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-dichloropropene
- 2,4-dichloropropene
- 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