

The Story of Bottled Water

Dr. John T. O'Connor, PE

Tom O'Connor, PE

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BPA in Baby Bottles

March 6, 2009 - San Francisco Chronicle:

... six major companies have agreed to stop selling hard-plastic baby bottles containing bisphenol A, an industrial chemical suspected of harming human development ...



... some of the companies have been making bisphenol A-free alternatives, including old-fashioned glass baby bottles ...

Studies in lab animals indicate that even small amounts of bisphenol A can damage brain and reproductive systems, alter mammary and prostate glands and lead to heart disease, obesity and diabetes.

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Leaching from Plastic Bottles ?

- Mineral water packaged in plastic contains roughly twice the amount of estrogen mimics compared with water sold in glass ...
- Estrogenic compounds have potential adverse health effects ...
- Increased activity in 12 of 20, most of which relied on PET bottles
- Female snails, raised in PET bottles, produced more than double the number of embryos compared with snails raised in glass bottles.

Environ. Sci. Poll. Research, DOI: 10.1007/s11356-009-0107-7

Why is Tap Water Safer?

Public Water Supplies subject to USEPA regulations: 83 MCL parameters

Bottled water (a Food Product) is regulated by the Food and Drug Admin.
FDA sets Standards of Quality (SOQ) for food products; weak for water.

Operationally, bottlers may test for only a few quality parameters:
e.g., coliform bacteria, ozone residual, conductivity, pH, fluoride

Tap Water is fresh, maintains a disinfectant residual, and has not been in contact with untested and unapproved surfaces, such as Bisphenol A.

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Bottled Water Insanity Pandemic - 2008

Better than milk for babies!

Saphia Water - *'designed'* by a neonatologist in consultation with lactation experts, will be offered in Lovingly Lemon, Pacifying Peach and Bliss Berry flavors at Babies R Us and Motherhood Maternity Stores.

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SaphiaTM

Water for Smart Women Expecting More

Saphia Water is the first enhanced water created specifically to respond to obstetricians' universal prescription for pregnant women and breastfeeding mothers to drink the equivalent of at least eight, eight-ounce glasses of healthy water daily.

At \$45/case, that's \$1,832 for 9 months




ING



How far would you go for Love?
This bottle has been individually hand crafted with Swarovski Crystals making it unique in the Love Limited Edition Collection.
Luxury in a bottle.
www.LoveFlz.co.uk


LOVE
Limited Edition


LOVE
Limited Edition

£21.99
Each Country of origin, England 
H2O
Individually handcrafted with Swarovski Crystals, this Love Limited Edition Collection is a true luxury.

£21.99
Each Country of origin, England 

Love = £ 21.99

is all you need ...?



Bottled Water Insanity Pandemic - 2008



When your water sommelier brings you a Swarovski crystal-studded bottle, it will contain Bling h²o, the most expensive water in the world.

Offered for an exclusive market *'where water is the new wine'*, this \$38 per bottle potable is reputedly Paris Hilton's choice for her Chihuahua.

Your on-line price for the limited edition *'Christmas'* Bling (750 ml in a crimson and Peridot green bottle) is \$40.

Bling h²o is also available in *'convenient'* plastic bottles.

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bling_{h2o}

More Than a Pretty Taste

IN THE NEWS: Most Expensive Bottled Water

Fancy water that's cooler than wine. A few months ago, Madonna's pal let it slip that the Material Girlfriend spends \$10000 each month for water blessed by Kabbalah rabbis.

BLING NOW!
at the Bling Store

Look Who's Talking

FOX

\$55 per bottle - girl not included



Bring your Own Bottle?

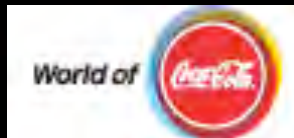
Eliminate Bottle Transport & Waste



The Boomerang Water Bottling System, if ever deployed near you, promises to “sanitize, fill and cap glass and aluminum bottles of water on site for immediate sale and consumption, thereby eliminating landfill contribution and reducing CO₂ emissions.”

Vitaminwater

(hydrate responsibly)



GLACÉAU
inwater

formula 50

50% daily dose

provides 50% of the many important vitamins you need every day (b vitamins, c, e + folic acid).

formula 50

grape

ingredients: vapor distilled/deionized water, crystal-line fructose, natural flavor, citric acid, ascorbic acid (Vitamin C), vitamin E acetate, fruit and vegetable juice (color), magnesium lactate (electrolyte), calcium lactate (electrolyte), niacin (B3), monopotassium phosphate (electrolyte), pantothenic acid (B5), pyridoxine hydrochloride (B6), cyanocobalamin (B12), folic acid.

make your drink work for you.



Nutrition Facts

Serving Size 8 fl oz (240 mL)

Servings Per Container 2.5

Amount Per Serving

Calories 50

% Daily Values*

Total Fat 0g 0%

Sodium 0mg 0%

Total Carbohydrate 13g 4%

Sugar 13g

Protein 0g

	per serving	per bottle
Vitamin C	20%	50%
Vitamin E	20%	50%
Vitamin B3	20%	50%
Vitamin B6	20%	50%
Folic Acid	20%	50%
Vitamin B12	20%	50%
Vitamin B5	20%	50%

*Percent Daily Values are based on a 2,000 calorie diet.

contains less than 1% juice

not a significant source of calories from saturated fat, cholesterol, dietary fiber, vitamin A, calcium or iron

No! The calories are from 32.5 g of sugar!



function YOUTH TRIP: Protect your skin from the inside out.
 function BRAINAC: Boost your memory and mental acuity with powerful antioxidants.
 function URBAN DETOX: Help rid your lungs and sinuses of airborne pollutants and fight bacteria.
 function SHOCK SPORTS: Ease sore muscles and hydrate after working out.
 function ALTERNATIVE ENERGY: All-natural time release energy and stamina for 6-8 hours.
 function HOUSE CALL: Help boost your immune system and fight colds.
 function VACATION: Improve your mood and reduce stress.
 function LIGHT WEIGHT: Ignite your metabolism and burn more calories per hour.



Propel Fitness Water

Now, with high fructose corn syrup!

Still, Propel contains less sugar, salt, and carbohydrates than its cousin, Gatorade, which offers 50 kilocalories per 240 ml serving.

One sports drink, notably Gatorade, even comes without *water*. It is also sold as a powder.



FortiFido or PET SWEAT ?

Vitamin Water in PET for your PET



HEALTHY BONES

(Peanut Butter Flavored) With Calcium added to help maintain healthy bones in **adult dogs**. Available in two sizes: 1 liter and 2 liter.

GUARANTEED ANALYSIS

Molsture (max)	99.9%
Calcium	0.02%
Pantothenic acid (Vitamin B5) (min)	5 MG/KG
Niacin (Vitamin B3) (min)	10 MG/KG
Vitamin B6 (Pyridoxine) (min)	1 MG/KG
Vitamin B12 (min)	0.015 MG/KG



Bottled Water Insanity Pandemic - 2008

Sensing a challenge, H₂O'C Engineering is in the process of developing a highly advanced water product having the potential to sell for even more than all other competitors.

Condensed in hydrostatically-fused borosilicate capillaries, *H₃O'C bi-ionic electroneutral polywater* promises to be a *powerdrink* capable of delivering steroids and male enhancement products in undetectable form.

In addition to saving marriages, *polywater* has already shown its capability for curing cancer and minimizing the effects of the common cold.

What's in it? Don't ask; we won't tell.

But, if you *really* love your family ... !

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Pharmaceuticals in Water and Wastewater

Toilet to Tap?

There are no more orange groves in Orange County, California.

Instead, population grows and water is in increasingly short supply. However, there is an ever-increasing flow of *wastewater* (a.k.a., *sewage*).

Now, a \$481m *groundwater replenishment system* employing microfiltration, reverse osmosis and UV-peroxide oxidation is purportedly making wastewater 'as pure as distilled water'...

Orange County, CA Water District

'Indirect Potable Water Reuse'

70 mgd - Groundwater Replenishment System



\$481 million

When freshwater gets scarce ... utilize 'toilet to tap', a.k.a.

Wastewater Reclamation & Reuse

**California State Department of Health
permits use of reclaimed wastewater for:**

- agricultural irrigation of over 20 food crops***,
- landscape parks, playgrounds and golf courses,**
- restricted recreational impoundments,**
- groundwater recharge to domestic water supply areas**

*Apples, Grapes, Asparagus, Lettuce, Avocados,
Maize, Barley, Peaches, Beans, Peppers, Broccoli,
Pistachios, Cabbage, Plums, Cauliflower, Squash,
Celery, Sugar Beets, Citrus, Wheat



Emerging Health Concerns



pharmaceuticals: N-nitrosodimethylamine (NDMA), 1,4-dioxane, bisphenol A, alkylphenol polyethoxy carboxylates (APECs), dioxin, disinfection by-products, ...



cosmetics, hormones, nanomaterials



endocrine disruptors, a class of compounds that perturb the normal functioning of endocrine systems including those that affect growth, reproduction and behavior.

Partial removal requires capital, energy-intensive processes:

(GAC adsorption; ozonation; micro-, ultra-, nano-filtration; reverse osmosis; membrane bioreactors; advanced oxidation (hydrogen peroxide - UV))

Pharmaceuticals in drinking water

- Water tested positive for pharmaceuticals
- Water tested negative for pharmaceuticals
- Water not tested for pharmaceuticals
- Test results pending



* In Virginia Beach, pharmaceuticals were found in source water but not in treated drinking water.
** Drinking water in Austin, Texas, was tested for only one prescription drug, a synthetic birth control chemical.

NOTE: All places include some surrounding areas except: Albuquerque, N.M.; Arlington, Texas; Fresno, Calif.; Long Beach, Calif.; Los Angeles; Memphis, Tenn.; New Orleans; New York City; and Orlando, Fla.

Great Headlines



STUDY SHOWS DRUGS IN WATER **TMJ4**

fox4.com tmj4.com fox4.com

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Over-the-Counter Drugs in Drinking Water

Caffeine was found at the highest concentration of all drugs tested by Philadelphia Water

If you drink eight glasses of water a day for more than 1,200 years, you'll get the amount of caffeine in a single cup of coffee (~100 mg)



Over-the-Counter Drugs in Drinking Water

If you drink eight glasses of water a day for more than 40,000 years, you'll get the amount of acetaminophen in a single infant dose (80 mg) of Tylenol.

There is currently no indication that such extremely low concentrations pose any public health risk.



www.pharmer.org

Pharmaceuticals

"Ask your doctor if _____ is right for you" ...
take pills ⇒ pee 'em out (& dispose extras) ⇒
toilet ⇒ wastewater plant ⇒ river ⇒ drinking
water treatment plant intake ⇒ tap

Concentrations in drinking water are in the
parts-per-bazillion range.

The real story here is:

- ✓ How amazing the detection methods of modern analytical equipment are.
- ✓ This stuff that we make persists and is incorporated into the environment.



GlaxoSmithKline





Recreational Drugs in Wastewater

- **Oregon State University** drug-tested influent at 40 wastewater plants
- A "city with a gambling industry" used five times more methamphetamines
- A "fairly affluent community" scored low for everything except cocaine
- Cocaine and ecstasy levels peaked on the weekends,
but the meth and prescription drugs were constant

Municipal Water Reuse Markets 2010

Analysis, forecasts
and inventory



Global
Water Intelligence

A Global Water Intelligence publication
www.globalwaterintel.com

Produced in collaboration
with PUB Singapore

PUB
Singapore's Water Authority

“NEW REVENUE STREAM SPRINGS UP “

“WATER REUSE MARKET SET FOR EXPLOSIVE GROWTH”

“We will drink more reclaimed water - indirectly.”

“Ultrafiltration, reverse osmosis and ultraviolet disinfection - have become cheaper and more effective.”

“Recycling water seems as natural as any other recycling.”

“... water reuse can be an essential part of sustainable cities”.

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Water Reuse will be Beautiful



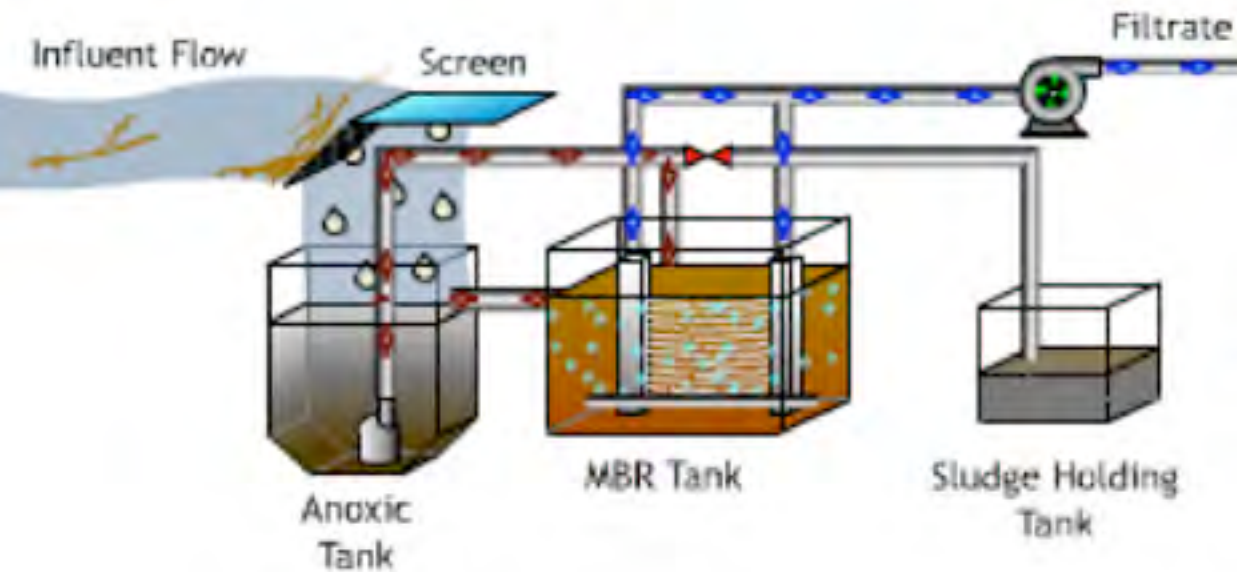
KCMO Symbol



Tapping into Sewers

'Sewer Mining' for 'Brown Gold'

Membrane Bioreactors



Membrane Module



Requires Chemical Control of Membrane Fouling

Sewer Mining?

Padlock your manholes?

Membrane Bioreactors (MBR)

membranes immersed into highly concentrated mixed liquor suspended solids

Hydraulic Retention Time: 4-8 hours; 25% conventional footprint

Solids Retention Time: 10- 365 days; 20% conventional sludge yield

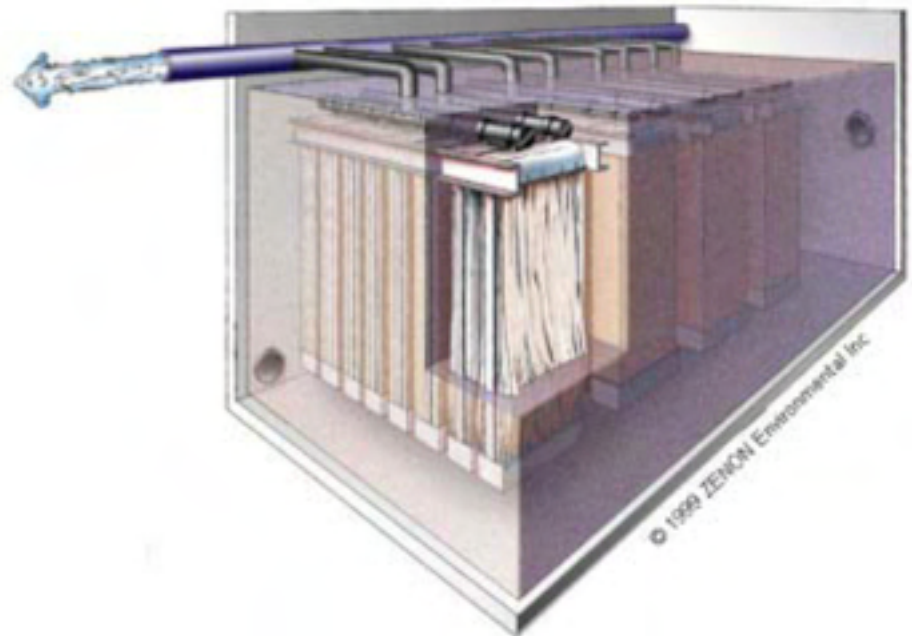
MLSS: 10,000 - 15,000 mg/l

Modular: small scale

Effective organism removals

Removal of nutrients

Reuse of product water



Operational Issues

Membrane Bioreactors (MBR)

Fine Screening (1 mm) required; disposal of untreated waste

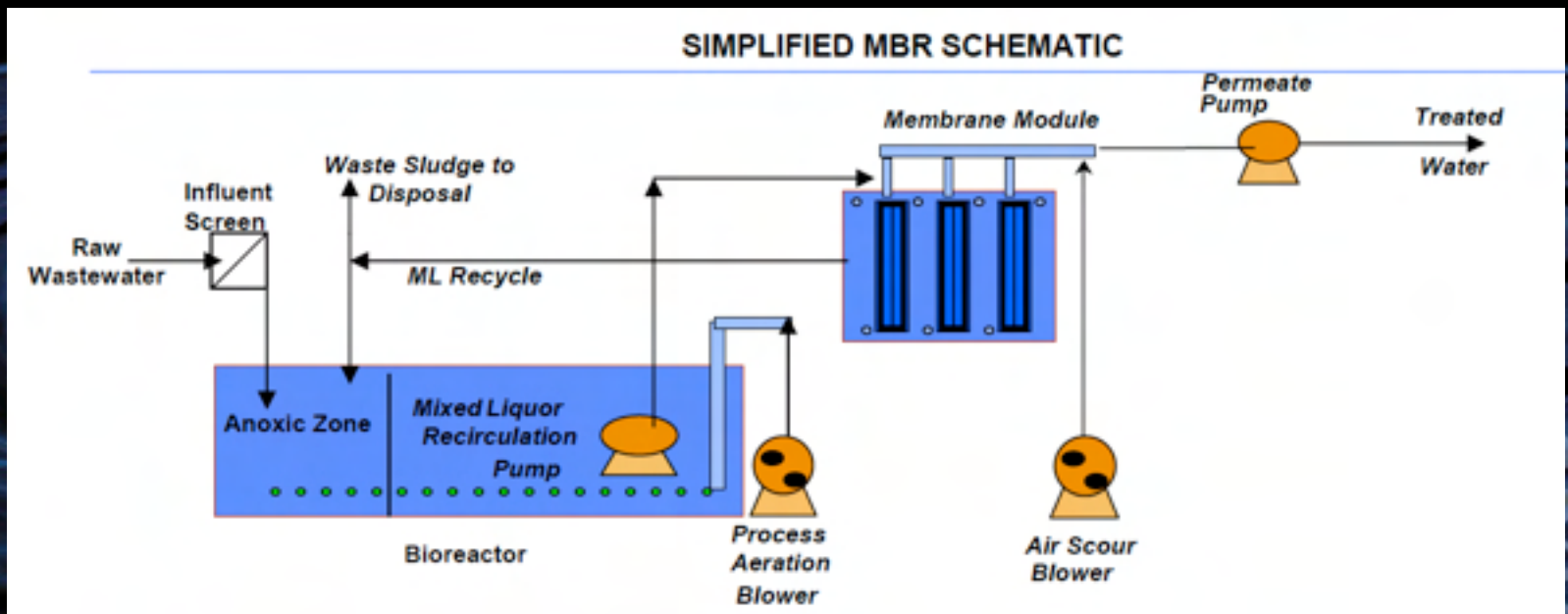
Fouling results in low membrane flux rates; large membrane surfaces

Air Scour, MLSS recirculation: high energy consumption

Large Equalization Tank Volume: to offset low peak flow tolerance

Low Oxygen Transfer Efficiency due to high MLSS

Membrane Replacement Frequency and Costs



Where is Reclamation Occurring?

CA, FL, TX, AZ, NM, NE, CO, GA, WA, VA, NY, MA

Orange County Water District
Central/West Basin
Metropolitan Water District
San Jose
Los Angeles Co Sanit District
San Diego County
Irvine Ranch
Dublin San Ramon
East Bay Municipal Utility District
Orlando
Scottsdale
Phoenix

San Antonio
El Paso
Tarrant Regional
St. Petersburg
Pinellas County
King County (WA)
Austin
Santa Rosa
UOSA (VA)
Southwestern Nevada Water Authority/Las Vegas
Valley Water District



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0.25 mgd used for toilet flushing



H₂O'C Library

www.h2oc.com

john@h2oc.com
877-22-WATER

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Dr. John T. O'Connor, PE

H₂O'C Engineering 2401 Tahoe Court Columbia, MO 65203-1444 www.h2oc.com

877-22-WATER

573-446-5595

john@h2oc.com

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