

**CONTAMINANTS OF EMERGING CONCERN (CECS) &  
PHARMACEUTICALS AND PERSONAL CARE  
PRODUCTS (PPCPS)**

**REGULATORY AND RESEARCH UPDATE**

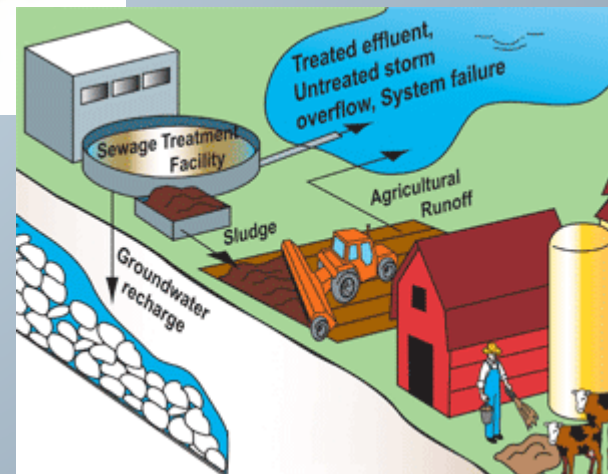
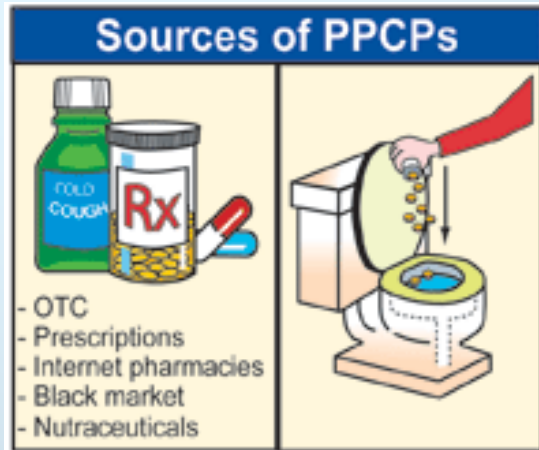
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S&ME, Inc.

SESSION NN

July 7-10, 2015

29<sup>th</sup> Annual Environmental Permitting  
Summer School





# CATEGORIES

- Prescription and OTC Therapeutic Drugs
- Cosmetics
- Steroids & Hormones (EDCs)
- Sunscreen Products
- Veterinary Drugs
- Nutraceuticals (e.g. vitamins)
- Fragrances

# OVERVIEW

PPCPs represent a vast group of compounds manufactured in large quantities that are frequently used by humans (and domesticated animals) worldwide and are not commonly monitored for or regulated.

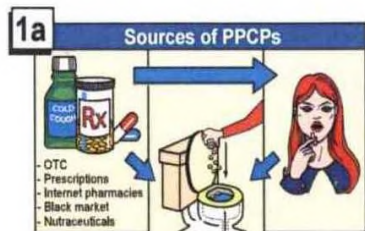
# OVERVIEW

Ongoing research is focused on the environmental impacts of these compounds, including research on the prioritization of compounds of greatest concern, the development of better detection and analytical methodologies, removal technologies; management and disposal, source characterization, and human health and ecological impacts.



# SOURCES OF PPCPS

- Human activity
- Residues from hospitals
- Illicit drugs
- Residues from pharmaceutical manufacturing
- Veterinary drug use, especially antibiotics and steroids
- Agribusiness

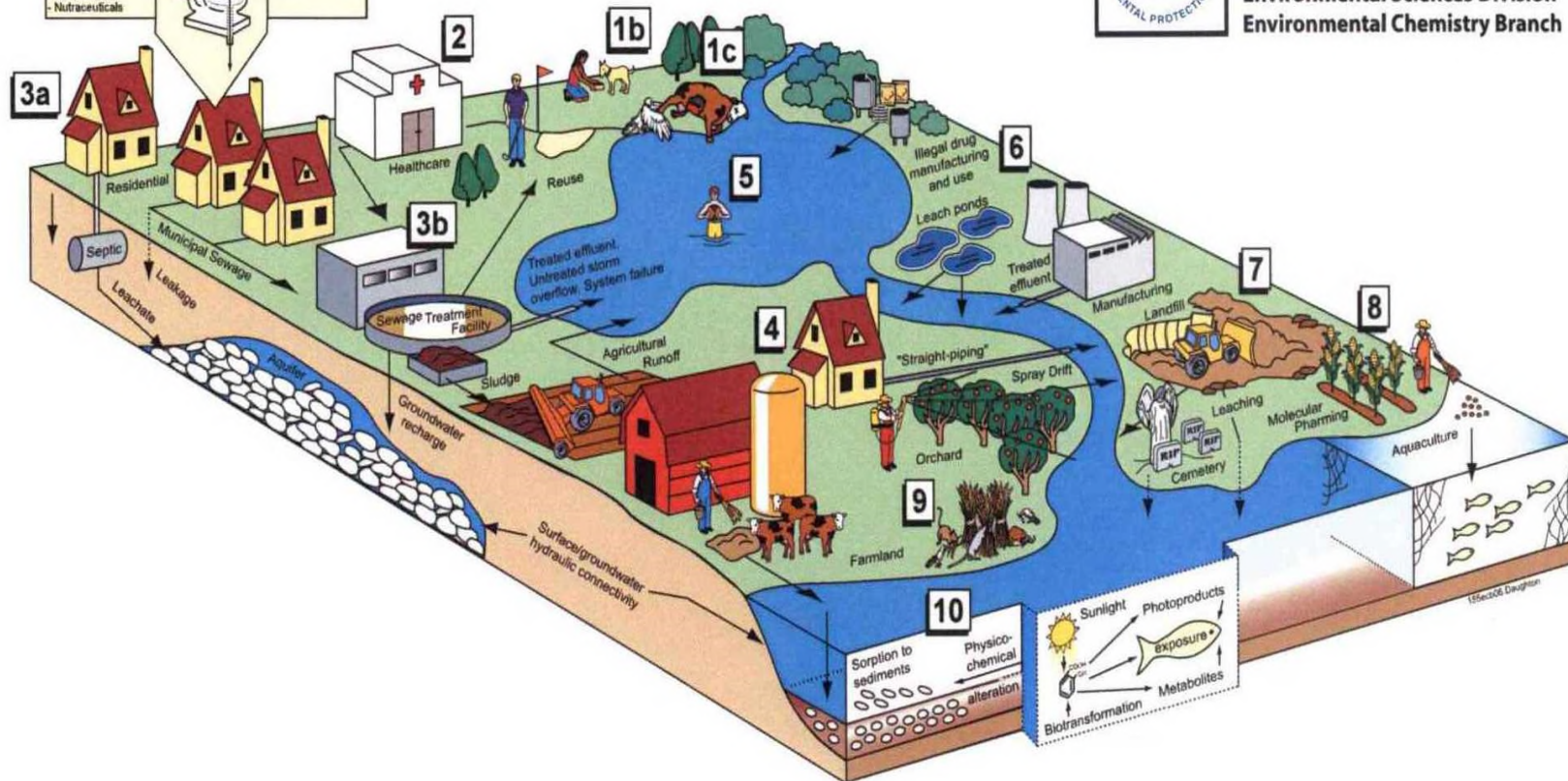


# Origins and Fate of PPCPs<sup>†</sup> in the Environment

<sup>†</sup>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



# Very low concentrations – ppb & ppt

## **1 Part Per Billion (ppb):**

- 1 inch to 16,000 miles
- 1 second to 32 years
- 1 cent to \$10 million
- 1 pinch of salt to 10 tons of potato chips

## **1 Part Per Trillion (ppt):**

- 1 inch to 16 million miles (A six-inch leap on a journey to the Sun)
- 1 second in 320 centuries
- 1 cent to \$10 billion
- 1 pinch of salt to 10,000 tons of potato chips





# HOW PPCPs ENTER THE ENVIRONMENT

- Largely from sewage treatment plants
- Fish farms
- Stormwater runoff
- Recreational activities
- Leaking landfills

# 2013-2014 RESEARCH SUMMARY

- Great Lakes -  $<1/2$  PPCPs removed by WWTPs.
- Coral reefs impacted by compound used in soaps, laundry detergent and cosmetics.
- Human fertility problems.
- Turtle feminization.
- Columbia River impacted by PPCPs.
- Direct link between WWTPs and feminized fish.

# 2013-2014 REGULATORY SUMMARY

- EPA develops guidelines to phase out some antibiotics used as livestock growth enhancer.
- WHO guidelines regarding cancer drugs and hospital & health insurance companies responsibilities.
- Minnesota bans triclosan in anti-bacterial soap – effective 1/1/17.
- Lawsuit settled in New Hampshire with Omnicare regarding pharmaceutical waste.



# RECENT RESEARCH BPA (EDC)

- 1/12/15 – BPA alternative (BPS) disrupts normal brain cell growth – tied to hyper-anxiety. Low doses more harmful than high doses (study Zebra fish).
- 1/22/15 – BPA affects fertility in males – low sperm counts and rising rates of testicular cancer. Changes are to stem cells (humans).
- 6/3/15 – EWG surveyed 252 canned food products. A little more than half reported using BPA in all of their products

# RECENT RESEARCH

- 3/7/15 – Canadian study using animal models showed autistic features associated with prenatal exposure to EDCs, in particular fire retardants and phthalates.
- 9/17/14 – 18 different flame retardants detected in household laundry wastewater. They accumulate on clothing.
- 3/29/15 – a Texas Tech study showed DNA from antibiotic resistant bacteria in cattle feedlots is airborne.

# RECENT RESEARCH

- 3/24/15 – Fish exposed to EDCs pass adverse reproductive effects to their offspring for up to three generations.
- 10/25/14 – Congaree National Park, South Carolina. Formerly pristine waters now have detected metformin, estrogens and epilepsy-treatment drugs.
- 6/3/15 – Remote Minnesota lakes: 73% of lakes have xray contrast compounds, also antibiotics & BPA. Next phase of study will be air and rain samples to try to determine sources.



# TREATMENT

- 5/13/15 – Microbes that clean water may stitch together pharmaceuticals. Two drugs tested for at a Wisconsin WWTP showed higher concentrations in the effluent than before treatment.
- 6/19/15 – A new treatment technology using hydrogen peroxide and catalysts removes most estrogenic compounds.
- A new WWTP to be completed in Regina Saskatchewan in December 2016 will improve the reduction of PPCPs by 80% to 95%. It will use a biological nutrient removal system.

# REGULATORY UPDATES

- 9/3/14 – California 9<sup>th</sup> Circuit Court of Appeals decision requires drug manufacturers to share in the cost of drug disposal in Alameda County.
- June 2015 – Pending legislation in Rhode Island to provide chemo-therapy drug safety – in part it will hold drug manufacturers responsible for the collection and disposal of cytotoxins.
- 3/8/15 – Dairy farmers have been found to be using antibiotics that are not detected by routine tests – drugs that are not meant for dairy cows.





# RECENT NEWS/TECHNOLOGY

- 4/30/15 – A study was published that showed women apply an average of 168 chemicals to their face and body every day. Many are harmless. The Environmental Working Group has produced an App that can be used to evaluate many products.



EWG = Environmental Working Group



# QUESTIONS AND MORE INFORMATION

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