

Pretreatment Program Updates



BAXTER & WOODMAN Consulting Engineers



Mercury Reduction

- IEPA is moving toward the water quality effluent mercury standard for Human Health Criteria – **12 ng/L**
- NPDES permits affected
- Mercury source reduction is imminent
- Dental amalgams containing Hg will be targeted for inclusion in pre-treatment programs

Regional Mercury Reduction – A Case Study of the San Francisco Bay Area



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This project was funded by BACWA, a joint powers public agency that serves 9-county SF Bay Area

- BACWA conducts region-wide watershed programs to ensure long-term stewardship of the San Francisco Bay Estuary.
 - 5 principal members
 - 14 associate members
 - 36 affiliate members



Bay Area Clean Water Agencies

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Outline for Today's Discussion

- Why we conducted this project
 - Regional Mercury Watershed Permit
- How we conducted this project
 - *Regional* approach to permit metrics
 - Methodology for quantifying results
- Conclusions
- Next Steps



California “Region 2” Municipal & Industrial Dischargers are Subject to a Single “Mercury Watershed Permit”

- The 5-year Order became effective March 1, 2008
- Includes a dental mercury source control program
 - Applies to **all municipal dischargers** that discharge to San Francisco Bay (Region 2)



Dental Metrics in Permit

- **Regionally**, Bay Area agencies are to be evaluated based on two metrics:
 - *“target for this program is that **85% of dental offices** that generate mercury amalgam waste in the region will be participating in an amalgam program”*
 - DEADLINE: March 1, 2013
 - *“Dischargers... shall estimate the dental amalgam collected (with description of basis for estimate)... Dischargers may collaborate ... in a single report...”*
 - DEADLINE: Provide this to Board by June 30, 2012



These are REGIONAL Goals

- Individual agencies are responsible for:
 - Initiating a “program” by *March 2010*
 - Providing program information to BACWA
- Individual agencies are NOT responsible for:
 - Reporting to the Board about these metrics
 - Quantifying dental amalgam collected in service area

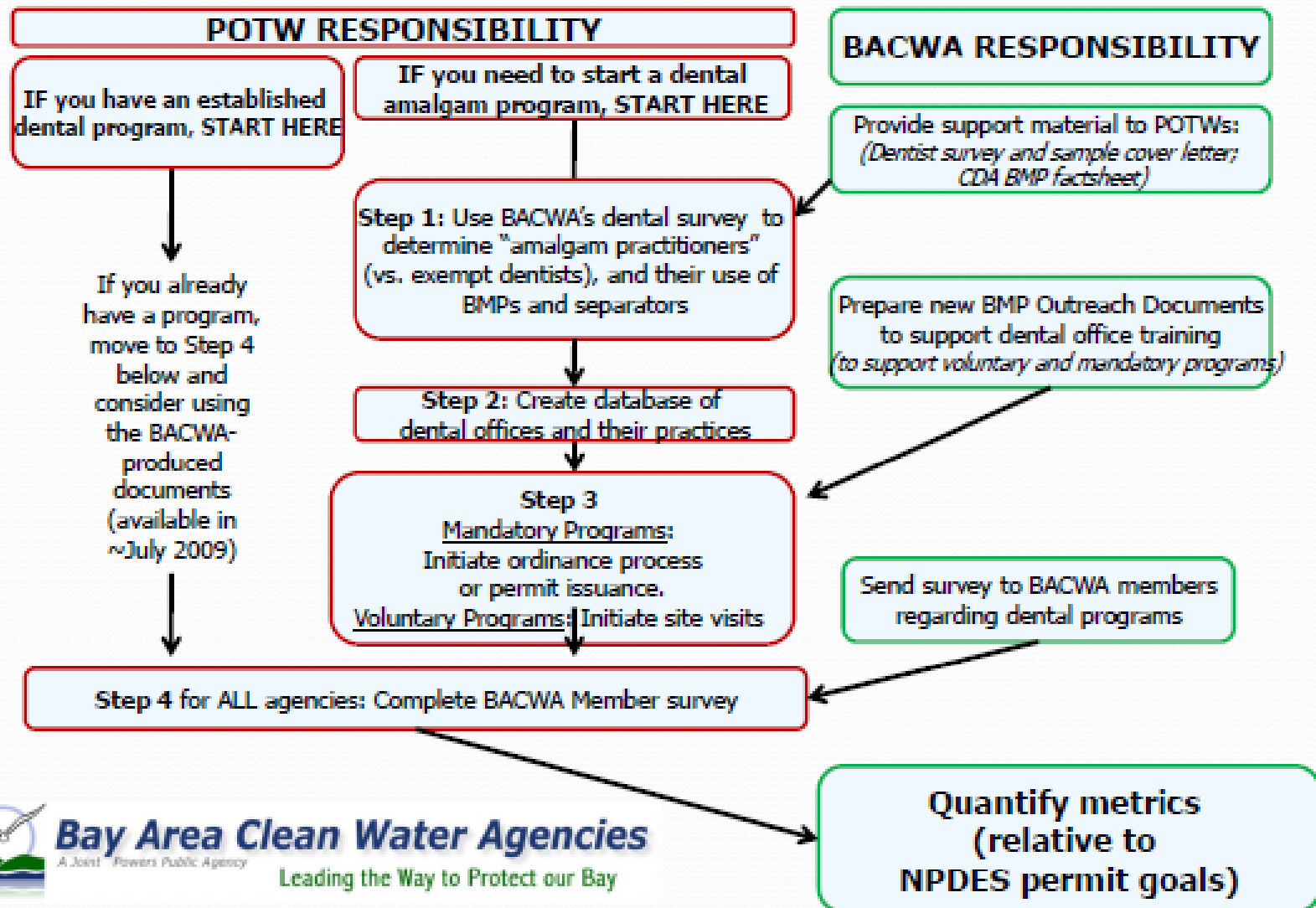


BACWA provided support to member agencies and affiliates

- Developed support materials for agencies to use
 - Sample survey (and cover letter)
 - BMP educational flyer
 - A web site with support materials
- Coordinated regional review of metrics
 - We developed a SINGLE result for each of these metrics as a result of this project



We identified a regional dental amalgam approach, including roles and responsibilities for POTWs and BACWA



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Approach to the Two Regional Metrics

Submitted Excel-Based Survey to All Bay
Area POTWs

We Used a Survey-Based Approach to Collect Needed Data

- Survey was Fall 2009
 - Therefore this is a **snapshot** in time
 - Results will improve as agency programs evolve
- Surveys sent out to all 39 Bay Area POTWs
 - 36 surveys returned
 - Conducted follow-up calls and emails to clarify some survey responses
- Surveys combined into a single master spreadsheet to evaluate regional results relative to the two metrics



Metric One



- **GOAL of 85% dental office participation with an amalgam program by March 1, 2013**

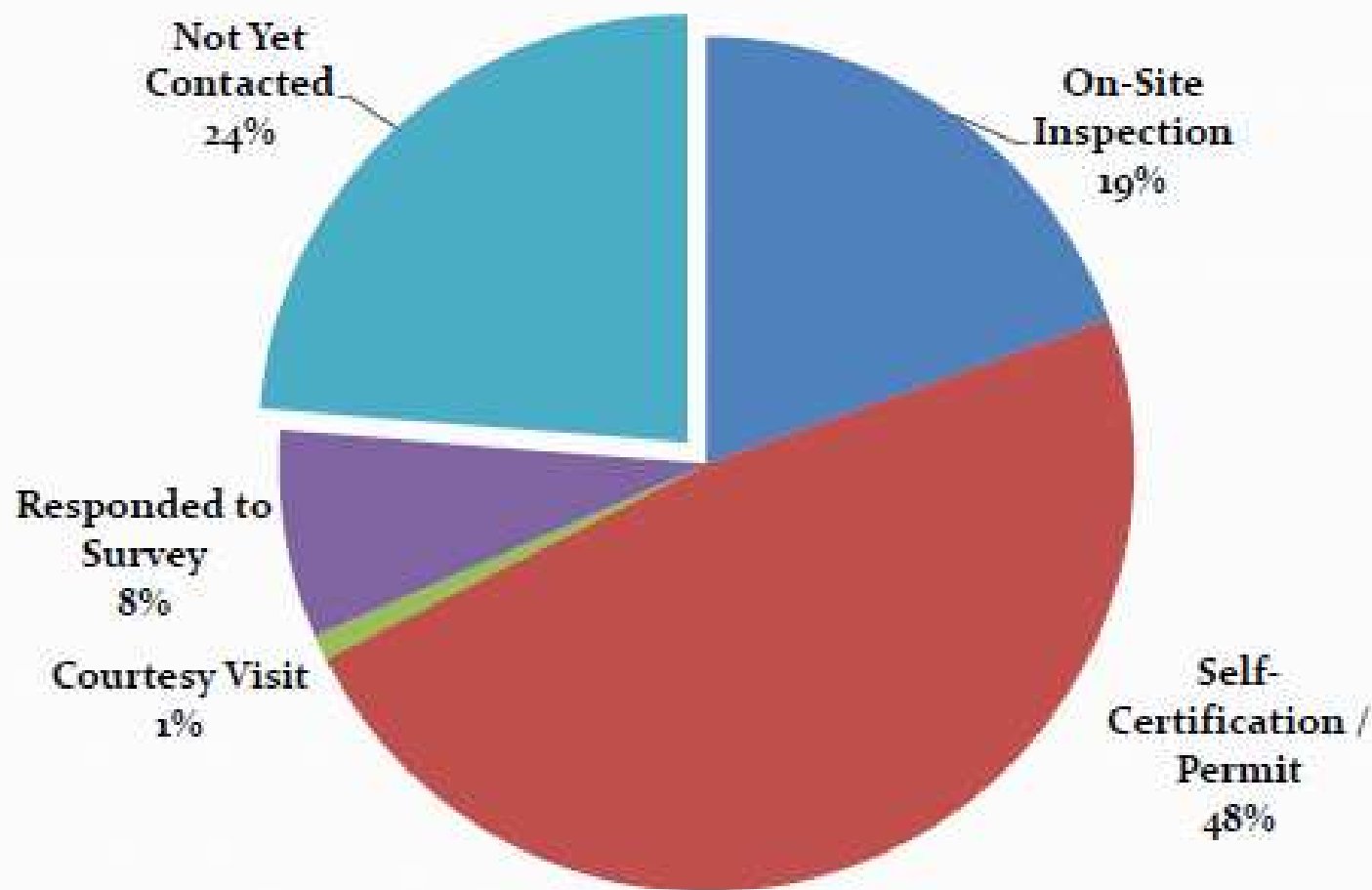


Regional Board Set Minimum Requirements for a “Dental Amalgam Program”

- Agency **MUST** at **MINIMUM** have a **MEASUREABLE** participation
 - For instance:
 - Survey
 - Permit
 - Site visit data
 - Other evaluation of BMP use in your service area



Of estimated 5,325 dental amalgam practitioners, 76% have been contacted by their POTW at some level



Metric Two



- Estimate the **dental amalgam collected** (with description of basis for the estimation)



How did we define “Amount of Amalgam Collected”?

- The goal is to estimate mercury
 - diverted from wastewater
 - vs. landfill diversions
 - and ONLY that attributable to implementation of POTW dental programs
 - because dental offices have been collecting Hg wastes previous to our programs

“amalgam *diverted* from collection system”



So how did we measure “Amount of Amalgam Diverted”?

- Based on a methodology originally developed by Bill Johnson, Betsy Elzufon (LWA), and Tom Barron
- Excel-based tool to estimate the mass of amalgam diverted from influents
 - We used agencies with existing dental programs for model calibration
 - We incorporated **survey** information provided by Bay Area agencies



Metric 2 - Hg Reduction

- Two Step Process
 1. Obtained Data from BACWA Surveys:
 - Amalgam Procedures Done
 - Waste Hg Generated per Procedure
 - Best Management Practice Use
 2. Estimated Hg Discharge
 - For Each District
 - Total for Bay Area



Estimated amalgam procedures based on survey results

Estimated Number of:

- Active Dentists
5,325 in SF Bay Area
- Amalgam Placement Procedures
Average = 126 per dentist / yr
- Amalgam Removal Procedures
Average = 209 per dentist / yr

Trend: Amalgam Procedures Steadily Decreasing



Estimated amalgam waste generated from removals

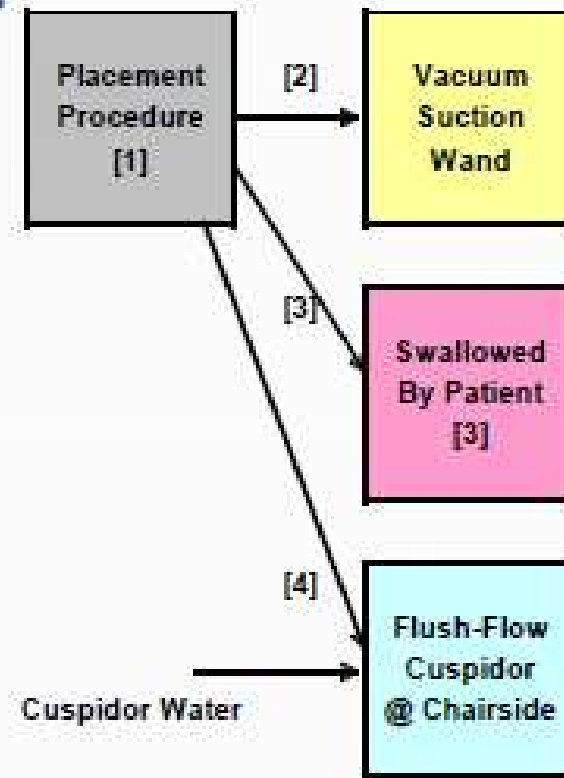
- Each procedure:
0.38 gram of Hg
- Hg from each dentist:
79.4 g/yr
- SF Bay Area:
423 Kg/yr



More waste than from placements ...

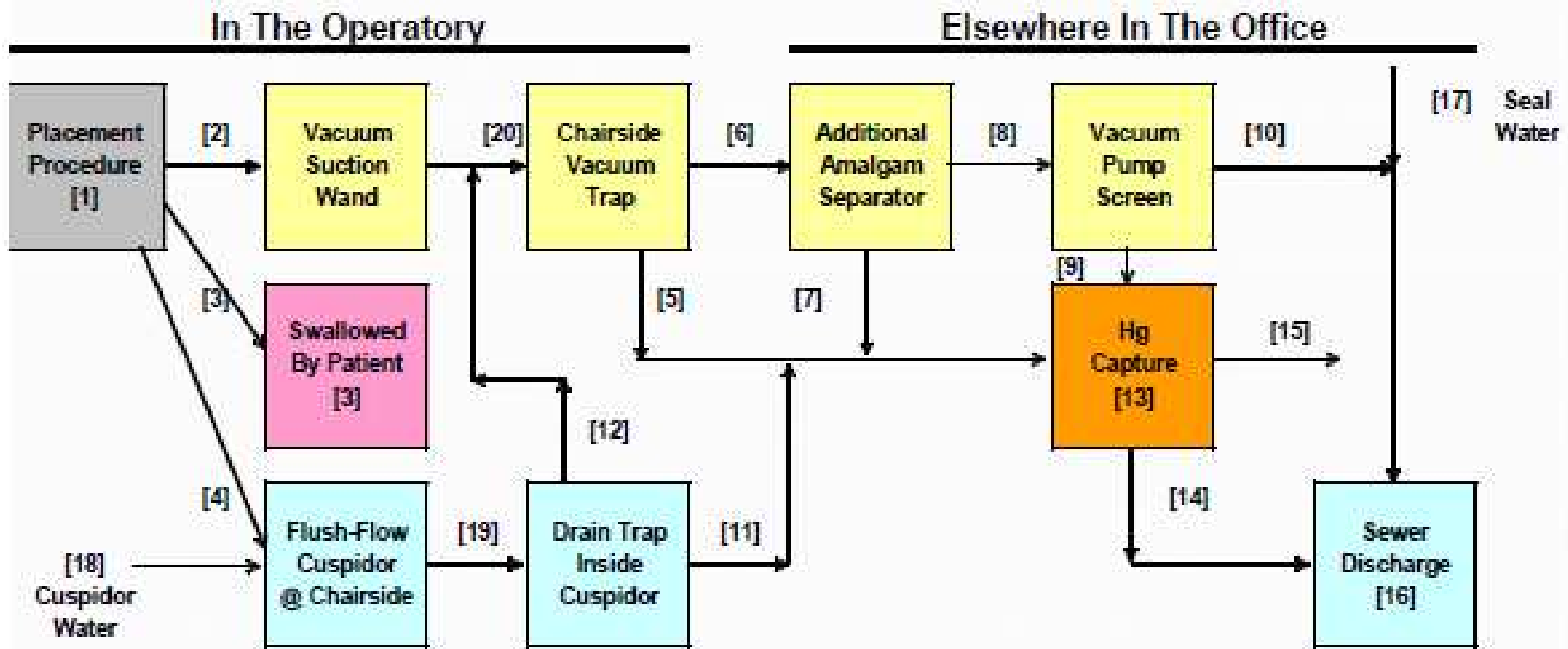
Estimated amalgam waste generated by placements

- Each Procedure:
0.045 gram of Hg
- Hg from Each Dentist:
5.67 g/yr
- SF Bay Area Total:
30 Kg/yr



Location	Flow (l)	Hg Mass (mg)	
		Hg Mass (mg)	%
[1] One Amalgam Placement	1.0	45.0	100%
[2] Suction Wand	0.9	31.5	70%
[3] Swallowed by Patient	0.1	4.5	10%
[4] Mouthwash into Cuspidor	0.5	9.0	20%

There are numerous paths for Hg waste in the office



How Much Hg Discharged?

Depends Upon:

- How Procedures Done
- BMP Use
- Amalgam Separator



Photo: US Navy

Only some of the Best Management Practices (BMPs) impact sewer discharges

1. Use of Non-bleach Vacuum Line Cleaners
2. Collection of Chairside Trap Waste
3. Collection of Vacuum Pump Screen Waste
4. Proper Collection/Storage of All Amalgam Waste



Assumed that use of all four these key BMPs capture up to 80% of Hg Wastes

We also made an assumption regarding amalgam separators

- Our analysis assumed that they intercept up to **90%** of residual Hg that BMPs don't catch
 - Separators require maintenance to work well
 - Results in the field expected to be lower than in lab studies

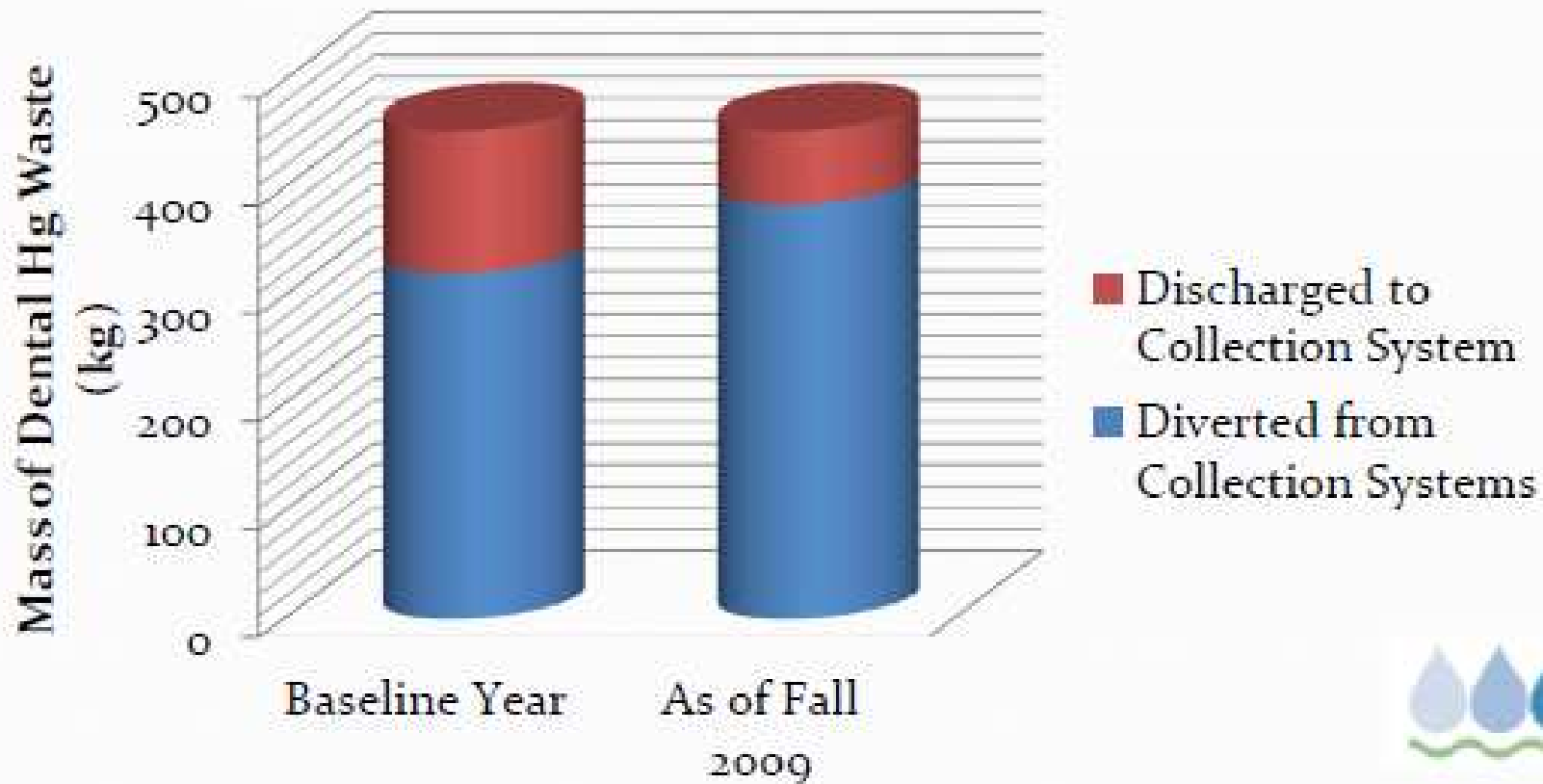


RESULTS: Estimated Dental Mercury Discharge Reduction

	Baseline (w/out BMPs)	Year 2009
Amalgam Practitioners	5,325	5,325
Hg Waste Generated (Kg/yr)	453	453
Percent Discharged	29%	15%
Hg Discharged (Kg/yr)	132	68

Estimate that mercury discharges have reduced from 29% of total generated waste to 15%

This represents an effective reduction to collection systems of 50%.



The Regional Board Reviewed and Approved our Methodology

- Next Steps
 - Update prior to June 2012 permit deadline
 - Provide final results to Regional Board relative to the two metrics
 - Hope to achieve/exceed the 85⁰% target



Mercury Reductions are Dramatic for Agencies with Strong Dental Programs

Agency	Amalgam Program Fully Operational	% Mercury Reduction
Central Contra Costa Sanitary District	November 2007 (mandatory)	77% (biosolids)
King County, WA	End of 2004 (97% compliance)	55% (biosolids)
Madison Metropolitan Sewerage District, WI	December 2008 (mandatory)	45% (biosolids)
MWRA, Boston, MA	April 2006 (mandatory, statewide)	60% (biosolids)
MCES, Minneapolis / St. Paul, MN	January 2003 voluntary; later mandatory	51% (influent)
Regional Water Quality Control Plant, Palo Alto	March 31, 2005 (mandatory)	63% (biosolids)
San Francisco PUC	February 2004 (mandatory)	45% (biosolids)
Western Lake Superior Sanitary District, Duluth, MN	2005 (100% compliance)	62% (biosolids) 77% (effluent)

For more information

- See: <http://bacwa.org/>
 - Then look to left side “news and events”
 - “The first complete BACWA dental mercury assessment”
 - Technical memorandum describing analysis
 - Sample of the POTW survey for BACWA study
 - Detailed table of % Hg reductions at various USA agencies (with footnotes re sources)
- See www.baywise.org
 - Resources developed for dental offices



Thanks for your attention!

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Graphic courtesy of Jamie Hartshorn



–Questions/Discussion

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