The Future for Drinking Water Contaminant Regulations

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Regulations versus Health

- Not every drinking water contaminant of health consequence gets regulated
- Not every regulated contaminant has health consequence

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

The Safe Drinking Water Act Directs EPA's DW Regulations

- Maximum Contaminant Level Goals
  - Not enforceable, but direct MCL selection
  - "Each MCLG...shall be set at the level at which no known or anticipated adverse effects on the health of persons occur and which allow an adequate margin of safety"
- National Primary Drinking Water Regulations
  - Enforceable
  - Set as close as feasible to MCLGs
  - Feasible analytical methods, treatment technologies
  - Administrator can adjust MCL for cost reasons
- Other regulatory applications generally not considered

How a Drinking Water Regulation is Put Together

- A contaminant is identified as being of possible health concern in drinking water
- The contaminant is listed on the EPA DW Contaminant Candidate List
- Health, occurrence and exposure information are collected for preliminary risk assessment
- A determination is then made on whether there exists an opportunity to reduce public health risks by regulation

How a Drinking Water Regulation is Put Together, 2

- After a determination to go forward is made, the regulatory elements are developed
  - Risk assessments to determine potential standards and to quantify benefits
  - Analytical methods for the levels of concern
  - Treatment methods to achieve compliance
  - Cost analyses for compliance and enforcement
- MCLG and feasible MCLs are suggested

How a Drinking Water Regulation is Put Together, 3

- Draft MCL is selected based on benefits/costs
- Draft MCL and other regulatory elements are reviewed by EPA and OMB, then proposed
- Public comments are taken and addressed
- Final NPDWR is reviewed by EPA and OMB again, then promulgated
- Implementation and enforcement follow according to schedule

What the Near-Term Future Holds

- USEPA regulations in development
  - TCR revisions/ Distribution system regs
- Security concerns
- Data gathering for future regulations
  - CCL2, CCL3
  - UCMR2

TCR & Distribution System

- TCR review to consider monitoring, not MCLs
- Distribution system reg suggested by FACA2
  - Will consider cross-connection control, other O&M elements
  - Discussion papers on EPA's website
    - www.epa.gov/safewater/tcr
  - Workgroup now up and running
- Regulations years away

Security Issues

- Bioterrorism monitoring?
  - R&D effort to support large system source and finished water monitoring for bioterrorism agents
- For all systems, a change in emphasis from terrorism to natural disasters
  - Emergency response preparation
  - Delivery of potable water
- Unknown if regulations will address these

Contaminant Candidate Lists

- CCL to be published every five years
  - List unregulated contaminants known or anticipated to occur in public water supplies that may require regulation
- CCL criteria
  - Consider adverse health effects
  - Consider known or anticipated occurrence
  - Consult with scientific community

Previous Approach

- CCL1 based on best professional judgements
  - Chemicals
  - Microbials
- CCL1 regulatory determinations addressed 9 of 60 on list
- CCL2 is 51 left-overs from CCL1

CCL2 Microbials

- Adenoviruses
- Caliciviruses
- Coxsackieviruses
- Echoviruses
- Cyanobacteria (blue-green algae), other freshwater algae, and their toxins
- *Helicobacter pylori*
- Microsporidia (Enterocytozoon and Septata)
- Mycobacterium avium intracellulare (MAC)

CCL2 Chemicals

- 1,1,1,2-tetrachloroethane
- 1,1-dichloroethane
- 1,2-diphenylhydrazine
- 1,3-dichloropropene
- 2,2-dichloropropane
- 2,4-dinitrophenol
- 2,6-dinitrotoluene
- Acetochlor
- Aluminum
- Bromobenzene
- DCPA di-acid degradate
- Diazinon
- Diuron
- Fonofos
- Linuron
- Methyl-t-butyl ether (MTBE)
- Molinate
- Organotins
- Prometon
- Terbacil
- Triazines and degradation products of triazines
- Alachlor ESA and acetanilide degradation products
- 1,2,4-trimethylbenzene
- 1,1-dichloropropene
- 1,3-dichloropropane
- 2,4,6-trichlorophenol
- 2,4-dichlorophenol
- 2,4-dinitrotoluene
- 2-methylphenol (o-cresol)
- Vanadium
- Boron
- DCPA mono-acid degradate
- DDE
- Disulfoton
- EPTC (s-ethyl-dipropylthiocarbamate)
- p-Isopropyltoluene (p-cymene)
- Methyl bromide
- Metolachlor
- Nitrobenzene
- Perchlorate
- RDX
- Terbufos

CCL2 Regulatory Determinations

- EPA reviewed 13 contaminants on CCL2 for possible regulation
- Perchlorate, MTBE
- 11 others
  - Boron
  - Dacthal mono and diacid degradates
  - DDE
  - 1,3 Dichloropropene
  - 2,4 Dinitrotoluene
  - EPTC
  - 2,6 Dinitrotoluene
  - Fonofos
  - Terbacil
  - 1,1,2,2-Tetrachloroethane

Contaminant Candidate List 3

- USEPA asked National Academy of Sciences for advice
  - Suggested top-down approach
  - Consider universe of chemicals, microbials
  - Screen to possible contaminants
  - Further winnow to draft CCL
- Proposed models, QSAR
- Very theoretical

More About CCL3

- National Drinking Water Advisory Council reviewed NAS approach
  - Determined that methods, resources currently lacking
  - Suggested alternative approach incorporating best professional judgement
- USEPA asked for nominations
  - FR 71 #119, October 16, 2006, pp60704-60708
- Draft CCL3 slated for late 2007
- Final CCL3 slated for late 2008

Unregulated Contaminant Monitoring Rule, 2

- USEPA is finalizing a second Unregulated Contaminant Monitoring Rule
  - Expected early 2007
- Monitoring during 2008-2010
- USEPA will again manage data
- Based on lessons learned, should be more user friendly...

Proposed UCMR Chemicals

- Acetochlor, Acetochlor ESA and OA
- Alachlor, Alachlor ESA and OA
- Metolachlor, Metolachlor ESA and OA
- Nitrosamines
  - NDMA, NDBA, NDEA, NDPA, NMEA, NPyr
- Dimethoate
- Terbufos sulfone
- BDE-47, BDE-99, BDE-100, BDE-153, 245-HBB
- 1,3-dinitrobenzene, TNT, RDX

Worries About What's Over the Horizon

- Human-derived, environmentally-persistent contaminants of possible health concern (HDEPCPHC)
- Disinfection byproducts
- Algal toxins

HDEPCPHC

- Pharmaceutically-active compounds
  - Prescription drugs
  - Over the counter medications
  - Veterinary antibiotics and hormones
- Personal care products
- Endocrine disrupting chemicals
  - Estrogens and androgens
- Pesticides

HDEPCPHC Health Worries

- Feminization of males
- Hormone-influenced health effects
  - Diabetes
  - Early onset of puberty
- Reproductive and developmental effects
- Antibiotic resistance
- Consumer fears about water safety

What Do We Know About Health Effects of These Materials?

- At environmental levels, very little
- Some information suggesting pathogen resistance from veterinary use of antibiotics
- Some information indicating effects on aquatic organisms from sex steroids
- Algal toxins may cause systemic damage

Current Status

- Inadequacy of health, occurrence and exposure information prevents regulatory efforts
- Few on CCL2 list
- Few on UCMR2 list
- No USEPA regulatory efforts pending

Disinfection Byproducts

- The more we look, the more we find
  - N-nitroso compounds
- Alternative disinfectants make alternative DBPs
  - Chloramines → iodoacetate
- Halo-nitro-compounds may be more toxic
- We may be regulating the wrong things

Algae

- Some cyanobacteria (blue-green algae) produce toxins
- Many algae are a pain to treat, regardless of toxicity
  - Taste and odor problems from disinfection, decay
  - Filter overloads
  - pH fluctuations
- Much unknown about physiology, occurrence, impacts, toxicity

Summary
Concerns for the Here and Now

- Nutrients → algal growth
- Disinfection of nitrogenous organic carbon → DBPs
- Disinfection of seawater-contaminated sources → DBPs