Regulating Emerging Environmental Contaminants

Emerging Contaminants Workshop
UA Water Sustainability Program
March 2, 2007

Regulation of Environmental Contaminants

- Based on:
  - Medium – groundwater, surface water, drinking water, air
  - Uses – pesticides, drugs, industry
- Using variety of regulatory strategies and types of assessments
- Key factors to consider for regulation:
  - Human health & aquatic effects from exposure
  - State of the science
  - Cumulative impacts of exposure to multiple chemicals from multiple sources and the potential synergistic/additive effects
  - Detection versus quantification
  - Frequency of contaminant occurrence

What do we know?

- Lower detection limits & improved analytical instruments/methods result in greater detection
- Of the 95 chemicals found in USGS study – less than 20 have adopted standards or criteria
- Measured concentrations very low < 1 ppb
  - rarely exceeded standard or advisory (if one exists)
  - far below therapeutic doses
- For the majority of those detected – little is known about human or ecological effects
  - some exceptions (i.e. arsenic, radionuclide, estrogenic response in fish)

Detection ? Risk

Risk = Exposure x Toxicity

= x
Possible Sources and Pathways

Human Drugs

Industry

Excretion

Waste Disposal

Unused Medicine

Sewage Treatment Plants

Veterinary Drugs

Excretion

Manure

Soil

Septic Systems

Solid Waste Landfills

Groundwater

Drinking Water

Surface Water

DoD

Potential Sources and Pathways

Adapted from Heberer, 2002 (modified)

Drinking Water Regulation

• Safe Drinking Water Act (1974)
• Goal: to protect human health by
  – Setting acceptable concentrations of constituents in drinking water delivered to consumers
• EPA decides to regulate a contaminant based on:
  – Known or likely to occur in public water systems at a frequency to pose concern
  – At levels that may adversely effect human health
  – Ability of the regulation to provide meaningful risk reduction

SDWA – Setting Standards

1. Identify drinking water issues
   – Determine what contaminants to regulate
     • Contaminant Candidate List (CCL)
     • Unregulated Contaminants Monitoring Rule

2. Establish priorities
   – Contaminants on CCL are prioritized
   – Every 5 years, EPA selects contaminants for possible action

SDWA – Setting Standards

3. Propose Primary Drinking Water Standard
   – EPA sets Maximum Contaminant Level Goal (MCLG)
     • Based on:
       – RISK posed by individual pollutant (OCSF or RfD)
       – EXPOSURE rates (ingestion or consumption)
       – BODY WEIGHT (national averages)
   – Lastly, EPA sets Maximum Contaminant Level (MCL) as close to MCLG as feasible considering:
     • Best Available Technology
     • Treatment technology (TT)
     • Other means taking into consideration costs
**Groundwater Regulation**

- Environmental Quality Act (1986)
- Establishes comprehensive program to
  - study, monitor & regulate aquifer water quality
- ADEQ adopts aquifer water quality standards (ARS 49-221)
- Regulates & protects groundwater through a variety of programs:
  - Aquifer Protection Permit Program (BADCT, POC)
  - Reclaimed Water Program
  - Pesticide Contamination Prevention
  - Agricultural Programs – CAFOs, fertilizer application
  - Dry wells

**Aquifer Water Quality Standards**

- Aquifers are protected for drinking water use (ARS 49-224)
- Two types of standards
  - Narrative “...a discharge shall not cause....”
  - Numeric values
    - Based on protection of human health
    - Aquifer Water Quality Standards = MCL
  - The Director may adopt additional AWQS based on:
    - Protection of human health using (ARS 49-223.B & C)
    - Technical protocols for development of aquifer WQS
    - Credible medical & toxicological evidence subjected to peer review

**Surface Water Regulation**

- Clean Water Act (1972)
- Goal: restore & protect surface waters to be
  “fishable & swimmable”
- States establish surface water quality standards
- EPA develops guidelines for WWTPs & industry
- Regulates chemicals in waters through variety of programs including:
  - NPDES permitting program – municipal & industrial wastewater, stormwater, CAFOs
  - Biosolids
  - TMDL Program

**Surface Water Quality Standards**

- Two types of standards
  - Narrative “...a water shall be free from....”
  - Numeric values
    - Protect designated uses of surface waters
    - Considers magnitude, frequency & duration of exposure
    - Based on either human health levels or ambient criteria developed by EPA (304(a)/307(a))
- Subject to EPA review & approval
**Designated Uses**

- All surface waters have beneficial uses
- **Human Health Uses**
  - Domestic Water Source
  - Fish Consumption
  - Full/Partial Body Contact
- **Aquatic & Wildlife based on type**
  - Cold water, warm water, effluent dependent, ephemeral
- **Agricultural Uses**
  - Irrigation
  - Livestock watering

**CWA – Setting Standards**

- **Domestic Water Source**
  - Where an MCL is established  
    DWS = MCL
  - No MCL? Use EPA methodology w/ OCSF or RfD
- **Fish Consumption or Recreational Uses**
  - Same basic equation as DWS with modifications for ingestion rate – 17.5 g/day (FC); 10-15 ml/day (FBC/PBC)
- **Aquatic & Wildlife Uses**
  - Based on national EPA derived criteria for both acute and chronic exposures – protects 95% of all species
  - States can modify to account for state specific factors

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### So where are we?

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**Regulatory Efforts**

- **Federal**
  - Research
    - Risk to human health and aquatic life
      - Aggregate exposure (from multiple sources) and cumulative exposure (to multiple chemicals)
      - Significance of exposure to multiple chemicals at trace concentrations over long durations
  - New analytical capabilities
  - Continue to monitor occurrence
  - Developing indicators for DW & WW
  - Continued research in treatment & removal technologies
State and Local Efforts

- Improved communication
  - Public education
  - Between hazard experts and public works
- Guidelines for acceptance of toxic substances
- Permitting – WWTP, CAFOs, biosolids
  - Use new standards to set action levels or permit limits
  - Both numeric and narrative standards apply (including toxicity testing, as appropriate)
  - If no standard available, may require monitoring, Best Management Practices (BMPs)

Public Education Efforts

- Can help ….
  - Educate regarding emerging contaminants
  - Reduce amounts entering surface water, groundwater and wastewater systems
- How?
  - Labeling programs to educate homeowners
  - Source control – take back programs
  - Household hazardous waste collection programs (Tempe)
  - Guidelines for how to proper disposal
    - AAC R18-13-1418 Discarded Drugs
    - 2/2007 EPA press release on disposing of unused prescriptions

Questions???

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