Pharmaceuticals: A Wastewater Perspective

Jen Jackson
East Bay Municipal Utility District
Environmental Services Division
jacksonj@ebmud.com
Overview

- Background
- Why should POTWs care?
- Bay Area collection efforts
- In pursuit of a long-term solution
- Coming soon?
Background

“Emerging” contaminants

- Synthetic or naturally occurring chemicals or microorganisms
- Not commonly monitored in the environment
- Potential to enter the environment and cause known or suspected adverse ecological and/or human health effects
- May be new chemicals OR
- Release may have occurred for a long time, but only recently recognized as a potential problem OR
- New use of existing chemicals
**Background (continued)**

Examples of emerging contaminants

- Pharmaceuticals
- Personal care products
- Antibacterial compounds
- Pesticides
- Flame retardants
- Surfactants
- Plasticizers
Background (continued)

- 17alpha Ethynyl Estradiol (16%)
  - Median concentration 73 ng/l
  - Effects at as low as 1 ng/l
  - Feminization of male fish
- Acetaminophen (24%)
- Steroids and hormones (16%)
- Diltiazem (blood pressure medication) (13%)
- Codeine (11%)
- Antibiotics and antimicrobials (10%)
- Ibuprofen (10%)
Why should POTWs Care?

- Major “source” of pharmaceuticals in surface waters
- Better detection limits
- Less tolerance for risk

Phillips et al 2005
Why should POTWs Care? (continued)

- Increasing attention to emerging contaminants, particularly pharmaceuticals
  - Media
  - Public
  - Non-governmental organizations

- Potential impacts to organisms at low concentrations
  - Persistence in the environment
  - Bioaccumulation
  - Chronic toxicity
  - Endocrine disruption

- Future regulation?
**Bay Area Pilot Projects**

**Palo Alto**
- Drop-bins at senior facilities
- Acceptance at HHW facility

**EBMUD**
- Partnered with Save The Bay
- One-day events with thermometer exchanges

**Marin County**
- Drop-bins at pharmacies

---

**Don’t Medicate Your Bay!**

**When & Where:**
- **Weekly Drop-Offs**
  - Every Thursday, 8:30am – 5:30pm
  - 2525 Old Bay Area Blvd, SF, 94129

**Weekly Drop-Offs & Events**
- For a **FREE** digital thermometer, you can bring your expired medicines that are:
  - OTC medicines
  - Prescription medicines
  - Herbal products

---

**Thermometer Exchange & Expired Medicine Drop-off**

Exchange your glass mercury thermometer for a **FREE** digital thermometer! Dispose of unused medicine properly - not down the drain!

**When & Where:**
- **Weekly Drop-Offs**
  - Every Thursday, 8:30am – 5:30pm
  - 2525 Old Bay Area Blvd, SF, 94129

---

**Save The Bay**

www.savebay.org

---

**Save the Bay**

www.ebmud.com
Local Pilot Projects (continued)

Lessons learned

- DEA regulations
  - Controlled medication
- No regional disposal message
  - HHW
    - Funding concerns
    - Controlled substances
  - Bay Area solid waste agencies do not want pharmaceuticals in garbage
    - Liability if garbage is sorted at landfill
    - Leachate
Regional Safe Medicine Disposal Days
May 13-21, 2006

- Week of disposal events throughout the region
- Regional coordination through Bay Area Pollution Prevention Group (BAPPG)
- Regional partnership with Walgreens
- Regional information sharing
- Publicity and media outreach coordinated regionally
Regional Safe Medicine Disposal
Days May 13-21, 2006

Objectives
- Build public awareness
- Provide disposal alternative
- Build agency capacity
- Conduct “by the book” events
  - Pharmacists segregate controlled substances
  - Police handle and destroy controlled substances
- Full accounting of costs
  - Staff/pharmacist/police time
  - Advertising/outreach
  - Printing
- Collect participant survey data

Days May 13-21, 2006

Provide disposal alternative

Police handle and destroy controlled substances

Full accounting of costs

Collect participant survey data
Regional Safe Medicine Disposal Days
May 13-21, 2006

- 19 agencies and organizations participated
- 38 collection events regionally in 1 week
- Extensive publicity
  - Dedicated website (www.BayWise.org)
  - Regional phone hotline
  - >215,000 direct mailings
  - >30,000 flyers distributed
  - 320 transit ads
  - Radio PSAs
  - Email listservs
  - Community calendars
  - 65 newspaper ads in local and regional papers

38 collection events regionally in 1 week
19 agencies and organizations participated
Extensive publicity
- Dedicated website (www.BayWise.org)
- Regional phone hotline
- >215,000 direct mailings
- >30,000 flyers distributed
- 320 transit ads
- Radio PSAs
- Email listservs
- Community calendars
- 65 newspaper ads in local and regional papers
Regional Safe Medicine Disposal Days
May 13-21, 2006

Results

- 3,685 pounds collected in one week
  - 9% controlled substances (median)

- Extensive media
  - 5 press events
  - 10 newspaper articles
  - 4 radio interviews
  - 5 TV stations covered events

- Some agencies continuing programs

Some agencies continuing programs
Regional Safe Medicine Disposal Days
May 13-21, 2006

Survey results

- Previous disposal methods
  - 45% garbage
  - 28% toilet
- 74% stored medicine more than 1 year
Regional Safe Medicine Disposal Days
May 13-21, 2006

Lessons learned

💧 One-time events “by the (DEA) book” are costly
  • Staff time - 1,980 staff hours from 19 agencies
  • Pharmacist time expensive
  • Police involvement extremely difficult

💧 But demand for proper disposal is high – need non-event based solution
In pursuit of a long-term solution...

Working with DEA on long-term solution since May 2006

- Events with pharmacist and police = OK
- Bins at pharmacies handled by law enforcement = OK
- Pharmacy-based program without police (if collecting controlled substances) = NO
- Mail-back program to law enforcement = OK
- Mail-back program to reverse distributor = ?

December 2006

- BAPPG crafted pilot mail-back proposal to DEA & USPS with reverse distributor as mailer recipient

Next steps:

- Explore partnership with CA Bureau of Narcotics Enforcement
In pursuit of a long-term solution (continued)

- New collections in San Mateo County police stations
  - Mailbox style collection bins
  - Removal by hazardous waste hauler
- Expansion of non-controlled bins in Marin County & East San Francisco Bay
- Passage of SB 966 – a first step
Coming soon…?

- More bins at pharmacies and select locations for non-controlled medicine
- Mailers for controlled medicine
- All-in-one bins at select police stations within EBMUD wastewater service area
- Continued one-time events until long-term solutions in place, & to kick off new sites
Acknowledgements

- Bay Area Pollution Prevention Group
- Karin North, City of Palo Alto
- Save The Bay
- Teleosis Institute Green Pharmacy Program