

Controlling Dental Mercury Waste at the Source

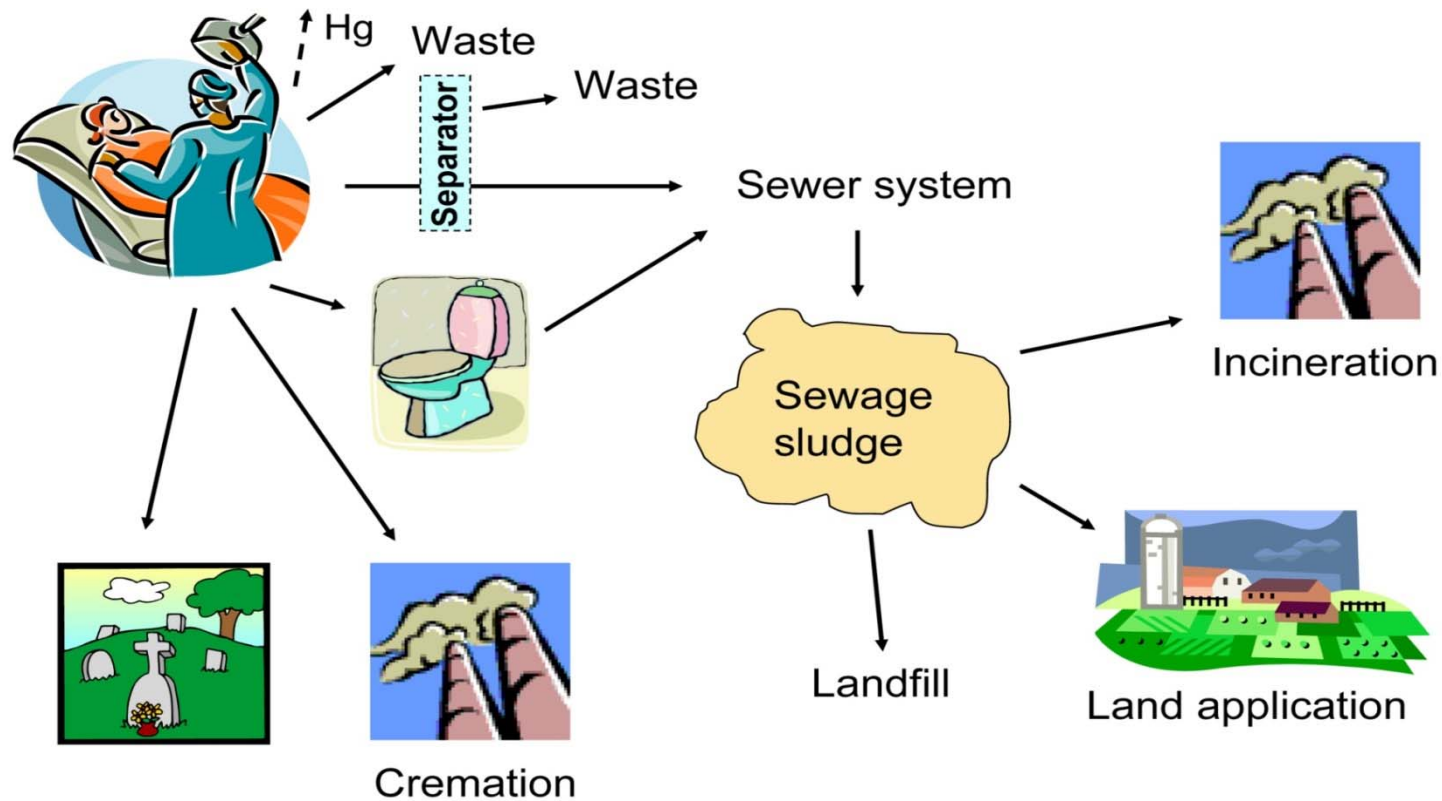
**Michael T. Bender, Director
Mercury Policy Project**

www.mercurypolicy.org

**2014 National Pretreatment
and
Pollution Prevention Workshop
Minneapolis, MN
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Dental Amalgam Releases to the Local & Global Mercury Environment



Slide Courtesy of Swedish Chemical Agency

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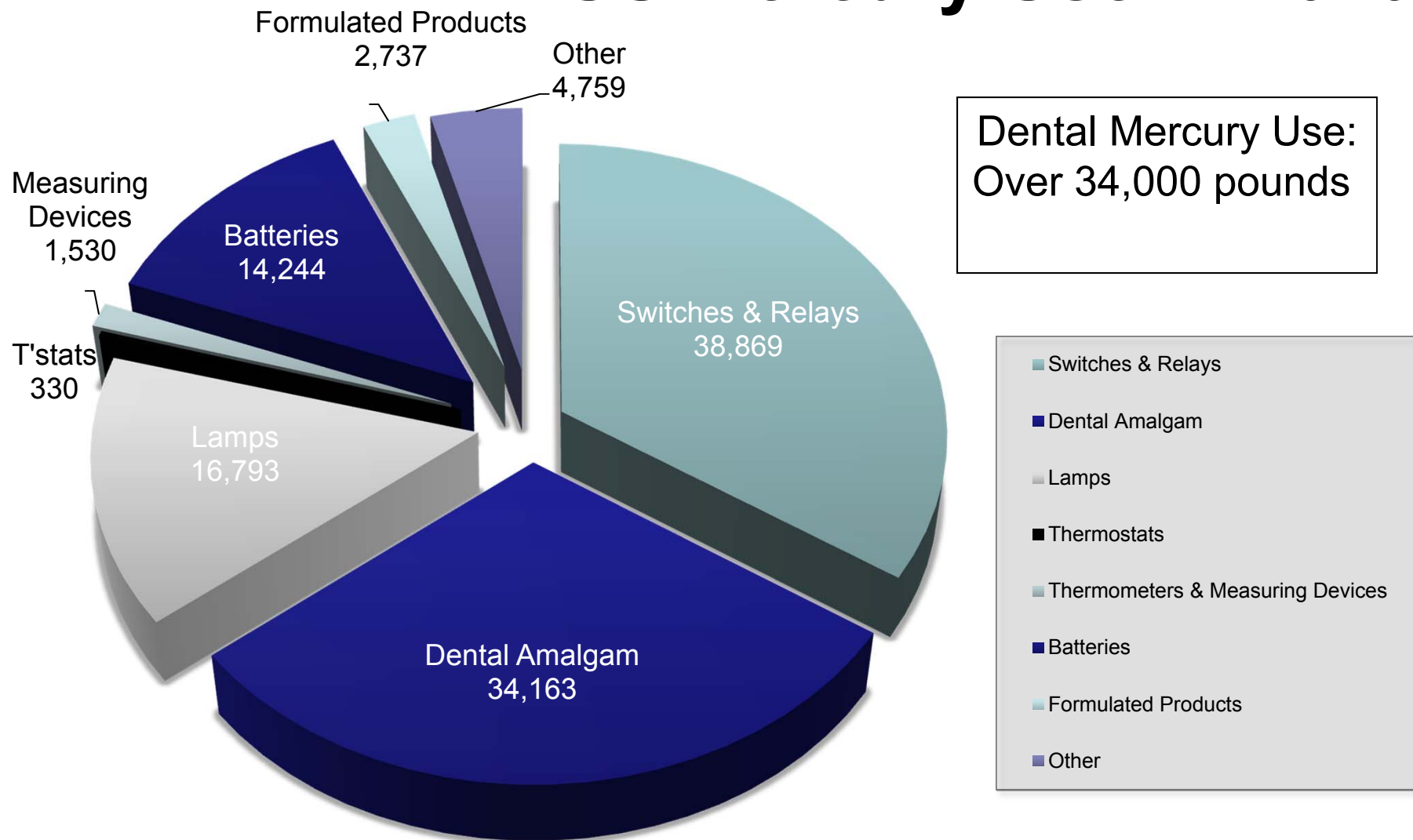
Major Annual Release Pathways of Dental Amalgam Globally

Major release/pathways	Mercury (metric tonnes/year)
Atmosphere	50-70
Surface water	35-45
Groundwater	20-25
Soil	75-100
Recycling of dental amalgam	40-50
Sequestered, secure disposal	40-50
Total	260-340

Source: UNEP 2010

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US Mercury Use In 2010

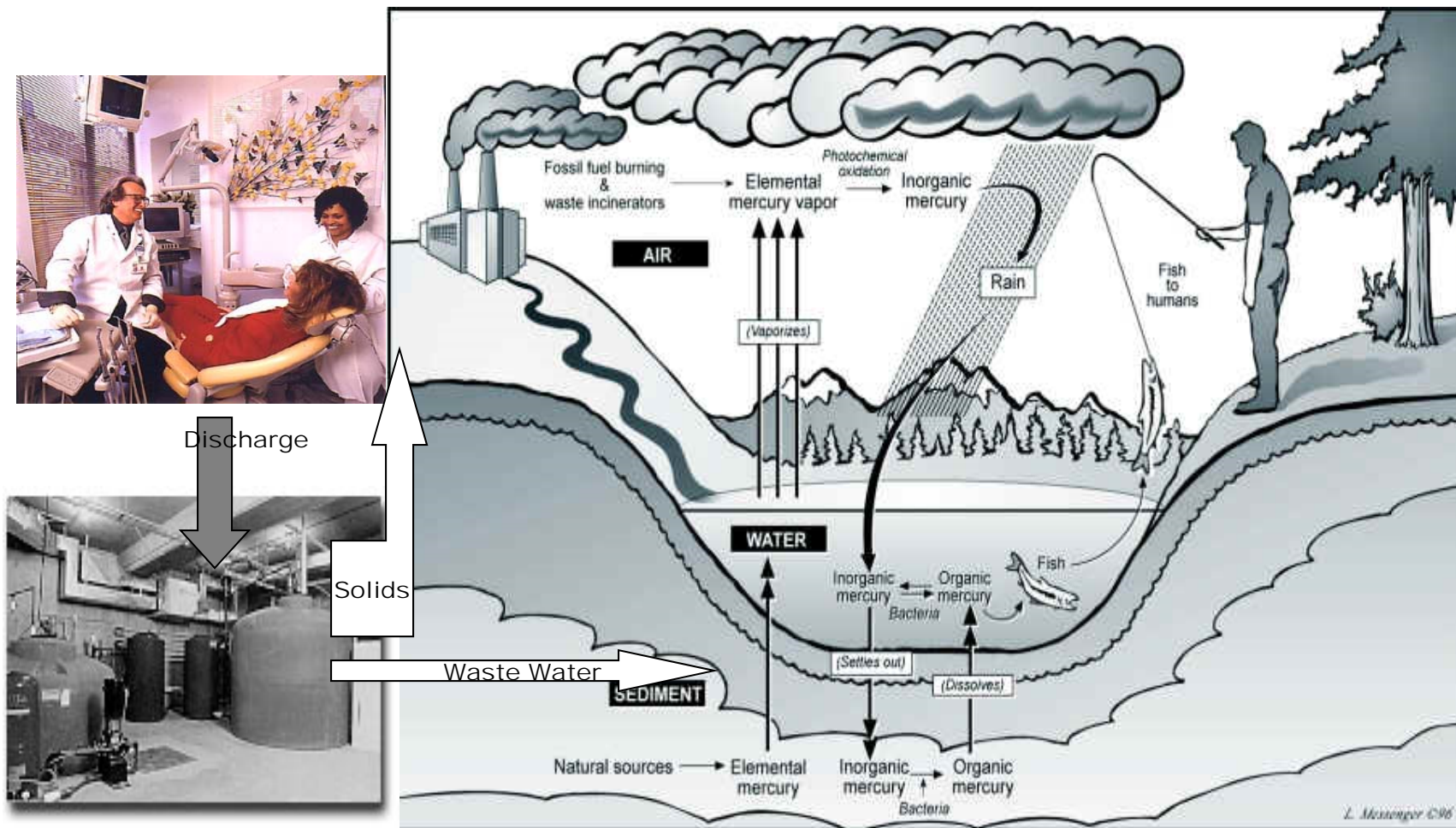


IMERC Mercury Use in Products

2001 – 2010 Data Analysis

www.newmoa.org/prevention/mercury/imerc/Notification

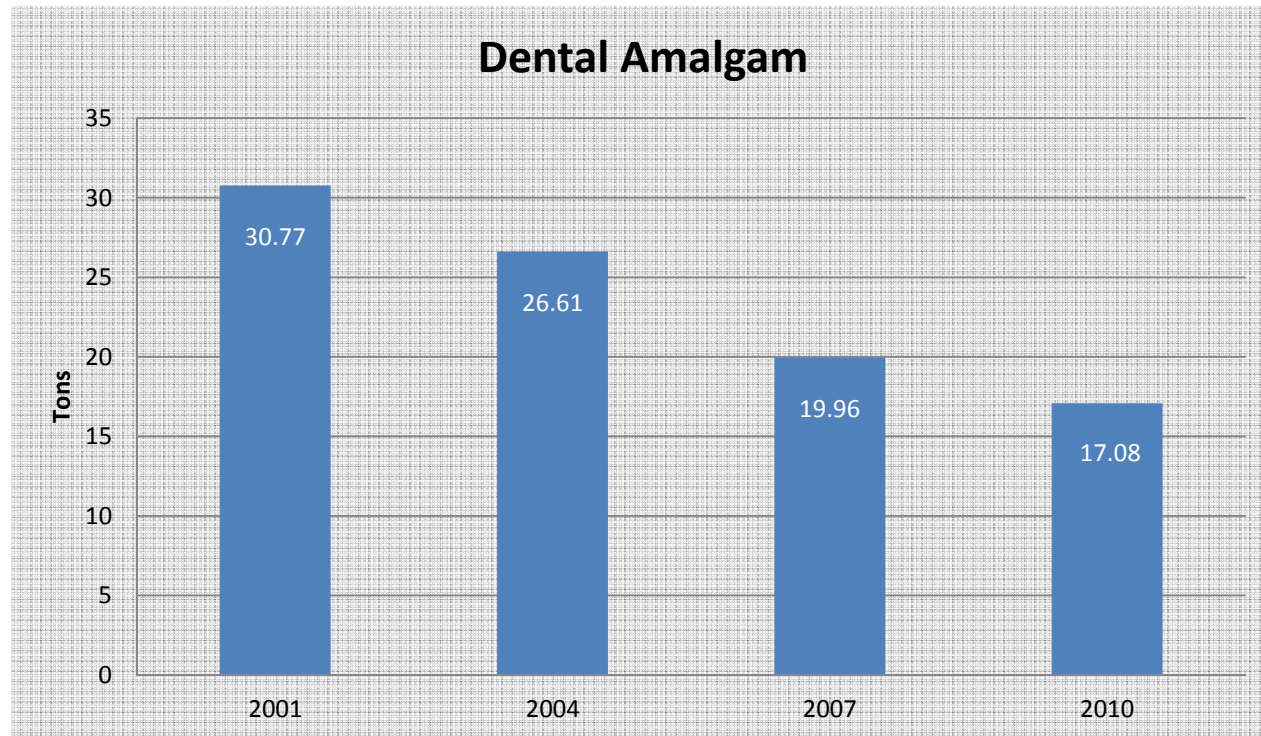
Dental Sector Largest Mercury Product Use* and Polluter to Nation's Wastewater



*Source: USGS 2013, IMERC 2013

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Consumption of Dental Mercury is Decreasing, But Still Significant



**IMERC Mercury Use in Products
2001 – 2010 Data Analysis**

www.newmoa.org/prevention/mercury/imerc/Notification

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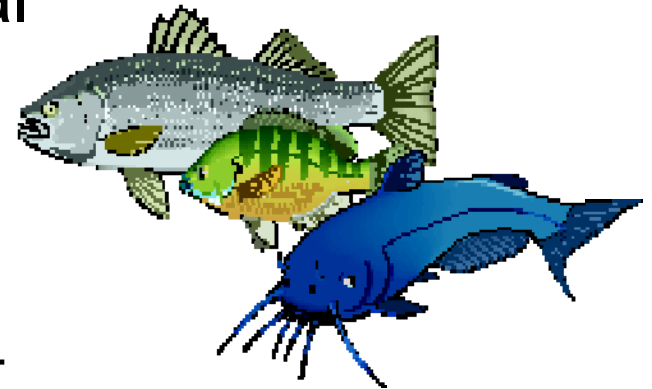
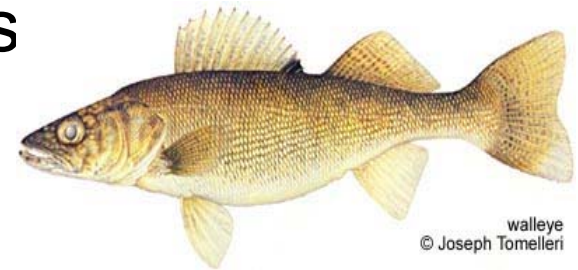
Dental Mercury in Wastewater

- Dental identified as "by far" the greatest mercury contributors to wastewater: over 3 times next source
- AMSA – In all seven POTW's tested, the largest contributor of mercury were dental clinics
- US EPA estimates 50% of mercury entering POTWs from dental clinics

City	Mercury load from dental offices
Duluth, Minnesota	36%
Seattle, Washington	40-60%
Palo Alto, California	83%

Dental Mercury Uptake in Air, Water, Fish & People

- 2007 US EPA Report to Congress made the link between waste disposal and mercury in fish
- US EPA website states that dental mercury can methylate in wastewater and contaminate fish
- Dental Hg releases from sewage sludge now resulting in significant costs to local communities (more on that later...)



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Human Health Effects of MeHg

- Human Health concerns are the primary driver for low level mercury discharge limits
- Human exposure to mercury in the USA primarily through fish consumption
- Even chronic low dose exposure is thought to be harmful, especially to the fetus and the developing infant
- Nearly all states and EPA/FDA have issued fish consumption advisories due to MeHg
- Global treaty adopted in 2013 by 94 countries to reduce human exposure to mercury, with the USA becoming the first country to ratify it

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MPP's 2007 Testimony to Congress

Atmospheric emissions of dental mercury (tons)			
Pathway	EPA National Emissions Inventory 2002	This report 2005 (low estimate)	This report 2005 (high estimate)
Human cremation	0.3	3.0	3.5
Dental clinics	0.6	0.9	1.3
Dental mercury sewage sludge incineration	0.6	1.5	2.0
Dental mercury sludge spread on land and landfilled	n.a.	0.8	1.2
Dental mercury MSW incineration and landfill	n.a.	0.2	0.5
Dental mercury infectious and hazardous waste	n.a.	0.5	0.7
Human respiration	n.a.	0.2	0.2
Total	1.5	7.1	9.4

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Hg Emissions from Sludge Incineration

- Most POTWs (without separator mandates) transferring dental Hg to sludge incinerators
- Nationwide about 20% of sewage sludge is incinerated on average
- 184 sewage sludge incinerators across the USA
- Dental mercury content estimated on the order of 8.5 tons
- 60% or more of the mercury content is typically emitted to the atmosphere

Sewage Sludge Incinerator (SSI)

“MACT” Compliance Costs

- US EPA estimated nationwide Maximum Achievable Control Technology (MACT) costs for 184 existing SSI estimated at approximately **\$218 million**
- Problem primarily from dental mercury pollution
- **Much of this cost is borne by local communities**
- For more information, see:
<http://www.epa.gov/ttn/atw/129/ssi/ssipg.html>

Do Amalgam Separators Work?



- **Toronto, ON 58% Reduction**
(Source: Toronto Sewer Authority)
- **Seattle King County, WA**
50% Reduction (Source: Seattle King County Sewer Authority 2005)
- **Victoria, BC 70% Reduction**
(Source: The Victoria Times Colonist, May 5, 2005 Victoria BC)
- **Wichita, KS 50% Reduction**
(Source: Jamie Beldon, Wichita Sewer District)
- **MCES, Minneapolis, St. Paul, MN 29% - 44%** (Source: Peter Berglund, MCES, 2005)

Requirements for BMPs, Amalgam Separators

- Connecticut (2003)
- Maine (2004)
- New Hampshire (2005)
- Massachusetts (2006)
- Vermont (2007)
- Rhode Island (2007)
- New York (2008)
- New Jersey (2009)
- Oregon (2010)
- Michigan (2013)
- New Mexico (2014)
- (Many cities, counties also)



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State/Local Government Requirements

- Require adherence to best management practices (BMPs); including installing, properly operating and maintaining amalgam separators
- Require dentists to provide certification that mercury was recycled
- Require dentists to verify compliance w/BMPs, separator requirements through self reporting
- Where self-reporting required and a fine is looming, compliance is high
- (Since 2007, the American Dental Association has recommended separators as part of its BMPs)

Amalgam Separator Costs & Compliance

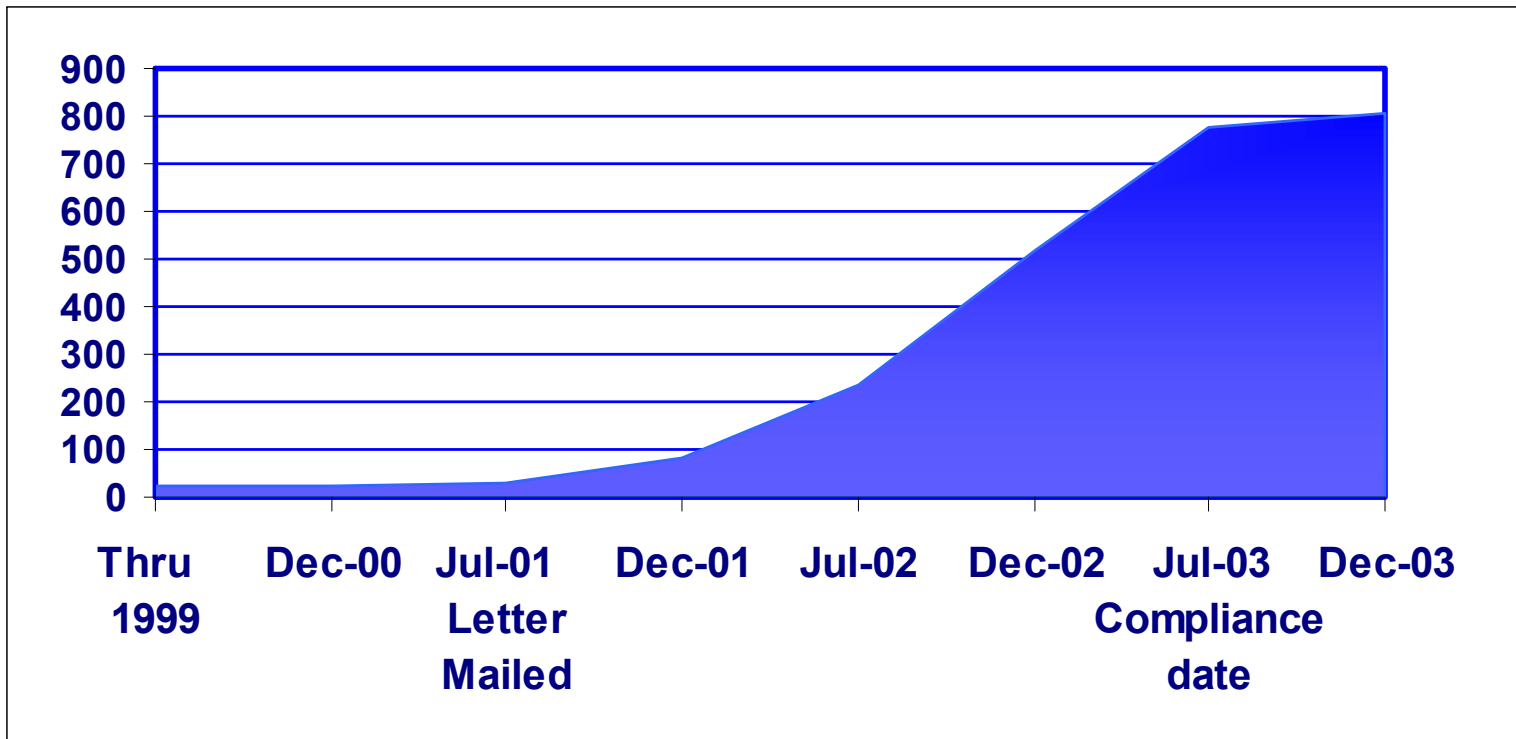
- San Francisco estimates cost to install separator \$883, plus \$250/year for recycling, etc.
- NJ DEP estimates that:
 - costs of separator at between \$700-\$1,000
 - cost per dental facility to be 54 to 81 cents per patient per year
- About 2/3's of US dentists don't use amalgam separators
- Whether dentist has 6 months or 4 years to comply, most do so in last 2 months before deadline



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Requirements = Compliance*

Amalgam Separators Installed



*Data from Gail Savina and Olivia Chamberlain; KCLHWMP

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Summary

- Most cost effective P2 strategy is preventing mercury releases at the source: **the dental clinic!**
- Amalgam separator cost equates to \$1.95 per average mercury filling removal or 50 cents per patient per year
- Voluntary efforts have proven largely unsuccessful compared to mandates
- Controlling dental Hg requires mandates
- But burden on state, local government should be minimized!

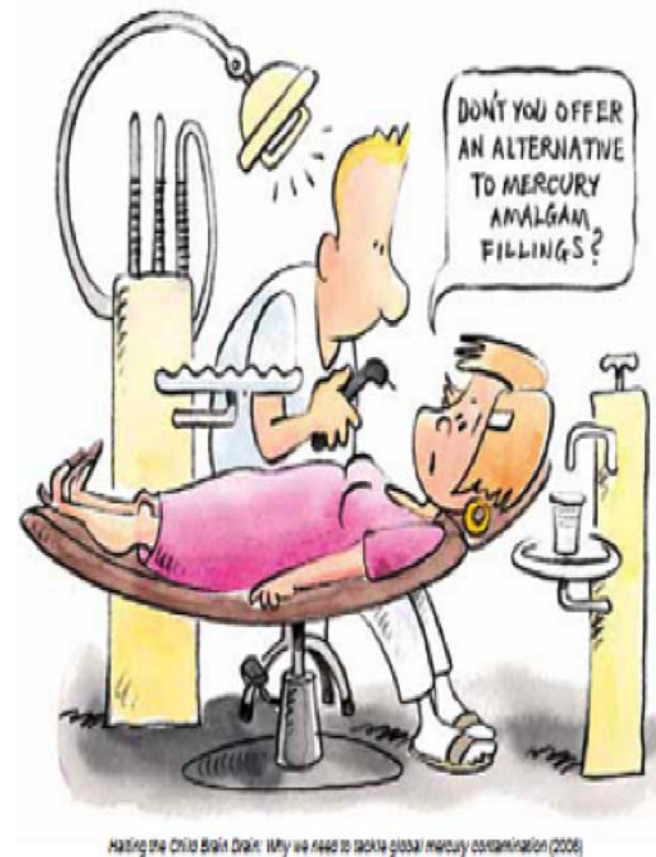


*2013 UNEP Report
Promoting Mercury Treaty*

Thank you!



Figure 10



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