

An Alternative Approach to Address the Chemicals of Emerging Concerns (CEC)

SWiMS-09 presentation
Chicago 2/11/2009

This presentation does not reflect EPA official position.

Presentation Outline

- Introduction
- Current framework
- An alternative approach
- Eagle Creek Watershed
- Conclusions

Introduction

- Many pharmaceuticals and other chemicals are introduced into the environment every year
- The environmental impact of most of these new chemicals are not fully understood, especially at low levels of concentration
- Many of these new & old chemicals are not routinely monitored or assessed

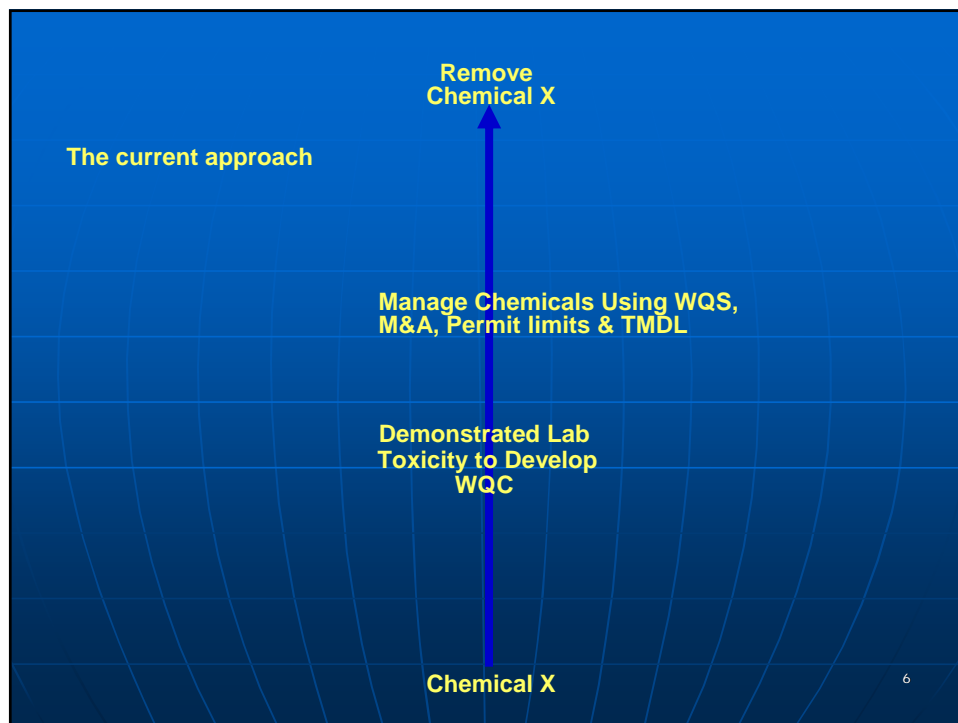
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Introduction

- Advances in science provides improved sensitivity in biological and chemical analysis
- The current environmental framework & regulations did not consider these emerging chemicals at such low levels of concentration
- Which chemicals should we monitor? see TICs
- Should we look at alternative approaches?

The Current Framework

- Uses one chemical toxicity effect from a laboratory to develop WQC
- Manages chemicals in the field using WQS, monitoring, Permits and TMDLs
- Does not address mixture effects and multiple sources at low concentrations
- Waits for a problem to be well defined before considering action
- Has limited options to address the issue e.g. chemical removal



The Alternative Approach

- Will provide a holistic framework to address the issue within the watershed
- Will focus on sensitive biological end points for source identification and management within the watershed

The Five Tools of the Alternative Approach

1. Sensitive biological end points
2. GIS watershed maps for the identification of potential sources
3. Prioritization of chemicals of interest
4. Improved chemical analysis methods
5. Targeted monitoring & assessments

Sensitive Biological End Points (SBEP):

- Identify molecular biological end points to detect functional groups
- Build a list of all available SBEP with their strengths and weaknesses
- Use appropriate SBEP to detect the effects and identify potential impacts
- Identify gaps in SBEP and promote filling it by stakeholder

GIS Watershed Maps for the Identification of Potential Sources

- Prioritize which watersheds to study for specific CEC impacts
- Use GIS maps to identify all potential point and non-point sources
- Identify specific areas within the watershed for analysis/study

Prioritization of Chemicals of Interest

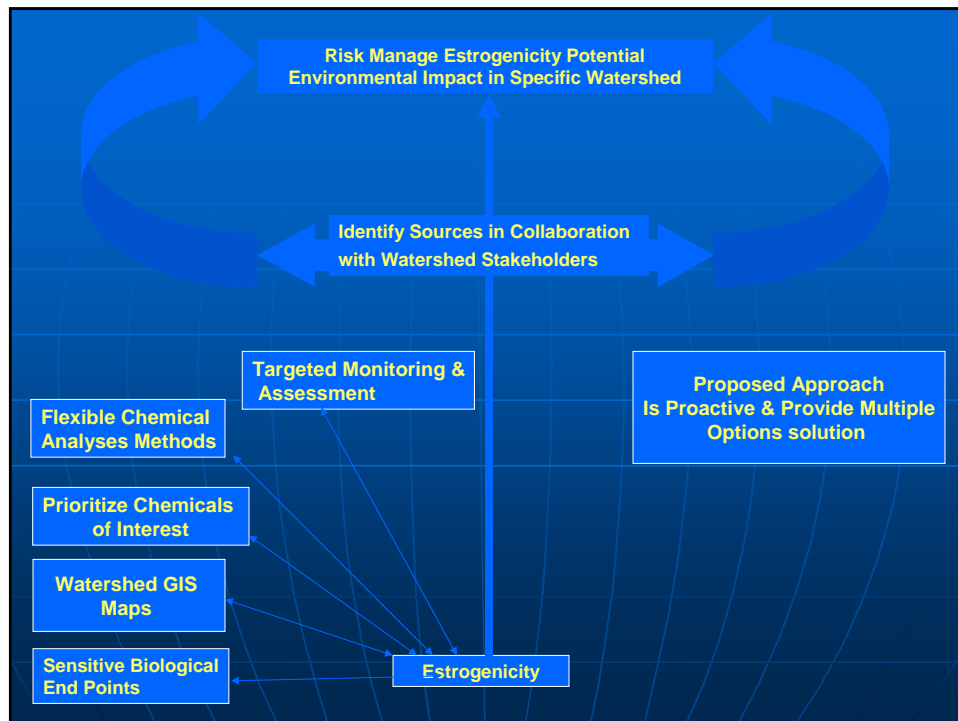
- Identify and prioritize potential chemicals and their active ingredients within the watershed
- For each chemical, identify the biological end points that may be used to detect its potential impacts

Flexible Chemical Analysis Methods (AM)

- Use collected information to identify chemical compounds and organize them by functional groups
- Identify which available AM to use
- Identify gaps and promote filling it by stakeholder

Targeted Monitoring & Assessment

- Obtain stakeholder involvement
- Identify the areas of concern using the other 4 tools within the watershed
- Identify specific questions to answer and select sampling locations
- Identify potential CEC sources



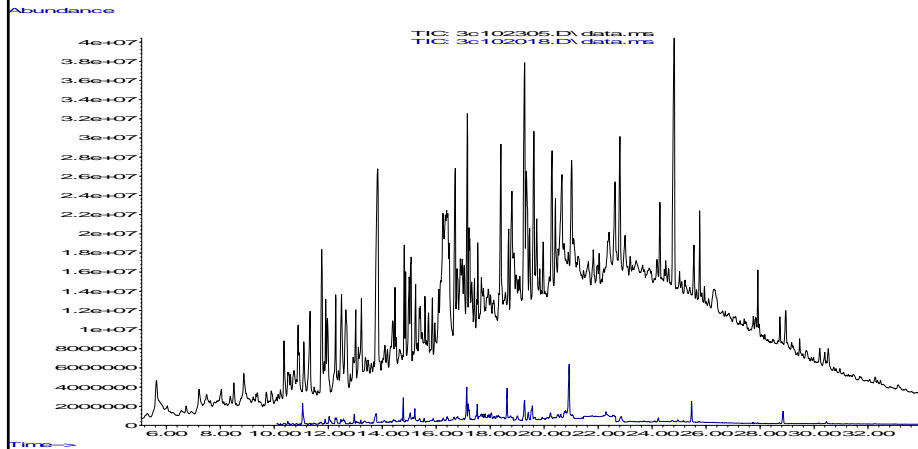
Eagle Creek Watershed (ECW)

- We selected ECW to test concept
- ORD (Jim & David) decided the SBEP
- IUPUI (Lenore) help in selecting sites
- ECW group did sampling and SBEP
- ORD & CRL did chemical analyses
- The other presentations

ECW Chemical Analyses results

- CRL analysed for APEs and did not find any above reporting limits of the five compounds. (APEs = NP, NP1EO, NP2EO, OP & BPA)
- Jim asked if we can estimate ECW caged fish exposure amount?
- We did a rough estimate using the Tentatively Identified Compounds (TICs) analyses.

TICs on the top and APEs on bottom
for sample # ECW-4D



Concentration Rough Estimate

- TICs = 600 ug/L (PPB)
- Sample = 30 ug/L
- 5 Standards = 10 ug/l

TICs Observations

- The fish were exposed to a rough estimated concentration of >500 ug/l
- This estimate represent the acid fraction only
- The fish are exposed to more chemicals if we include the based and neutral fractions, higher molecular weight chemicals, inorganic, and others.

Conclusions

- The initial results indicate that we can use the alternative approach to identify potential sources that causes Estrogenicity in the ECW
- We need to optimize and develop the five tools, share findings and plan on the next steps

U.S. EPA's *PPCPs* Web Site:

<http://www.epa.gov/PPCP>

White Paper:
**"Aquatic Life Criteria for
Contaminants of Emerging Concern:
General Challenges and Recommendations"**

<http://www.epa.gov/waterscience/criteria/aqlife/cec.html>



Questions feel free to contact:

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Definitions

- WQC: Water Quality Criteria
- WQS: Water Quality Standard
- TMDL: Total Maximum Daily Load
- CEC: Chemicals of Emerging Concern
- APEs: NP, NP1EO, NP2EO, OP & BPA
- TICs : Tentatively Identified Compounds