Consortium for Research and Education on Emerging Contaminants (CREEC) Meeting

April 10, 2008
Denver, Colorado

Project Team
Carol E. Lyons, Executive Director, Institute for Environmental Solutions (IES)
Kristen Bertuglia, Senior Research Associate, IES
Andrew Britton, IES Project Intern
Justin Guay, IES Project Intern
Casey Laycock, Institute Associate
Brenda D. Jones, IES Project Intern

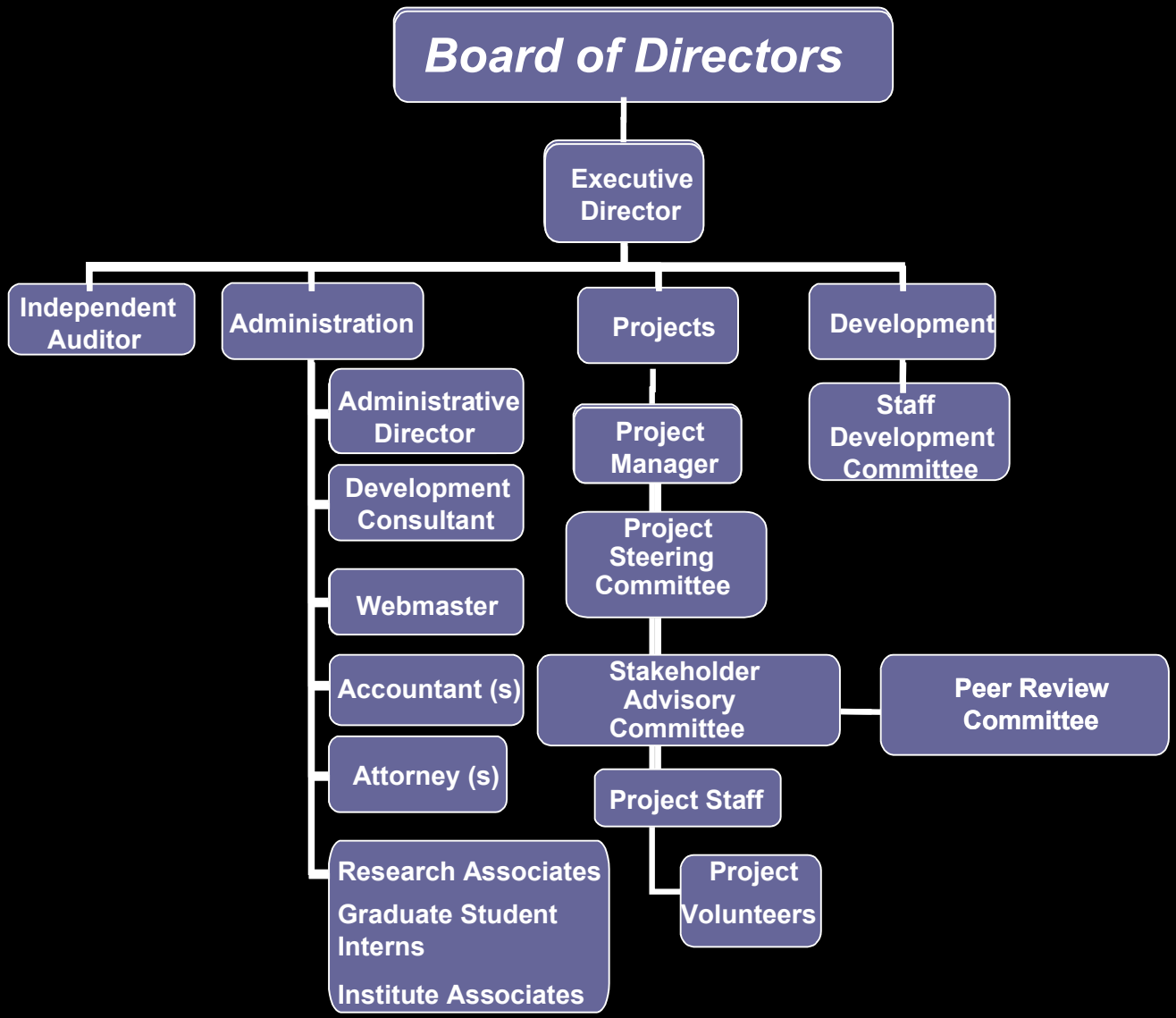
Institute for Environmental Solutions

An innovative approach to solving environmental problems, based on independent scientific analysis and stakeholder involvement

Mission:

- To deliver proactive technically sound solutions to complex environmental and natural resource problems - without unwanted side effects.

Institute for Environmental Solutions



Why IES?

Traditional, problem-solving approaches have limited effectiveness.

Need for IES

Examples:

- Montana Wood Smoke Study
- Denver Brown Cloud Study

Science provides accurate solutions free of emotion or bias with broad stakeholder involvement and independent and objective analysis.

How? - The IES approach

1. Assess the situation
   - Existing air pollution issue (wood smoke=PM pollution)
   - Financial (low-income)
   - 80% of homes heated with wood
2. Develop strategies
   - Collaborate with community, industry
   - Research, testing, assessment (e.g. covering wood piles)
3. Implementation
   - Montana – County passed regulation
4. Success – pollution reduced 90%

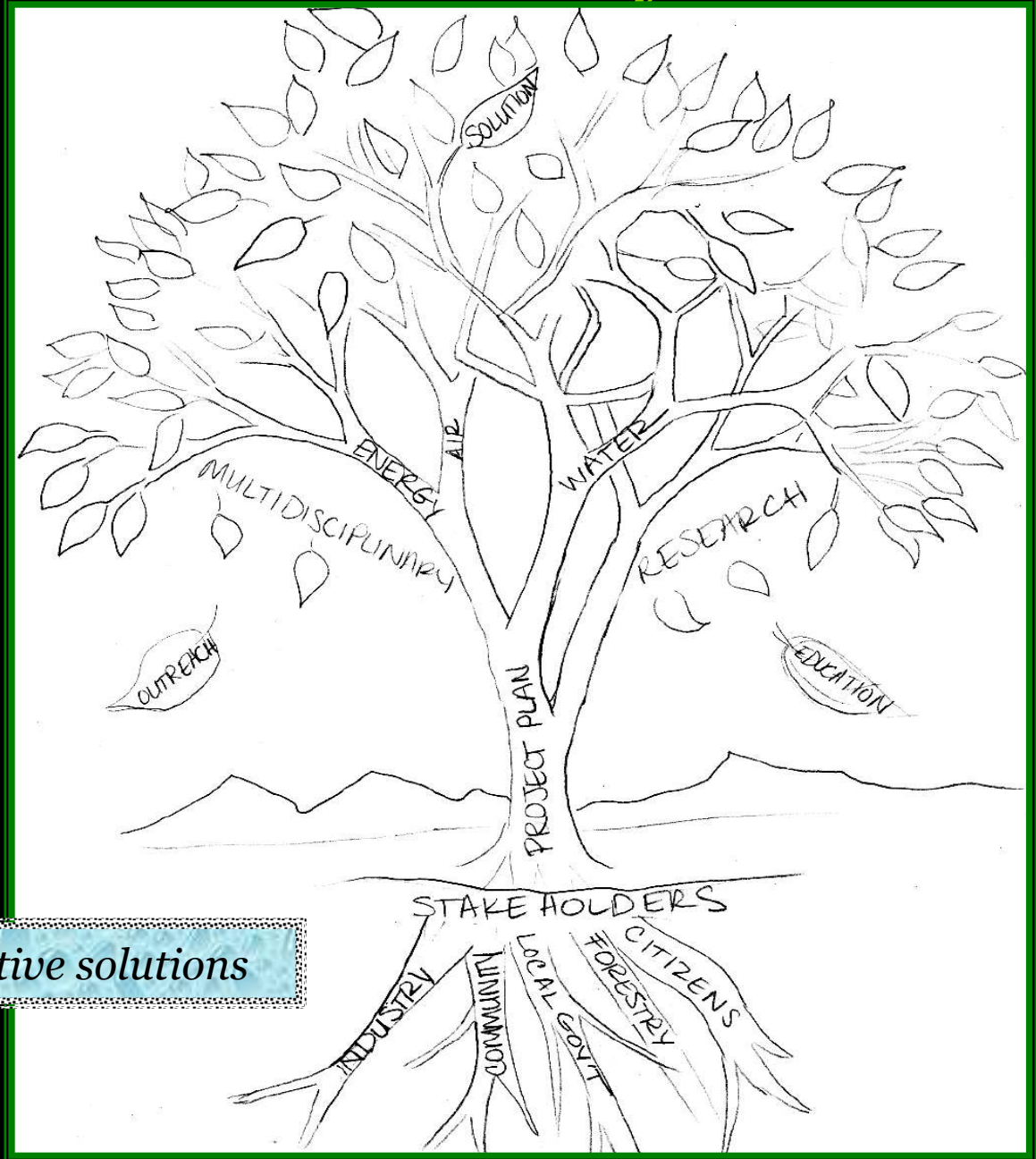
Key elements:

- *Stakeholder involvement*
  - *Uniting businesses, government, academia and communities*
- *Scientific integrity*
  - *Independent*
  - *Transparent*
  - *Multidisciplinary*

Emerging Contaminants Policy Issues

IES = link between science and policy

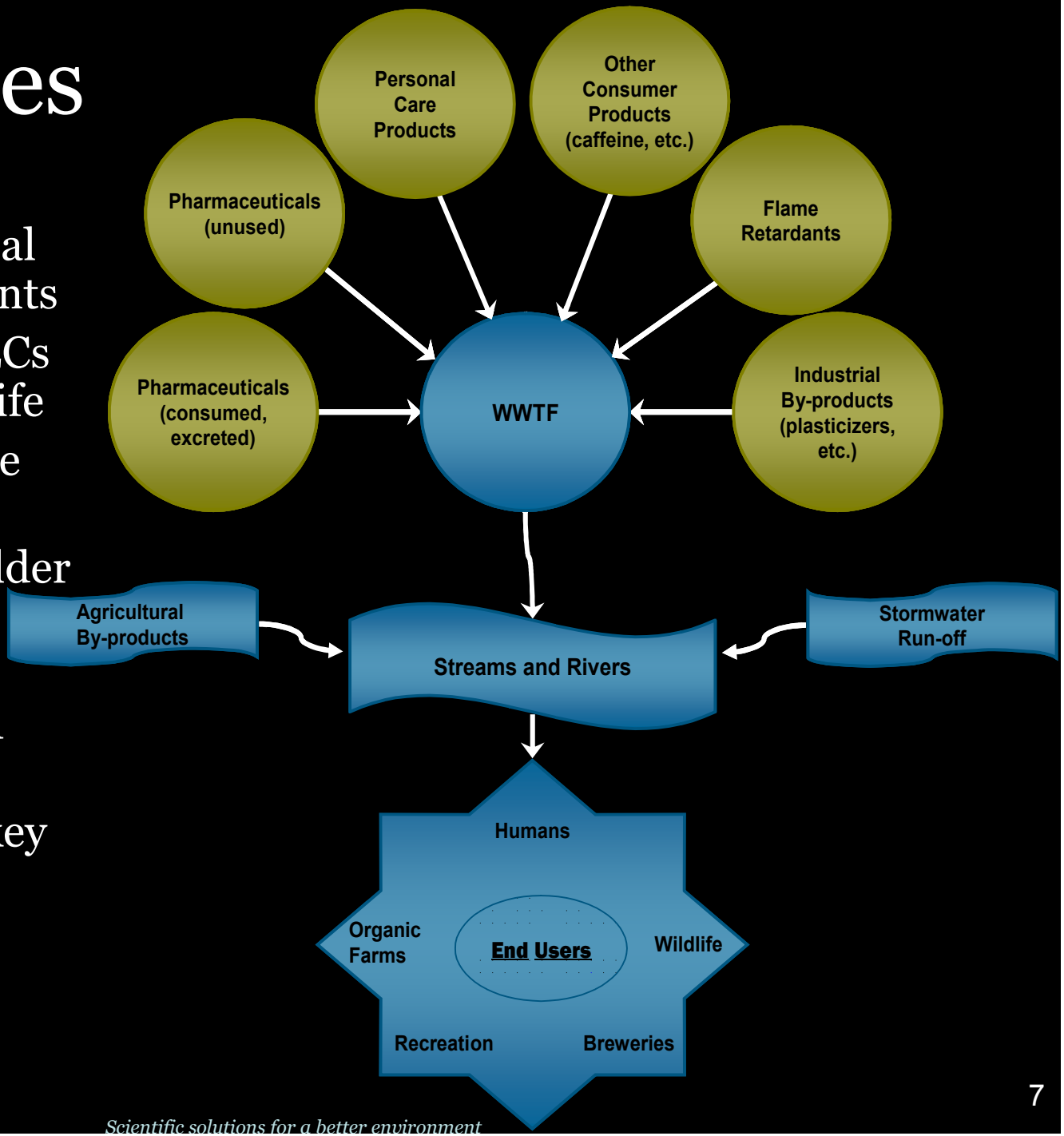
- Objective, science-based
- Stakeholder involvement is key



Science grows effective solutions

EC Issues

- Hundreds of potential chemical contaminants
- Complex effects of ECs on human and wildlife
- Difficult to link cause and effect
- Everyone is stakeholder
- Effective pollution reduction strategies need to be identified and tested
- Prevention may be key



Emerging Contaminants – Linking Science to Effective Action

EMERGING CONTAMINANTS

PROJECT MISSION

The mission of the IES EC Project is to determine the relative source contributions to EC levels in waterways, and effective prevention and mitigation strategies. IES is committed to sound science, not advocacy or policy-making.

EC Project Objectives

- Engage stakeholders.
- Implement pilot research and evaluation programs to determine: pollutants and relative pollutant sources.
- Research and evaluate potential pollution prevention and mitigation strategies.
- Education and outreach.

Project Plan

Phase 1 – Planning and Background

Stakeholder involvement

- Project committees
- Project design

Background technical, regulatory, and community information

- Existing research, policy information
- Technical guidebook
- Accessible web-based information

Project Plan

Phase 2 – Initial assessment of pollution sources

- **Pilot program**

1) Develop Pilot community-based program
   a) Pilot PPCP mitigation program with measurements
      - Partially funded by the Laura Jane Musser Fund
   b) Initial assessment of source contribution
   c) Evaluate existing and proposed policies and programs, (cost-benefit)
   d) Determine effective disposal and pollution prevention strategies

Phase 3 – Linking science to effective action

- **Education and outreach**
  - Design effective approaches to educate stakeholder groups
  - Best Practices information for the Front Range
  - EC public education
  - Science-based policy recommendations

Stakeholder Involvement

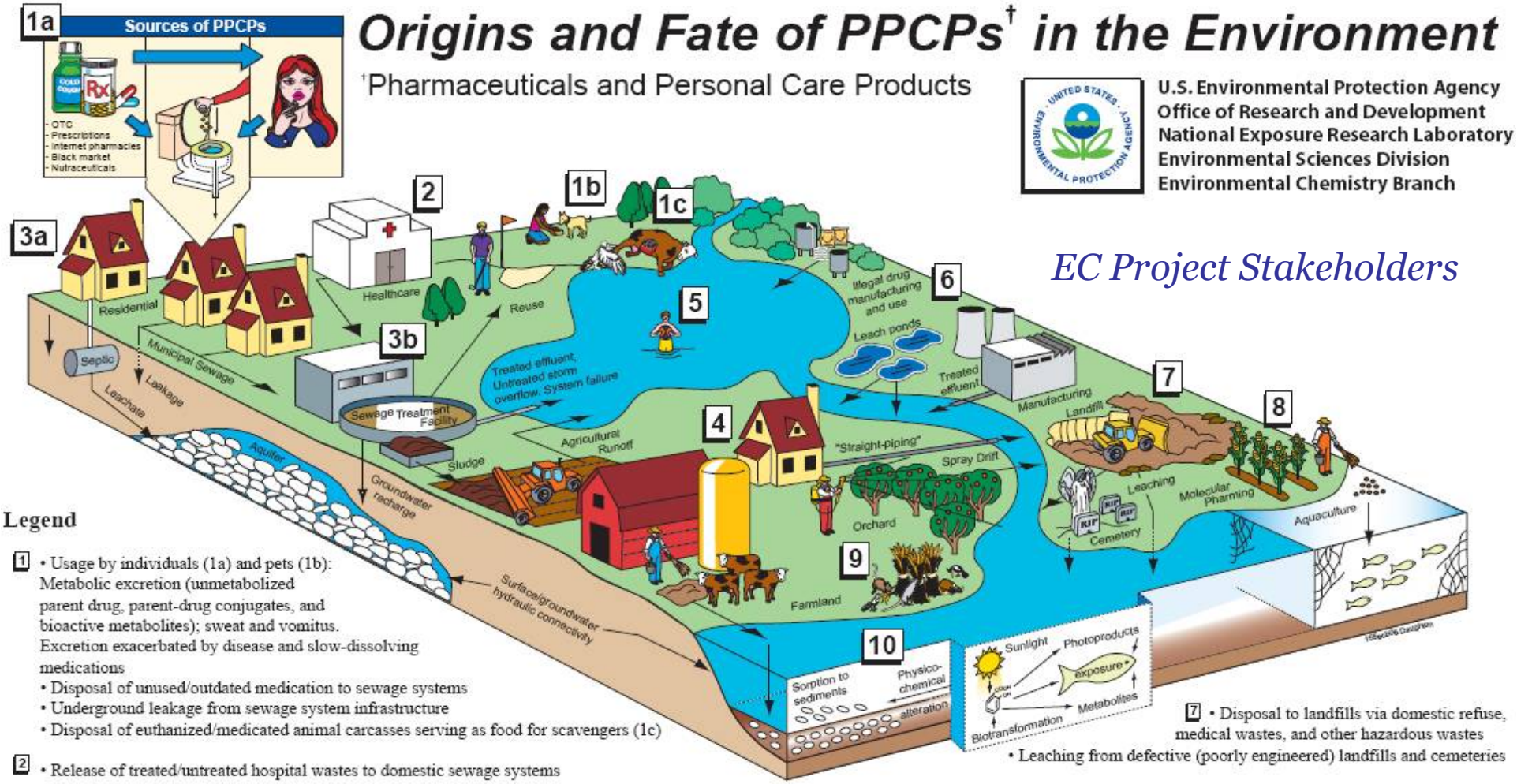
- Steering Committee (every other month)
  - Project Board of Directors
  - Technical approach
  - Project goals, design
  - Funding
- Peer Review Committee (virtual)
  - Technical review
- Stakeholder Advisory Committee (quarterly)
  - Review and advise project
  - Expand stakeholder base
    - Guidebook
    - Direct contacts

Origins and Fate of PPCPs† in the Environment

†Pharmaceuticals and Personal Care Products

U.S. Environmental Protection Agency
Office of Research and Development
National Exposure Research Laboratory
Environmental Sciences Division
Environmental Chemistry Branch

EC Project Stakeholders



Legend

1 • Usage by individuals (1a) and pets (1b): Metabolic excretion (unmetabolized parent drug, parent-drug conjugates, and bioactive metabolites); sweat and vomitus. Excretion exacerbated by disease and slow-dissolving medications
• Disposal of unused/outdated medication to sewage systems
• Underground leakage from sewage system infrastructure
• Disposal of euthanized/medicated animal carcasses serving as food for scavengers (1c)

2 • Release of treated/untreated hospital wastes to domestic sewage systems (weighted toward acutely toxic drugs and diagnostic agents, as opposed to long-term medications); also disposal by pharmacies, physicians, humanitarian drug surplus

3 • Release to private septic/leach fields (3a)
• Treated effluent from domestic sewage treatment plants discharged to surface waters, re-injected into aquifers (recharge), recycled/reused (irrigation or domestic uses) (3b)
• Overflow of untreated sewage from storm events and system failures directly to surface waters (3b)

4 • Transfer of sewage solids ("biosolids") to land (e.g., soil amendment/fertilization)
• "Straight-piping" from homes (untreated sewage discharged directly to surface waters)
• Release from agriculture: spray drift from tree crops (e.g., antibiotics)
• Dung from medicated domestic animals (e.g., feed) - CAFOs (confined animal feeding operations)

5 • Direct release to open waters via washing/bathing/swimming

6 • Discharge of regulated/controlled industrial manufacturing waste streams
• Disposal/release from clandestine drug labs and illicit drug usage

7 • Disposal to landfills via domestic refuse, medical wastes, and other hazardous wastes
• Leaching from defective (poorly engineered) landfills and cemeteries

8 • Release to open waters from aquaculture (medicated feed and resulting excreta)
• Future potential for release from molecular pharming (production of therapeutics in crops)

9 • Release of drugs that serve double duty as pest control agents:
examples: 4-aminopyridine, experimental multiple sclerosis drug → used as avicide; warfarin, anticoagulant → rat poison; azacholesterol, antilipidemics → avian/rodent reproductive inhibitors; certain antibiotics → used for orchard pathogens; acetaminophen, analgesic → brown tree snake control; caffeine, stimulant → *coqui* frog control

10 Ultimate environmental transport/fate:
• most PPCPs eventually transported from terrestrial domain to aqueous domain
• phototransformation (both direct and indirect reactions via UV light)
• physicochemical alteration, degradation, and ultimate mineralization
• volatilization (mainly certain anesthetics, fragrances)
• some uptake by plants
• respirable particulates containing sorbed drugs (e.g., medicated-feed dusts)

Stakeholder Involvement

Background Research / EC Guidebook

Sources of emerging contaminants
- Pharmaceuticals
- Personal care products
- Household products
- Agriculture

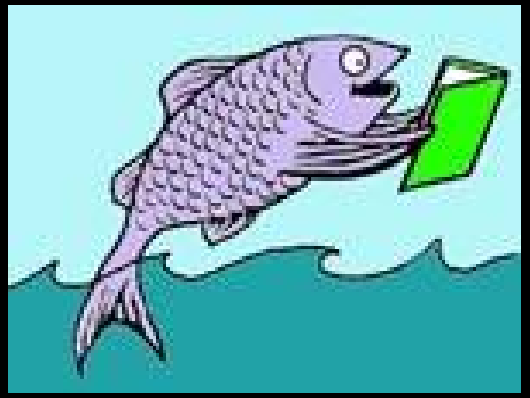
Origin, transport, groundwater, surface water

Water treatment
- Wastewater treatment
- Drinking water
- In situ
- Alternative

Effects of ECs
- Human health
- Wildlife
- Ecology

Mitigation
- Including drug take-back programs, prevention, disposal

Policy



Next Steps

Phase 1 Objectives

– Planning and Background

- Stakeholder involvement
- Background technical, regulatory, and community information

Phase 2 Objectives

– Initial Assessment of Pollution Sources

- Pilot program

EMERGING CONTAMINANTS

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

761 Newport Street • Denver, Colorado • 80220-5554

THE TREE PROJECT
ENERGY • WATER • AIR

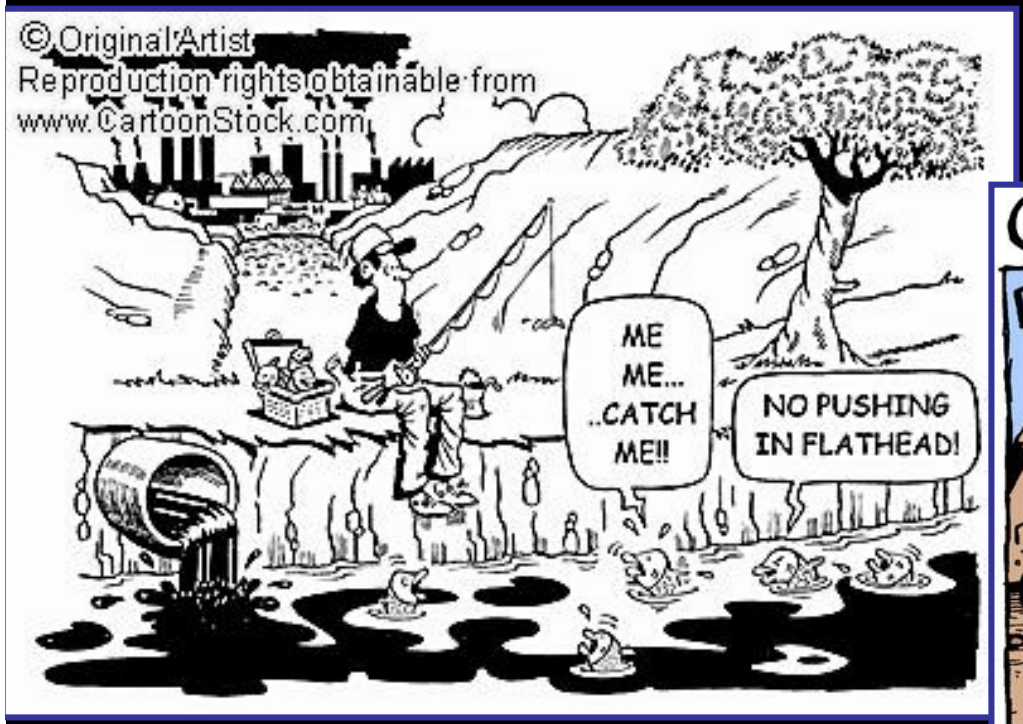
Please contact us!

www.instituteforenvironmentalsolutions.org

Carol E. Lyons, carol@i4es.org

Kristen Bertuglia, kristen@i4es.org

Discussion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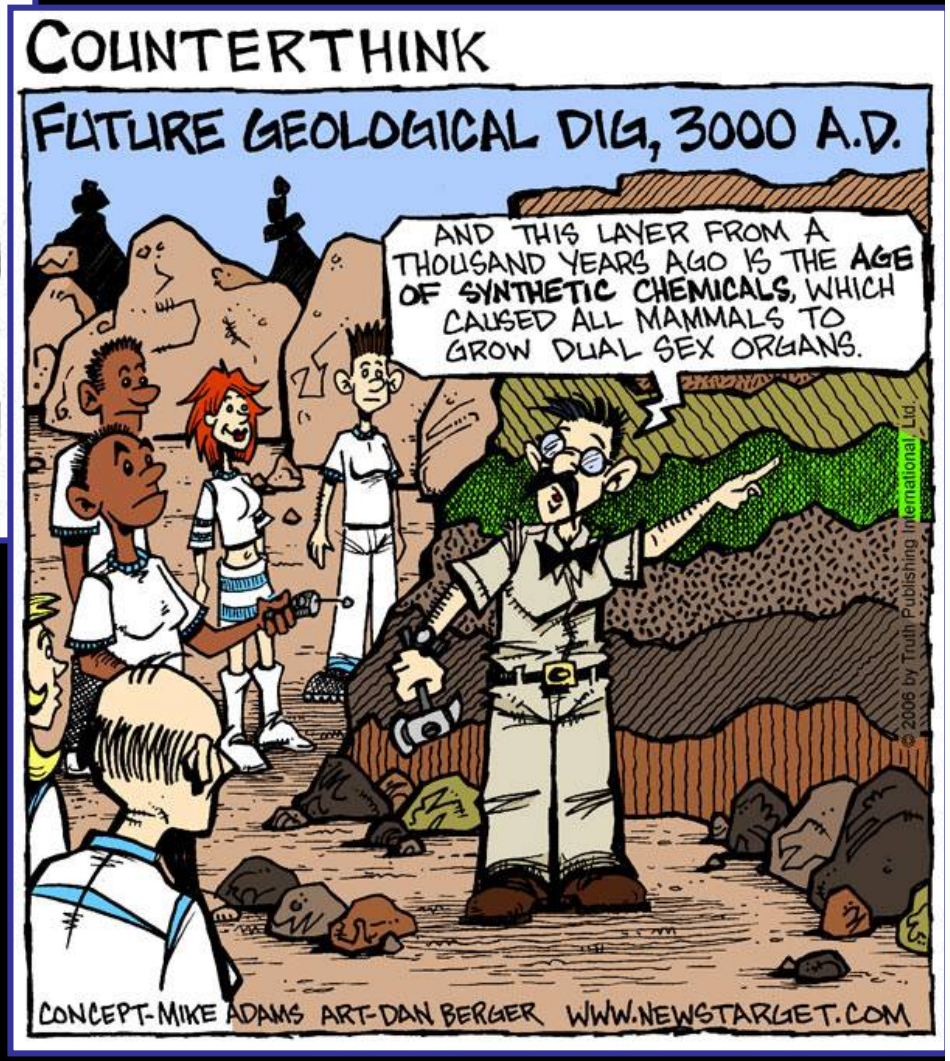
ME ME... ..CATCH ME!!
NO PUSHING IN FLATHEAD!


COUNTERTHINK
FUTURE GEOLOGICAL DIG, 3000 A.D.
AND THIS LAYER FROM A THOUSAND YEARS AGO IS THE AGE OF SYNTHETIC CHEMICALS, WHICH CAUSED ALL MAMMALS TO GROW DUAL SEX ORGANS.
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CONCEPT-MIKE ADAMS ART-DAN BERGER WWW.NEWSTARGET.COM

Stakeholder Involvement Benefits

What's in it for you?

- By helping to develop the project design, you have a say in:
  - How, when, where contaminants are evaluated
  - Pollution mitigation and prevention strategies
  - Cost effectiveness to your stake
  - Education and outreach methods
  - Best management practices recommendations
  - Policy development
  - Future potential regulatory action

Pilot Project Timeline

Timeline:

- **April 2008-May 2008**: Gather information of existing take-back programs around the country for use in Boulder County.
- **May 2008 – June 2009**: Assemble stakeholder group and maintain network (3 workshops). Stakeholder List; Take-Back Program Action Plan.
- **July 2008 – September 2009**: Community meetings for public review of action plan (3 town meetings). Introduce public education and outreach program. Finalize Consensus-based Implementation Plan for the Pharmaceutical Take-Back Program .
- **October 2008 – November 2009**: Collect pre-implementation water quality samples of local wastewater.
- **December 2008**: Preparation of Pharmaceutical Take-Back Program.
- **January 2009**: Execution of the Pharmaceutical Take-Back Program. Surveys conducted during take-back program for the collection of data on types of pharmaceuticals (to identify largest potential source contributors). Proper disposal of pharmaceuticals collected.
- **February-March 2009**: Collection of post-implementation water quality samples from local wastewater.
- **April-May 2009:** Compilation and analysis of sampling results and review of surveys.
- **June 2009:** Public release of information collected.
- **July 2009**: Project evaluation. Deliverable: Final Report.