

The U.S. *versus* the Rest of the World:



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The Safe Drinking Water Act

- ★ Federal law to protect public from drinking water contaminants of health concern
 - Adopted 1974
 - Significant amendments in 1986, 1996
- ★ 1986 amendments had explicit health goals and risk management approaches
- ★ 1996 amendments added new regulatory and public communications elements

US SDWA is Unique in World

- ❖ SDWA requires standards that must be met, monitoring that must be done and reported, enforcement, and consequences for violations
 - ❖ Standards are stringent
 - ❖ A lot of attention to detail required
- ❖ Most countries use general “due diligence” laws and guidelines
 - ❖ Generally, no required monitoring and reporting
 - ❖ If failure (outbreak), review to see if guidelines met
 - ❖ If guidelines were not met, only then legal trouble

Two Points About “Risk”

- ✦ Real risk is not the same as “regulatory risk”
- ✦ The perception of a risk has little to do with the actual nature and magnitude of the risk

Risk vs. “Regulatory” Risk

- ✱ Risk is the likelihood that something (bad) will happen, usually to the general population
 - Considers ranges of uncertainties and unknowns for toxicity and exposure estimates
 - May consider fuller exposure situations, population variation and other mitigating factors
- ✱ “Regulatory” risk is a defined calculation used to set benchmarks (regulations, usually)
 - Constrained by statute and precedent
 - Typically limited to contaminant and situation
 - Usually uses precautionary principle, most vulnerable
 - Seldom matches reality

What's the Difference?

- ★ Risks that produce health effects that a medical doctor can see:
 - Lung cancer from smoking ~1/10
 - Dying in car accident ~1/200
- ★ Drinking water regulations set risks below medical detection
 - Risk of cancer from benzene in DW at MCL <1/million

50 Years of the SDWA

Are We Better Off?

- Obvious decrease in waterborne disease outbreaks after SWTR, TCR in place
 - Resolution very low, though
- Essentially impossible to show public health improvements from chemical MCLs
 - THMs (~DBPs) regulated since 1979, but no evidence of decreases in bladder or colon cancers
 - Long-term decreases in blood lead levels have not resulted in IQ increases

SDWA

the Good, the Bad, the Ugly

★ Good

- Control of microbial pathogens
- Elimination of DW disease outbreaks

★ Bad

- Stringent requirements are costly
- Yet, increased public distrust

★ Ugly

- Currently chasing after marginal risks
- Process can ignore real risks

The Arsenic MCL is Weak

- ☀ Arsenic health effects on humans have been extensively studied:
- ☀ A variety of human cancers are associated with arsenic ingestion
 - Lung, bladder, kidney, nasal, prostate, skin, liver...
- ☀ Circulatory and neurological damage can occur
 - Ischemic heart disease
 - IQ deficits
- ☀ Arsenic may have hormonal effects, too
 - Diabetes, thyroid, endocrine effects
- ☀ Adverse effects on humans are seen at the 10 ug/liter MCL

Impacts of Lead Restrictions

- ✱ Lead banned in paint, 1978
- ✱ Lead banned in new plumbing, 1986
- ✱ Lead and Copper Rule for DW, 1991
- ✱ Tetra-ethyl lead banned in gas, 1996
- ✱ US blood lead levels have decreased by 94% from 1976 to 2016
 - ✱ From 12.6 down to 0.82 ug/dl average
 - ✱ Even more in kids

DW Lead and Copper Rules

- ✱ Initial LCR focused on corrosion control
 - ✱ Considered cost of replacing service lines too high for benefits
- ✱ Current approach is to replace service lines and other lead-containing parts
 - ✱ Biting the bullet, but costly
- ✱ CDC reference values are lower, mostly because blood lead levels are lower

PFAS Health Concerns

- ★ These materials are so common that we all have amounts of different PFAS in our blood
- ★ Epidemiological data suggest effects on the immune system
- ★ Toxicity studies show all sorts of biological problems, but their relevance to current human exposures is unclear
- ★ Some may bio-accumulate faster than they go away

PFAS DW Regulatory Dilemmas

- ✦ Some DW PFAS hot spots found, but most exposure seems to be from non-water sources
- ✦ “Easy” to regulate PFAS in DW, but will it make a health difference?
- ✦ EPA is developing regulations to control all exposure routes it can
 - ✦ DW, releases and waste disposal



Bottom Line:

The Safety of Drinking Water

- ◆ US DW Standards are very stringent
- ◆ They have led to reduced DW risks well below public health significance
- ◆ This is as much a result of utilities' attention to details as it is from compliance
- ◆ Very hard to communicate this