C-18 component of diesel fuel)	10.4	ND	100%
1-Pentadecene (C-17 component of diesel fuel)	6.08	ND	100%
2,6,10,14,18,22-Tetracosahexaene (aka Squalene; Shark liver oil; fish oil)	34.1	ND	100%
9-Octadecanoic acid (Oleic acid; from olive oil; used in soap)	430	ND	100%
Caffeine (Stimulant in beverages)	10.4	ND	100%
Cholestanol (From human feces, animal organs)	39.0	ND	100%
Decyl oleate (Emollient; skin conditioner)	15.5	ND	100%
Z-11-Hexadecenoic acid (Vaccenic acid; from milk fat and other dairy products)	6.44	ND	100%
n-Hexadecanoic acid (Palmitic acid; from palm oil; used in soap and as filler in processed foods)	478	ND	100%
Phenylpropanedioic acid (Controlled substance: decongestant)	12.3	ND	100%
Tetradecanoic acid (Myristic acid; Carrier in topical creams and ointments).	30.1	ND	100%

In Effluent only:

A common instance of DEET showing up solely in the effluent. Again, the sampler does not use DEET while sampling.

3-Penten-2-ol (aka Methyl 1-propenyl carbinol; Flavoring agent)	ND	6.88	Negative
Diethyltoluamide (DEET; Insect repellent)	ND	9.14	Negative

River Road 7/1-7/2/10

Except for steroids and a methamphetamine precursor, all compounds seem to be from foods and personal care products.

	Inf	Eff	Removal
4,4-Dimethyl-2-oxetanone (From the non-enzymatic browning of lactose)	1.89	ND	100%
3-Penten-2-ol (Flavoring agent)	19.2	ND	100%
Benzeneacetic acid (aka Phenylacetic acid; used in perfumes (honey odor); used in illegal methamphetamines)	27.5	ND	100%
Cholestane-3-one (Steroid)	28.1	ND	100%
Dodecanoic acid (Lauric acid; laurel oil/coconut oil. Soaps and cosmetics)	58.6	ND	100%
2-Butoxy-ethanol (Solvent, surfactant; in liquid soap)	17.9	ND	100%
n-Hexadecanoic acid (Palmitic acid; Used in soap and as filler in processed foods)	986	ND	100%
Pentadecanoic acid (Butter fat)	23.0	ND	100%
Tetradecanoic acid (Myristic acid; Used as carrier in topical ointments and creams)	127	ND	100%

River Road POTW 9/14-9/15-11

There seems to be a high amount of fat compounds, including two forms of cholesterol type compounds. Except for DEET, the compounds are easily utilizable by bacteria. There seems to be either food or cosmetic chemical compounds, with no pharmaceuticals.

	Inf	Eff	Removal
5-.beta.-Cholestan-3-one, oxime, TMS # 1	168	ND	100%
1-Octadecanol	21.3	ND	100%
(Steryl alcohol; Ointments, shampoos, hair conditioners)			
Benzeneacetic acid (Perfumes)	20.6	ND	100%
Cholestan-3-ol (A sterol)	150	ND	100%
Diethyltoluamide (DEET; insect repellant)	12.5	ND	100%
e-15-Heptadecenal	13.4	ND	100%
(Plant essential oil)			
n-Hexadecanoic acid (Palmitic acid)	807	ND	100%
Squalene (Shark liver oil; fish oil)	32.4	ND	100%
Tetradecanoic acid (Myristic acid)	34.5	ND	100%

Northside POTW, 10/17-10/18/11

There does seem to be more personal product compounds in the Northside POTW, possibly because the area serves on average a younger demographic.

Volatile Organics:	Inf	Eff	Removal
1-Eicosanol (Moisturizer)	1.89	ND	100%
2,6-Dimethyl-7-octen-2-ol (Perfume)	2.19	ND	100%

Semivolatile Organics:

1-Hexacosanol	2.09	ND	100%
(Medicinal herb from wheat germ, bran, etc.)			
2,6-Dimethyl-7-octen-2-ol (Perfume)	2.94	ND	100%
2,3-Epoxy-cholestane (Steroid)	18.5	ND	100%
Decamethyl-cyclopentasiloxane	3.26	1.49	54%
(Silicone fluid in hair conditioner, personal lubricant, etc.)			
Dodecanoic acid (Lauric acid)	8.32	ND	100%
e-15-Heptadecenal (From plastic degradation)	31.0	ND	100%
1-(2-Butoxyethoxy)-ethanol (Cleaning solvent)	6.68	ND	100%
2-((2-Ethylhexyl)oxy)-ethanol (Green cleaner)	13.0	ND	100%
Isopropyl palmitate (Moisturizer, anti-static)	4.62	ND	100%
Methyl dihydrojasmonate (Aroma compound)	2.66	ND	100%
n-Hexadecanoic acid (Palmitic acid)	120	ND	100%
n-Hexyl salicylate (Aroma compound)	4.00	ND	100%
Octadecanoic acid (Oleic acid)	59.1	ND	100%
Squalene (Shark liver oil)	21.7	ND	100%
Tetradecanoic acid (Myristic acid)	8.13	ND	100%

Effluent only:

The DEET may be a sampling contamination, but the sampler specifically did not use DEET. The aviation fuel contamination seems interesting given the immediate proximity of the SAFB runway.

Diethyltoluamide (aka DEET; OFF insect repellent)	ND	4.22	Negative
Hexadecane (Aviation fuel)	ND	2.90	Negative

River Road POTW, 3-5-12 to 3-6-12

Note that decanes (C-10), undecanes (C-11), and dodecanes (C12) are high weight components of engine fuel (typically composed of C4-C12 alkanes). The major origin of these compounds would seem to be infiltration of street runoff of combustion residue from gasoline and diesel engines, though some, such as Tridecane, may be used in mixed solvents for PPCP. The branched dodecanes, undecanes, and decanes seem to indicate origins in liquid paraffin, such as in kerosene, aviation fuel, baby oil, or laxatives.

Volatile organics (in ug/l):	Inf	Eff	Removal
3,7-Dimethyl decane	15.4	ND	100%
Dodecane	418	12.9	97%
(C-12 engine fuel component)			
4-Methyl dodecane	76.9	ND	100%
6-Methyl dodecane	78.2	ND	100%
Trans-2-methyl decalin	21.4	ND	100%
(Fuel additive)			
Tridecane			
(C-13 component of diesel or aviation fuel)	214	8.40	96%
Undecane			
(C-11 engine fuel component)	114	9.60	92%
2,10-Dimethyl undecane	76.2	ND	100%
2-Methyl undecane	66.3	ND	100%
3-Methyl undecane	56.3	ND	100%
4,6-Dimethyl undecane	107	ND	100%
4-Methyl undecane	38.5	ND	100%
5-Methyl undecane	94.2	ND	100%

The majority of the following chemicals seem to be fatty acids. Most seem to be from food and/or personal care products. While some of the heavier molecular weight fatty acids are often used as carriers in pharmaceutical creams and ointments, there seem to be no specific pharmaceuticals in the scan.

Semi-volatile organics:

1-Octadecane	36.0	ND	100%
(C-18 diesel fuel component)			
1-Tetradecane	42.1	2.10	95%
(C-17 diesel fuel component)			
2,6,10,14-Hexadecatetranoic acid	81.3	ND	100%
(Polyunsaturated fatty acid)			
7-Hexadecyne	25.5	ND	100%
(aka n-Tetradecyl acetylene)			
9,12-Octadecadienoic acid	29.2	ND	100%

(aka Linoelaidic acid; Omega-6 trans fatty acid found in vegetable oils)			
9-Octadecanoic acid (Oleic Acid)	733	ND	100%
(From olive oil; Omega 9 fatty acid; "good" fat; fat substitute)			
(Z)-Octadec-9-octadecanoic acid	52.2	ND	100%
(Oleic acid isomer; see above)			
Benzeneacetic acid (Perfumes)	30.9	ND	100%
Caffeine (Stimulant)	22.8	ND	100%
Cholesterol (Eggs; human feces; animal organs)	215	ND	100%
Cholesterol (Animal fat)	280	ND	100%
Cyclodecane	27.9	ND	100%
(Cleaner, solvent, contact lens cleaner)			
Dodecanoic acid (Lauric acid)	89.6	ND	100%
(Laurel oil/coconut oil. Soaps and cosmetics)			
(Z)-11-Hexadecenoic acid (Fatty acid)	30.8	ND	100%
(Vaccenic acid; from milk fat and other dairy products)			
n-Hexadecanoic acid (Palmitic acid)	742	ND	100%
(From palm oil; used in soap and as filler in processed foods)			
Octadecanoic acid (Stearic acid)	399	ND	100%
(Most common saturate fatty acid)			
Eicosyl ester oleic acid	35.3	ND	100%
Tetradecanoic acid (Myristic acid)	109	ND	100%
(Carrier in topical creams and ointments)			

Found in effluent only:

1,1-Difluoro ethane	ND	2.50	Negative
(In "Canned air", Ozone safe auto refrigerant)			