US EPA Pretreatment Webcast Series

POTWs and the Dental Mercury Discharges

Tuesday, June 9, 2009

Guide to Our Webcasts

For Technical Support click the "Help" button

- To Ask a Question - Type your question in the text box located in the lower left-hand corner of your screen and click on the "Submit Question" button
- To Answer a Poll Question – Click on the radio button to the left of your choice and click submit. Do not type your answer in the "Ask a Question" box
- To See Closed Captioning – Turn your pop-up blocker off and click on the "closed captioning" button
- To Complete the Survey – Turn off your pop-up blocker

Topics for Today's Discussion

- National Pretreatment Program Issues, Controlling Mercury
- History and Content of the Memorandum of Understanding on Reducing Dental Amalgam Discharges
- EPA Region 1 Perspective Dental Amalgam Separator

National Pretreatment Program Issues

Controlling Mercury

Jan Marie Pickrel
National Pretreatment Coordinator
U.S. Environmental Protection Agency
Office of Water/Office of Wastewater Management

Pretreatment Program

- Purpose is to Control “Indirect” Discharges to Sewer
- Wide variety of industry
- Program Objective is to Prevent:
  - Interference
  - Pass-Through
  - Sludge Contamination

40 CFR Part 403 Highlights

- 403.3 – Definitions, including SIU
  - Categorical
  - 25,000 gpd
  - 5% hydraulic/organic load
  - Potential to cause plant harm
- 403.5 – Prohibited Discharges
- 403.6 – Categorical Standards
  - Prohibition of dilution as treatment
  - Combined wastestream formula

National EPA POCs

Arsenic	Lead	Silver
Cadmium	**Mercury**	Zinc
Chromium	Molybdenum	BOD_5
Copper	Nickel	TSS
Cyanide	Selenium	Ammonia

Why is Mercury a Concern ?

- Toxicity concerns for humans and wildlife
  - “Persistent Bioaccumulative Toxic” chemical
- Fish Consumption Advisories:
  - As of 2006, >880,000 river miles under fish consumption advisories.

Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion

- Published January 2009 http://epa.gov/waterscience/criteria/methylmercury/pdf/guidance-final.pdf

- What's a POTW To Do?
  - Monitoring Techniques
  - Pollutant Minimization Plans
  - Case Study Summaries

Potential Mercury Sources to POTWs

- Categorical Standards regulating Mercury in the discharges:
  - 40 CFR 415 – Inorganic Chemical Manufacturing
  - 40 CFR 421 – Nonferrous Metals Manufacturing
  - 40 CFR 423 – Steam Electric Power Generation
  - 40 CFR 435 – Oil & Gas Extraction
  - 40 CFR 437 – Centralized Waste Treatment
  - 40 CFR 440 – Ore Mining and Dressing
  - 40 CFR 442 – Transportation Equipment Cleaning
  - 40 CFR 461 – Battery Manufacturing

Potential Mercury Sources to POTWs (continued)

- **Medical: Hospitals, clinics, nursing homes, veterinarians**
- **Dental clinics**
- **Schools-Secondary**
- **Schools-Colleges/Technical, laboratories**
- **Other Uses, Sources:**
  - **Thermostats – HVAC, Wholesalers/Contractors, Retail stores**
  - **Automobile and appliance switches**
  - **Dairy manometers**

- Source: MERCURY POLLUTANT MINIMIZATION PROGRAM GUIDANCE U.S. EPA Region 5, NPDES Programs Branch, November 2004

http://www.epa.gov/region5/water/npdestek/mercury_pmp_nov_04_guidance.pdf

Industry Sector and Effluent Guidelines:

Health Services Industry Detailed Study: Dental Amalgam -- **EPA-821-R-08-014** , August 2008

http://www.epa.gov/waterscience/guide/304m/2008/hsi-dental-200809.pdf

Observations from the HSI Study:

- An ADA-funded study showed that approximately 50% of mercury entering POTWs is from dental offices (6.5 tons).
- Amalgam separators increase the amount of amalgam that is recycled (amalgam separators are at least 95% efficient).
- Use of amalgam separators generally results in reductions in POTW influent and biosolids mercury concentrations.
- Use of amalgam separators does not always result in reductions in POTW effluent since most amalgam particles are removed with biosolids (29-50% reduction in biosolids has been reported).
- Approximately 11 States and at least 20 local mandatory pretreatment programs require dental facilities to use amalgam separators.

Industry Sector and Effluent Guidelines:

Health Services Industry Detailed Study: Dental Amalgam -- **EPA-821-R-08-014** , August 2008

Observations from the HSI Study (cont.):

- At least 10 local voluntary pretreatment programs require dental facilities to us amalgam separators (success ranges from <10% to 100% with mandatory second phase).
- As of October 2007, the ADA recommends the use of amalgam separators as part of its best management practices.

Comments on Preliminary 2008 Plan:

- The ADA would be willing to form a partnership with EPA to implement a nationwide voluntary separator program.
- NACWA supports voluntary efforts to address mercury discharges and pharmaceutical discharges, does not believe establishing effluent guidelines is practical (~100,000 dischargers in the category)
- ELGs would not result in substantial water quality improvements according to NACWA.
- Most local programs are initiated due to high mercury levels in surrounding water systems or sensitive waterways.

Moving Forward...

- Four-Pronged Approach
- Strengthening the Science
- Improving Public Understanding
- Identifying Partnership and Stewardship Opportunities
- Using Regulatory Tools

Questions?

History and Content of the Memorandum of Understanding on Reducing Dental Amalgam Discharges

Damon M. Highsmith
U.S. Environmental Protection Agency
Office of Water, Office of Science and Technology

Topics

- Effluent Guidelines Program 304(m)
- Dental Amalgam and ADA BMPs
- Amalgam separators
- Goals and responsibilities under the MOU

Effluent Guidelines Program

- Technology-based regulations to control industrial wastewater discharges
- National Pretreatment Program
  - Controls for industrial and commercial facilities that discharge wastewater to sewage treatment plants.
    - Prohibited Discharge Standards
    - Industry-specific standards
    - Local limits
- Facilities must meet those limits to comply with Clean Water Act requirements.

Effluent Limitation Guidelines Planning Process

- Process through which EPA identifies existing regulation for revision or industries for new regulation.
- Draft plan is completed in odd years
  - Describes the methodology, data, and findings for odd year review
  - Identifies and prioritizes categories for additional study
  - Principally based on hazard (i.e., pounds of toxic pollutants)
  - Does not identify categories for rulemaking
  - Solicits public comment on this and next annual review and preliminary plan
- Final plan is published in even years
  - Describes the methodology, data, and findings for even year review
  - Selects categories for rulemaking, if appropriate
  - Solicits public comment on next annual review

Final 2008 Effluent Guidelines Program Plan

- Final plan did not identify Dental Sector for effluent guideline rulemaking.
- Industries who make significant progress through voluntary programs are lower priority.
- ADA expressed interest in working with EPA on a voluntary program in their comments on the preliminary plan.
- In 2007 ADA adopted use of amalgam separators as one of their Best Management Practices.
- EPA may review the decision not to initiate rulemaking in the future.

Dental Amalgam Facts

- Used to restore teeth in dental practices.
- May contain as much as 50% mercury.
- EPA estimates there are 160,000 dentists practicing in 120,000 offices.
- Almost all facilities discharge directly to POTWs.
- EPA estimates approximately 0.45 tons of amalgam related Hg are discharged to surface waters from POTWs.

ADA Best Management Practices

- Use precapsulated alloys and stock varied capsule sizes.
- Recycle used disposable amalgam capsules.
- Salvage, store, and recycle recovered amalgam.
- Recycle teeth containing amalgam restorations.

ADA Best Management Practices

- Manage amalgam waste through recycling as much as possible.
- Use line cleaners that minimize dissolution of amalgam.
- *Use chair-side traps, vacuum pump filters and amalgam separators to retain amalgam and recycle their contents.*

Amalgam separators

- Device designed to remove dental amalgam from dentist office wastewater.
- Separate from particle filters in the vacuum system.
- Stores amalgam in a removable container for recycling.
- Amalgam separators remove up to 95% of amalgam discharged
- Estimated annual cost for medium-sized practice range from $300 to $1,100.

Memorandum of Understanding

- Signed December 29, 2008 between EPA, ADA, NACWA
- Purpose is to promote use of ADA BMPs by dentists.
- Increase recycling of amalgam
- Reduce discharge of dental amalgam to wastewater through the use of amalgam separators

Responsibilities of Parties

- ADA
  - Promote BMPs
  - Provide interim and final reports
  - Provide outreach, implementation, and training resources to members of dental practices.
  - Additional meeting facilitation
- EPA
  - Promote benefits of adopting ADA BMPs
  - Submit data and comments for preparation of baseline and tracking reports
  - Recognition and outreach programs

Responsibilities of Parties (cont'd)

- NACWA
  - Encourage individual members to submit data on mandatory and voluntary programs.
  - Provide comments on interim and final reports.
  - Keep members apprised of methods for reducing amalgam discharges to POTWs.

Goals

- Increase the number of dental offices following ADA BMPs.
- Establish a baseline estimating current separator usage nationwide.
- To establish a tracking program to track progress in increasing separator usage.

Goals (cont'd)

- Within one year, all parties agree to establish interim numerical goals for increasing amalgam separator use.
- Direct outreach, promoting BMPs, to dental office employees who may be involved in separator usage, maintenance, and handling of amalgam wastes.

Potential Results

- An increase in the amount of amalgam that is recycled.
- Diversion of up to 3.7 tons of mercury each year from entering POTWs.
- Use of amalgam separators generally results in reductions in mercury in POTW influent and biosolids concentrations.

Questions?

EPA Region 1 Perspective Dental Amalgam Separator

Jay Pimpare
Pretreatment Coordinator
U.S. Environmental Protection Agency
New England

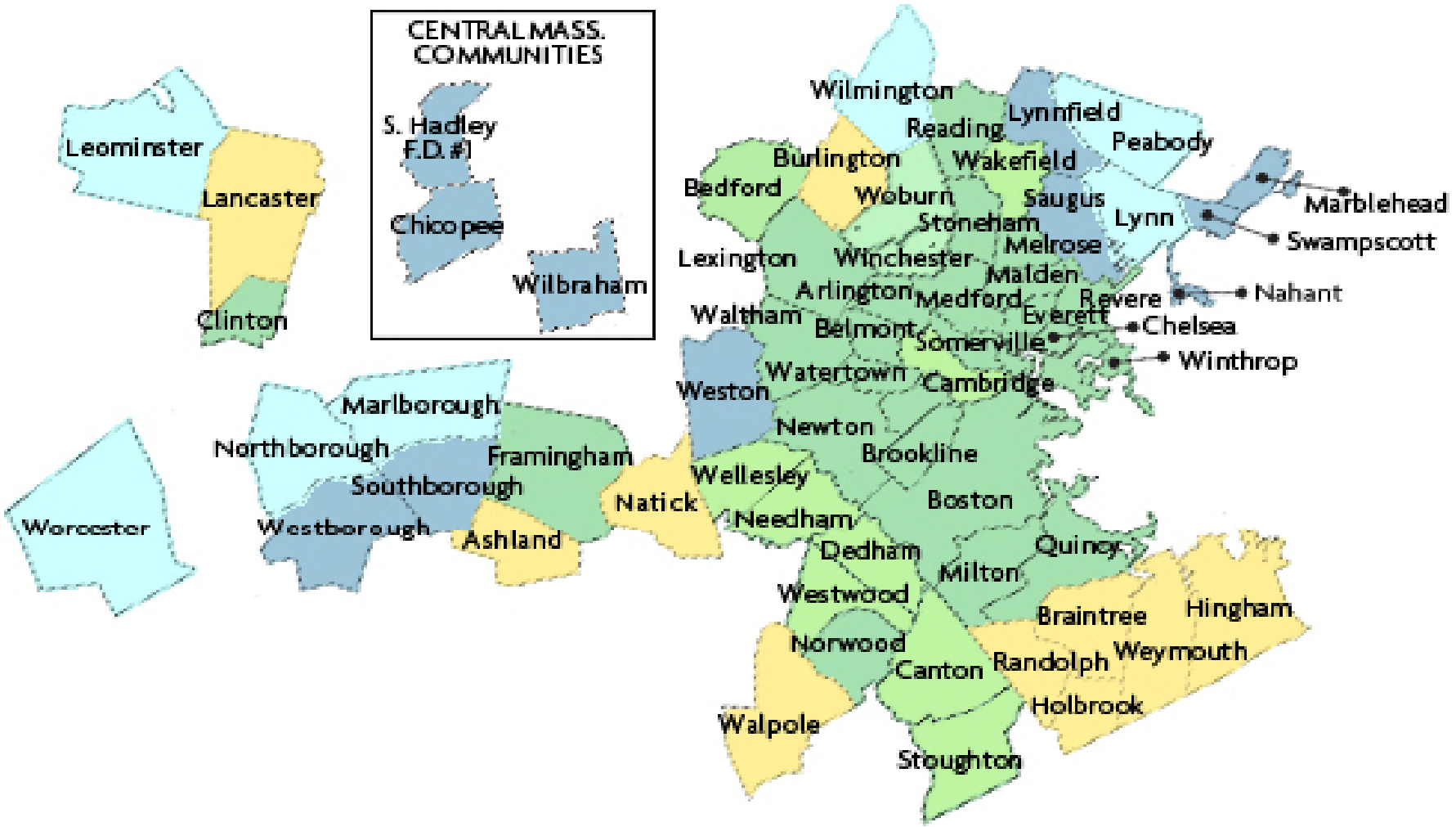
Overview

- Regional background
- Industrial pretreatment program and POTW mercury reduction
- State amalgam separator laws
- State and POTW studies
- Where do we go from here?

- April 1997— Great Lakes Basin Bi-National Toxics Strategy
  - Called for virtual elimination of mercury.
- One year later — The Regional Mercury Action Plan adopted .
  - Joint effort between New England Governors & Eastern Canadian Premiers
  - Goal of “virtual elimination of the discharge of mercury into the environment.”
- 1998 EPA Region 1 Mercury Reduction Plan
  - Launched mercury reduction efforts in the Northeast.

MWRA SERVICE AREA

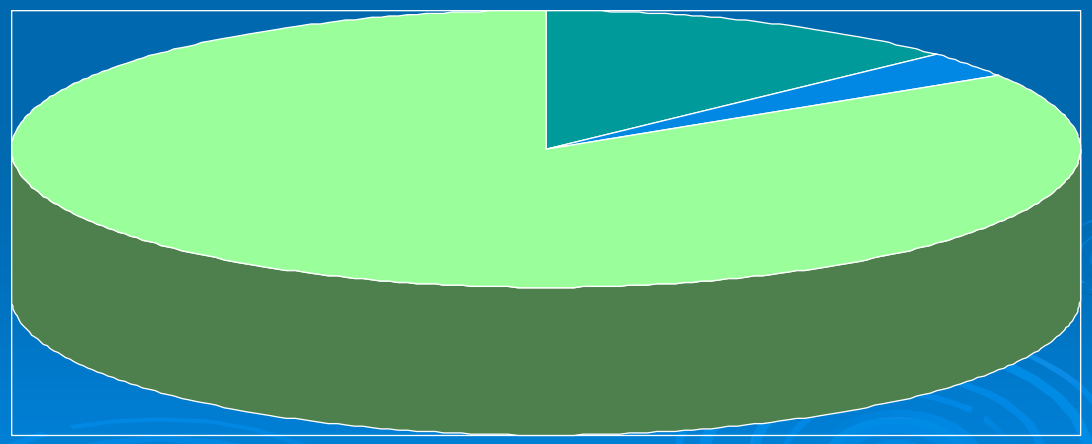
- Water only
- Sewer only
- Water and sewer
- Parital/emergency water only
- Full sewer, partial/emergency water only



MWRA

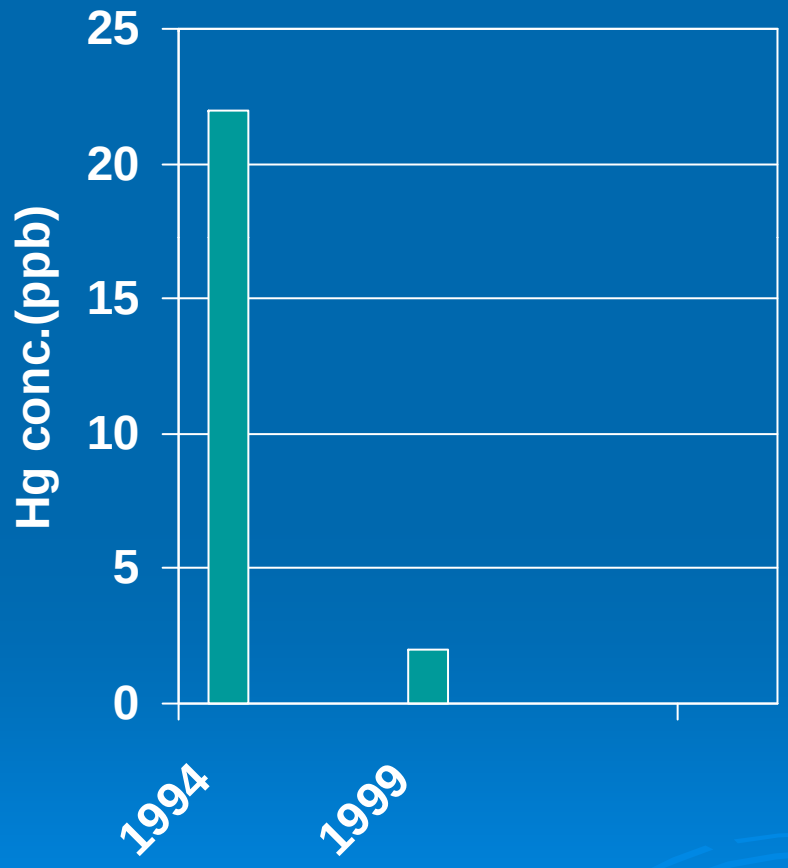
Massachusetts Water Resource Authority

- Adopted a prohibition on Mercury
- Enforces a local limit at 1 ppb
- ~ 350 MGD
- >250 SIUs



Hg Contributions

MWRA Hg Reductions



Average concentration from medical facilities

- 91% decrease over 5 year span.

2008 Enforcement Penalties

- Tufts New England Medical Center - $75K
- Tufts University – $95k
- Cambridge Health Alliance - $75k
- Brigham and Womens Hospital - $68k
- St. Elizabeth Medical Center - $148k

  Recent Penalties assessed
- Massachusetts General Hospital - $48k
- Forsyth Dental Institute - $77k

Region 1 Local Limits

* Region 1 average mercury local limit is 0.0368 mg/l or 36.8 ppb

* Without the 3 highest POTW values - regional average is 12 ppb

Narragansett Bay Case Study

- The Narragansett Bay Commission (NBC) has developed the following set of Environmental Best Management Practices (BMPs) for the Management of Waste Dental Amalgam to help the dental community safely and economically reduce the amount of mercury released into the environment.

www.narrabay.com/Documents/PDFs/NewDentalBMP.pdf

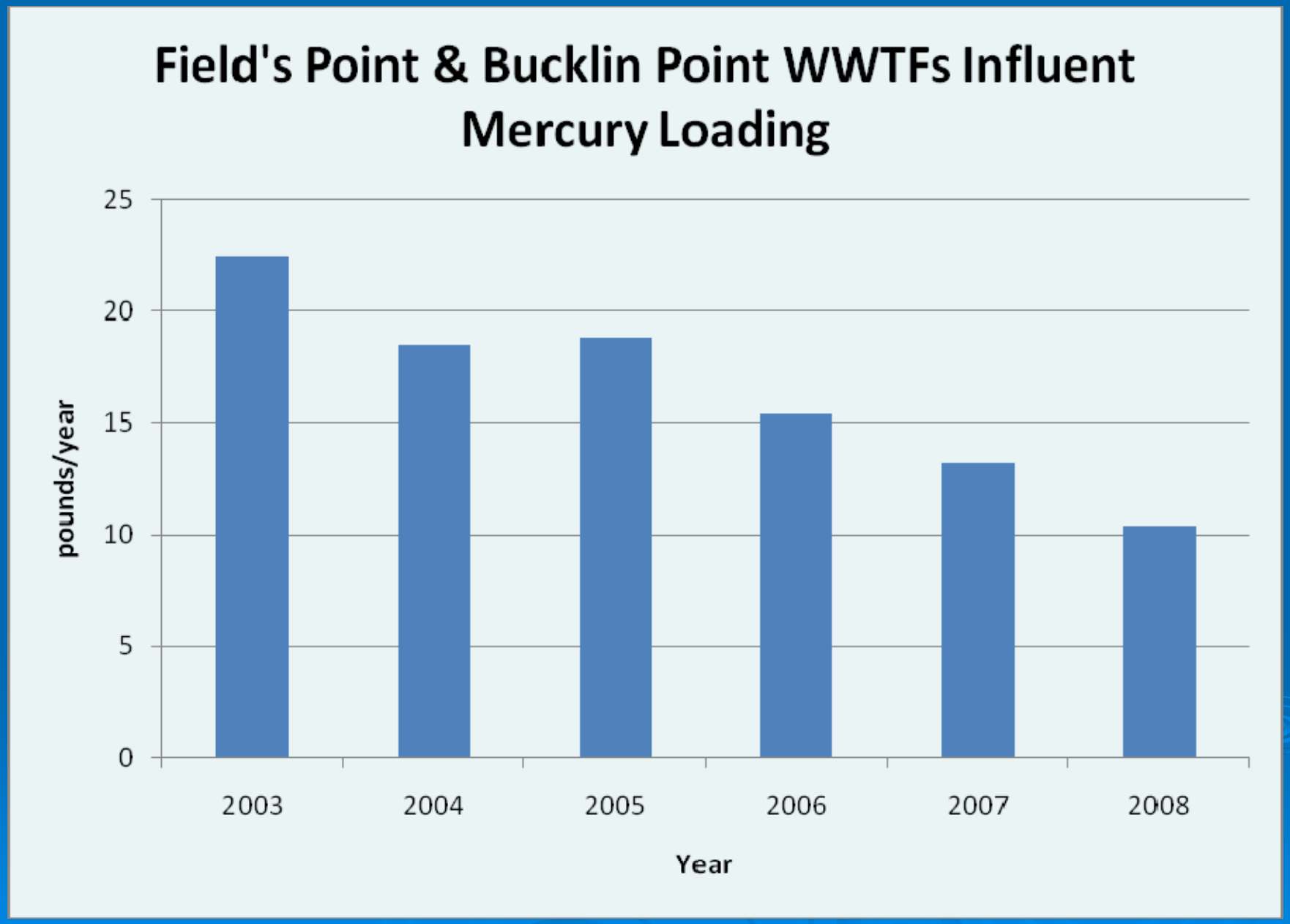
NBC Case Study

- Operates the two largest wastewater treatment plants in Rhode Island receiving wastewater from 10 cities and towns.
- ~1500 permitted users
- 2002: NBC began developing Dental BMP Program
- 2004: NBC began implementation of Dental BMP in cooperation with the Rhode Island Dental Association.
  - Require annual inspection since the implementation of the program
- 2004: 100% compliance with Dental BMP requirements
- 2007: Rhode Island passes state legislation requiring the installation of amalgam separators

NBC Options for Dentists

1. Install and maintain an amalgam separator
   - maintain efficiency of 99%
   - demonstrate compliance with the "Mandatory" BMPs.

2. Demonstrate continuous compliance with all applicable NBC discharges limits.


Field's Point & Bucklin Point WWTFs Influent Mercury Loading
25
20
15
10
5
0
pounds/year
2003
2004
2005
2006
2007
2008
Year

What is an Amalgam Separator?

- It is a solids collector!
  - Designed to capture solids so that they can be recycled and disposed of properly.
  - Captures mercury by default, not by design.
  - Designed to capture 99% of solids by weight not mercury
- Unit price from ~ $400 to ~ $1000

States Requiring Separators

- Connecticut
- Maine
- Massachusetts
- New Hampshire
- Oregon
- Rhode Island
- Vermont
- New York
- New Jersey
- Michigan

➢6 of those 10 States are located in Region 1

Region 1 State Regulations

- **Connecticut**
  http://www.dep.state.ct.us/wst/mercury/dental_bmp.htm
- **Massachusetts**
  http://www.mass.gov/dep/service/dentists.htm
- **Maine**
  http://www.state.me.us/dep/blwq/topic/amalgamseparator/dentist.htm
- **New Hampshire**
  http://www.des.state.nh.us/nhppp/dental/default.asp?link=leg
- **Rhode Island**
  http://www.rilin.state.ri.us/Billtext/BillText06/HouseText06/H7812Aaa.pdf
- **Vermont**
  http://www.anr.state.vt.us/dec/ead/mercury/dental/DentalSelfCertForm091206.doc

State Legislation

Massachusetts Case Study

- **http://www.mass.gov/dep/service/about08.htm**

- **Voluntary Amalgam Separator Incentive Program**
  - Dentists installing a separator unit before 3/1/05 granted exemption from fees, etc. until 2/1/10
  - If installation occurred after 3/1/05 but before 2/1/06, facility granted an additional one year or until 2/1/07 for the fees, upgrades, etc

- **This program was very successful. Over the 2-year voluntary compliance program (2004-2005), over 74% of MA dentists complied**.

Massachusetts Regulations

- http://mass.gov/dep/service/regulations/310cmr73.pdf

- **Regulations require dental practices and facilities to certify every 5 years to Massachusetts DRP:**
  - **Have installed an amalgam separator system that serves every dental chair in the practice or facility where waste amalgam is generated**
  - **Must demonstrate system operates at**
    - **95% efficiency (for units installed under the voluntary program, before 3/1/2005)**
    - **98% or more efficiency by ISO 11143 Test Protocol (for units installed after 3/1/2005)**

Massachusetts Compliance To Date

- 98% compliance with certification
- 97% compliance with installation
- 65 Dentists were issued $500 Reporting Penalty Assessment Notices
  - Failure to submit completed certification
  - Failure to confirm installation
  - Other related requirements

Massachusetts DEP Inspections

- 49 Randomly selected facilities
- 8-Page inspection form

Massachusetts DEP Inspection Results

- Right equipment:
  - 100% had the right sized equipment with the proper removal efficiency onsite
  - One facility that never had mercury amalgam onsite
- Equipment installation:
  - 98% had installed the separator (one facility did not)
- Proper maintenance:
  - 100% of those with the separator installed reported they were operating and maintaining the equipment properly
    - 71% maintained it themselves
    - 29% used a service provider

Massachusetts Waste Mercury Management (Facilities with Separators)

- Recycling
  - 100% said they were recycling at least some mercury
  - However later data indicates that not ALL mercury was being recycled
  - Some mercury waste was going to an approved recycling facility
- Use of approved recycling facility
  - 80% shipping at least SOME waste to approved facility
  - 9% not sending waste to approved facility
  - 11% sent to an unknown facility

Massachusetts POTW Results

- **Since 2004, mercury levels in sludge at the state's largest public POTW have decreased by about 48%.**
- **Reduction in environmental releases of mercury of about 136 pounds per year for this POTW alone**

Massachusetts Industrial User Pretreatment Limitations

- A mercury effluent limit of 1 part per billion on all industrial users went into effect on May 1, 2009.

Compliance by State

- Vermont – 100%
- Maine – 100%
- Massachusetts – 98%
- New Hampshire – 95%
- Connecticut – 84%
- Rhode Island - >90%

Region 1 Compliance

- >90% of all Region 1 dentists have certified they are compliance with the Rule
- Of all dentists required to install a separator ~95% have achieved that requirement

Where do we go from here?

Questions?

Contact Information

- Jan Marie Pickrel, National Pretreatment Coordinator
  US EPA, Office of Water, Office of Wastewater Management, Water Permits Division
  (202) 564-7904
  Fax: (202) 564-6431
  pickrel.jan@epa.gov

- Damon Highsmith
  US EPA, Office of Water, Office of Science and Technology, Engineering and Analysis Division
  (202) 566-2504
  Fax: 202-566-1053
  highsmith.damon@epa.gov

- Justin (Jay) Pimpare
  US EPA Region 1
  (617) 918-1531
  Fax: (617) 918-0531
  pimpare.justin@epa.gov