California’s Water Challenge
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Surface Water Quality – Emerging Pollutants

- There are well established standards and treatment methods for ‘traditional’ pollutants
- Emerging pollutants pose a potentially bigger issue – they can pass through water treatment plants
- We do not have MCLs for most emerging pollutants
- We do not monitor for most ‘emerging’ pollutants
The Problem

- Dr. K. Hooper (2003) of the Hazardous Materials Laboratory, Department of Toxic Substances Control, California EPA notes:

“Over the past 25 years, tens of thousands of new chemicals (7 chemicals per day) are introduced into commerce after evaluation by USEPA. Few (100-200) of the 85,000 chemicals presently in commerce are regulated. We have reasons to believe that a much larger number than 200 adversely affect human health and the environment.”
Emerging Pollutants Defined

• Our regulatory system for water quality is reactionary. We do not routinely look for ‘new’ contaminants.

• Some contemporary issues:
  - PPCPs: Designed to be biologically effective at low doses
    • All human and veterinary drugs, diagnostic agents, and other consumer chemicals such as fragrances and sunscreen agents.
Other “Traditional” Problems

• Bay Delta Area 303(d) Listings (various locations):
  ▪ Chlorpyrifos, DDT, Diazinon, mercury, unknown toxicity and legacy pesticides such as aldrin, dieldrin, chlordane, endrin, pathogens, nutrients, TDS, low DO, PCBs

• Other pollutants
  ▪ Perchlorate, PBDE
Long-Term Strategy

- Surface waters must ultimately achieve receiving water quality standards, but there are compliance problems.
- The true scope of the problem is unknown:
  - Nearly 23 million organic and inorganic substances
  - About 7 million of these substances are commercially available\(^1\)
- Current system is not efficient.

\(^1\) Daughton (2004)
Meanwhile, Regulatory Pressure is Increasing….

- In 1998, there were about 21,749 waterbodies listed as impaired nationally.
- In 2008, the number rose to 43,446 waterbodies nationally.
- **Leading Causes (US EPA):**
  - Pathogens
  - Mercury
  - Metals
  - Nutrients
  - Sediment
  - PCBs
Also Consider:

- That many pollutants persist in the environment
- Many are very soluble
- Take years for problems to manifest
- Take years for us to recognize a problem
- About 4% of the land in the US is home to 75% of the population – impairments should be limited to these areas…
  - Yet, problems occur far outside of urban areas…
Need for Change

• The current regulatory system is reactive and based on proxies to achieve water quality standards:
  ▪ Best management practices (BMPs)
  ▪ Numeric sizing
  ▪ Action levels for individual constituents

• The system is not working
  ▪ TMDLs taking more program resources
  ▪ Litigation taking more program resources
  ▪ Municipal governments being asked to pay for programs with no clear pathway to the ‘goal’
True Source Control

• ↓ Potential Pollutants
  - Reduce the number potential pollutants – Green chemistry (DTSC), Design with nature
  - If you make it, you take care of it (Cradle-to-cradle) – Product stewardship (CPSC), Extended Producer Responsibility (EPR) (CIWMB)
An Example of Source Control

- Brake pads are the single largest source for copper in highly urbanized watersheds in California
- Potentially responsible for up to half of copper in highly urban areas
- Copper can be toxic to aquatic life
Brake Pad Partnership / SB 346

- 1993 – Copper in brakes first identified as significant source
- 1996 – Brake Pad Partnership forms
- 1996 – 2009 - R&D, Shared fact-finding, Consensus-based decision
- 2008 – Decision triggered → Reformulate brake pads to be low copper
- 2009 – Legislation introduced – SB 346
Green Chemistry – Part of the Answer

• Wikipedia defines green chemistry as:
  ▪ “A philosophy of chemical research and engineering that encourages the design of products and processes that minimize the use and generation of hazardous substances. Green chemistry seeks to reduce and prevent pollution at its source. It aims to avoid problems before they happen.”
Call For Action

• The water quality problems we face are not primarily technical but rather political in nature
• There must be a societal change to affordably and sustainably improve surface water quality
• Regulation must be changed at the national level to recognize the fate of commercial chemicals in the environment
“Do not confuse motion with action”

-Ernest Hemmingway