

# Water Forum

## *Life In The Balance Series*

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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
<b>Concord Public</b>	<b>0.2</b>	<b>ND - 0.002</b>	<b>0.008 - 0.032</b>	<b>14 - 170</b>	<b>0.3 - 1.5</b>	<b>ND - 0.034</b>	<b>ND - 0.007</b>	<b>ND - 0.027</b>
Aquafina (Ayer/public)	0.5	<0.004	0.008	56	<0.1	<b>0.092</b>	<0.01	0.0016
Old Kerry (Haverhill/well)	<b>0.9</b>	<0.002	0.014	2.5	0.57	<b>0.048</b>	<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

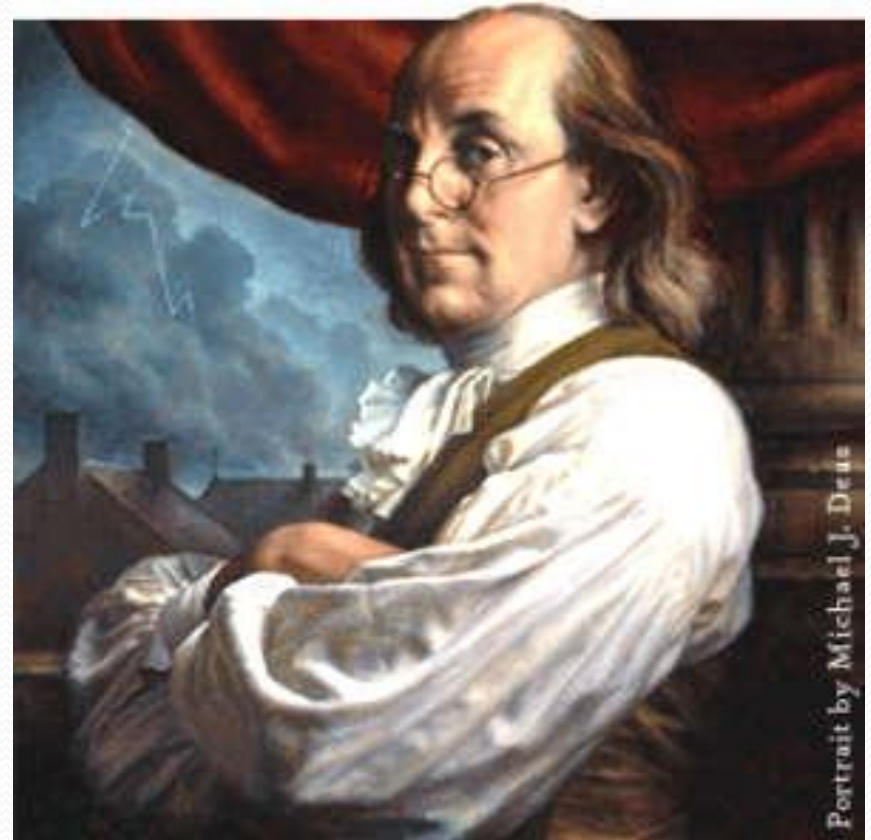
# Managing Uncertainty – Proactive vs. Reactive

*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