

Water Forum

Life In The Balance Series

November 5, 2010

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Key Issues — Bottled Water

- Water rights and supply
 - Pumping impacts to groundwater and surface water
 - Municipalities **Concord**
 - Domestic water well owners **Carlisle**
- Waste management
 - Landfill capacity
 - Oceans, lakes, rivers
 - Roadside
- Water Quality — Contamination
 - Legacy (oils, solvents, PCBs, metals, fertilizers, pesticides)
 - Emerging (hormones, narcotics, plasticizers, personal care products)
- Regulation of Water Quality

Bottled Water Regs — FDA & EPA

- FDA required to establish a regulatory standard for the same contaminants EPA regulates
 - Exceptions allowed if contaminant not present in water used for bottling.
- FDA standard must be no less protective than those for public water systems
 - Must use techniques EPA uses to meet EPA standards.
- FDA allowable levels must be no less stringent than EPA's MCL for drinking water
 - FDA regulation must have the same effective date as EPA regulation

Water Quality

Concord vs. Bottled

EPA Regulation	Turbidity	Arsenic	Barium	Chloride	Fluoride	Manganese	Selenium	THM
	1 - 5	0.01	2	250	2.4	0.05	0.05	0.08
Concord Public	0.2	ND - 0.002	0.008 - 0.032	14 - 170	0.3 - 1.5	ND - 0.034	ND - 0.007	ND - 0.027
Aquafina (Ayer/public)	0.5	<0.004	0.008	56	<0.1	0.092	<0.01	0.0016
Old Kerry (Haverhill/well)	0.9	<0.002	0.014	2.5	0.57	0.048	<0.001	<0.0005
Miscoe Springs (Menden/spring)	<0.1	<0.001	0.028	41	0.31	<0.005	<0.001	<0.0005

Units: mg/L; turbidity in NTU

Water Quality

Carlisle vs. Bottled

- Unknown
- Private well data not available
- Recommend baseline testing, annual thereafter
- Guidelines for testing from Mass DEP
 - <http://www.mass.gov/dep/water/drinking/privatew.htm>
- Consider testing for emerging contaminants
 - Hormones, drugs

Emerging Contaminants

- Hormones
 - Estrogen
- Drugs
 - Narcotics
 - Antibiotics
- Medical Testing
 - Radioactive Tracers
- BPA
 - Bottles
 - Can liners
- Plasticizers - Phthalates
- PFOA (Teflon)
 - Pan liners
- Flame retardants
- Personal Care
 - Sunscreen
 - Shampoo



Drugs In Treated DW — Muni System

- Drinking water treated at a conventional municipal system
- Unregulated contaminants, no analyses performed
 - Caffeine
 - Anti-convulsant
 - Nicotine metabolite
 - Digoxin metabolite (heart medication)
 - Fragrance ingredient
 - Flame retardants
 - Plasticizers (not phthalate)
 - BPA (polycarbonate plastic and epoxy resins)

Removal by Muni DW Treatment

- Pharmaceuticals
 - Effective to remove 90% +
 - Ozonation, UV, RO, biological activated carbon filtration (BACF)
 - Low or negligible effectiveness
 - Granular Activated Carbon (GAC) filtration = 53%
 - Chlorination = 32%
 - Clarification = 15%
- Estrogen
 - Conventional DW treatment (coagulation, chlorination, GAC)
 - Overall 84% but not all removed
 - E1 = 91%, E2 = 67%, E1-3S = 0, E1-3G = 0, E2-G = 0

Drugs in Treated Wastewater

- Transporting drugs to rivers and streams
 - 22 antibiotics
 - Digoxin, dehydronifedipine (heart meds)
 - Gemfibrozil (cholesterol and LDH management)
 - Fluoxetine (antidepressant)
 - MDMA (Ecstasy)
 - Codeine
 - Morphine
 - Methamphetamine
 - Marijuana metabolites

Drugs In Septic Systems & Groundwater

- Septic tanks, leach fields, groundwater plume
- Unregulated contaminants
 - Pharmaceuticals
 - Sulfamethoxazole (antibiotic)
 - Ibuprofen
 - Naproxen
 - Gemfibrozil (cholesterol and LDH management)
 - Caffeine
- Very few studies done for septic systems

Impacts from Emerging Contaminants

- Ecological
 - Credible evidence for harm to fish
 - Estrogen studies at Experimental Lakes Region, Canada
- Human Health
 - Indicated but not yet determined with scientific certainty
 - Studies underway
 - Uncontaminated Contaminants Monitoring Rule (UCMR)
 - Up to 30 contaminants selected every 5 yrs
 - Time from substance ID to final regulation to compliance
 - 10+ years

Sustainability of Wild Fish Populations

- Lab and field studies confirm impacts from Estrogen
- Seven Year Study at Experimental Lakes Region, Canada
 - Inoculated lake with Estrogen (EE2) in birth control pills
 - Concentration of EE2 = treated & untreated wastewater
 - 7 weeks: early feminization of male fathead minnow
 - 9 months: male genitalia deformed, ova present
 - 18 months: population collapse, reproductive failure
 - 24 months: no young fish
 - Conditions persisted for 2 years after stopping EE2

Similar issues emerging with birds, seals, polar bears, frogs, marine mollusks, alligators, others

Human Health Impacts

- Men in semi-rural and agricultural areas of US
 - Sperm counts 60% of those in urban areas
 - Motility impairment
 - Also occurring in Australia, Thailand, France
 - Fertilizers, hormones (humans & animals), septic systems
- Male children of women exposed pre-natally to phthalates
 - Increased incidence of undescended testicles
 - Lower sperm counts and mobility
- Phthalate and hormone exposure may also influence
 - Infertility in men and women
 - Gender identity

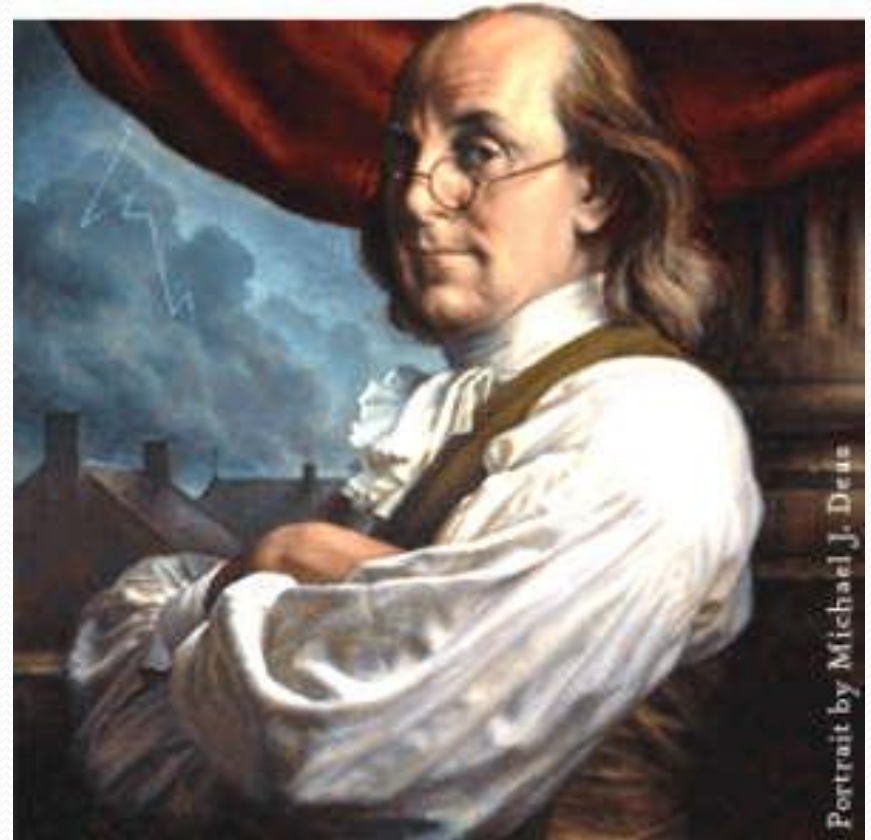
Managing Uncertainty – Proactive vs. Reactive

An ounce of protection is worth a pound of cure.

– Benjamin Franklin

PRECAUTIONARY PRINCIPLE

Acting to avoid serious or irreversible potential harm, despite lack of scientific certainty as to the likelihood, magnitude, or causation of that harm.



Precautionary Principle — REACH

- **R**egistration, **E**valuation, **A**uthorisation and Restriction of **C**hemical substances
- European Community Regulation effective June 2007
 - Phased-in over 11 years
- Greater responsibility to industry to manage risks
- Improve the protection of human health and the environment
 - Better and earlier ID of chemicals & properties
- Enhance innovative capability and competitiveness of EU chemicals industry
- Substitute most dangerous chemicals when suitable alternatives identified
- Addresses testing protocols using animals

Action Items – Proactive Broad Strokes

- Waste Management
 - Reduce consumption
 - Recycle plastic bottles for all liquids
 - Pass “Bottle Bill”
 - Unused prescription drop-off program expansion
- Water Quality Protection
 - Identify potential impacts from emerging issues
 - Land use
 - Households and Businesses (plastics, Rx, personal care products)
 - Groundwater Conservancy District (well-head protection)
 - Update regulations

Action Items – Proactive Broad Strokes

- Water Rights & Quantity Protection
 - Re-examine existing regulations with “new eyes”
 - Forecast potential scenarios and determine protective measures
 - Implement revised or new policies and regulations
- Lobby for REACH type program in US
 - Consumer and industrial product development
 - Drug development and manufacturing
 - Food manufacturing and processing
 - Packaging