

Industrial Ecology, Pollution Prevention and the NY/NJ Harbor

**Project Completion Briefing
June 4, 2008**



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Former Director of the Harbor Project 2000-2005

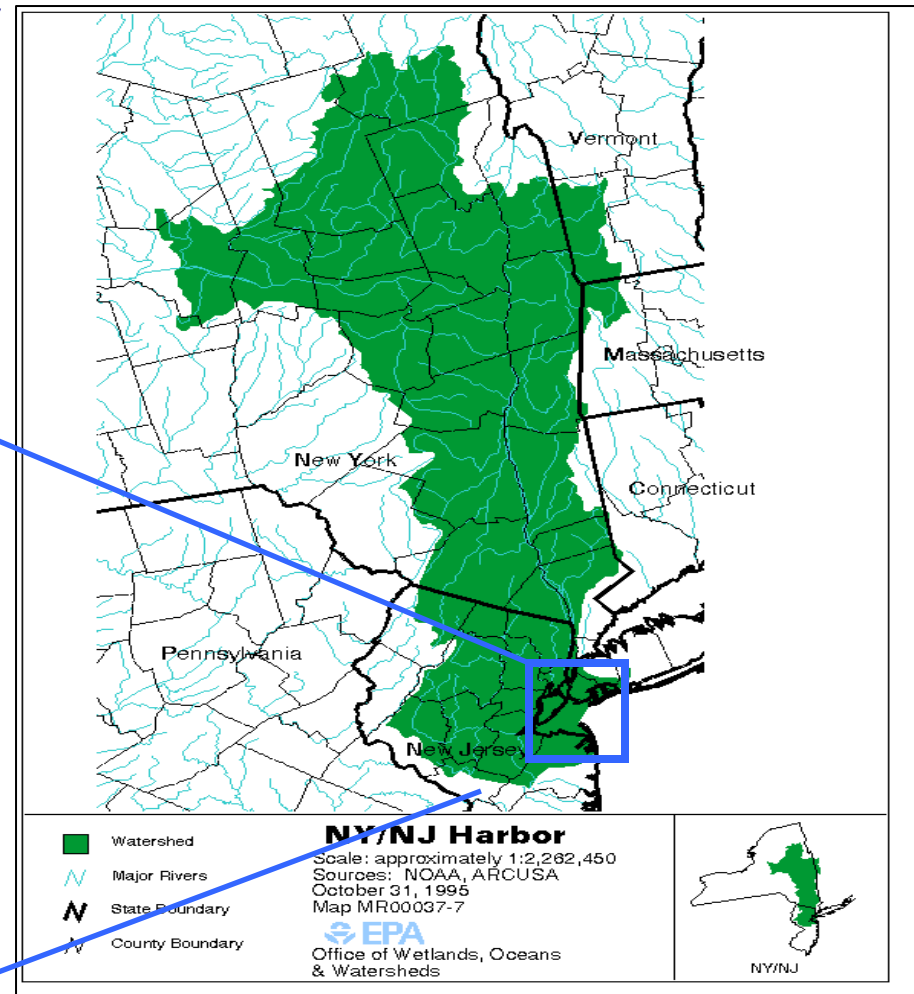
II-IN Sea Grant & Liaison to the U.S. EPA GLNPO, Chicago IL

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Industrial Ecology, Pollution Prevention and the NY/NJ Harbor project

- **The NY/NJ Harbor:**

- Economically, politically, socially complex urban system
- Over 14 Million people (GL=33M)
- In top 20 largest ports in the world



Goals of the Harbor Project

The project aims to identify ongoing pollution and identify strategies to reduce those loadings

1. **Track** the flow and cycling of Hg, Cd, PCBs, Dioxins and PAHs and suspended solids
2. **Identify P2 strategies** to reduce contaminant loadings ecologically healthy and economically viable harbor
3. **Promote implementation of these strategies**

Stakeholder Process

- **Stakeholders - research, P2 strategies & implementation**
- **Open process - educational, info sharing, decision making forum**
- **Promoted diversity of sponsors (\$\$) and more trust**

The Analytical Tools Used

Principles of Industrial Ecology (IE)

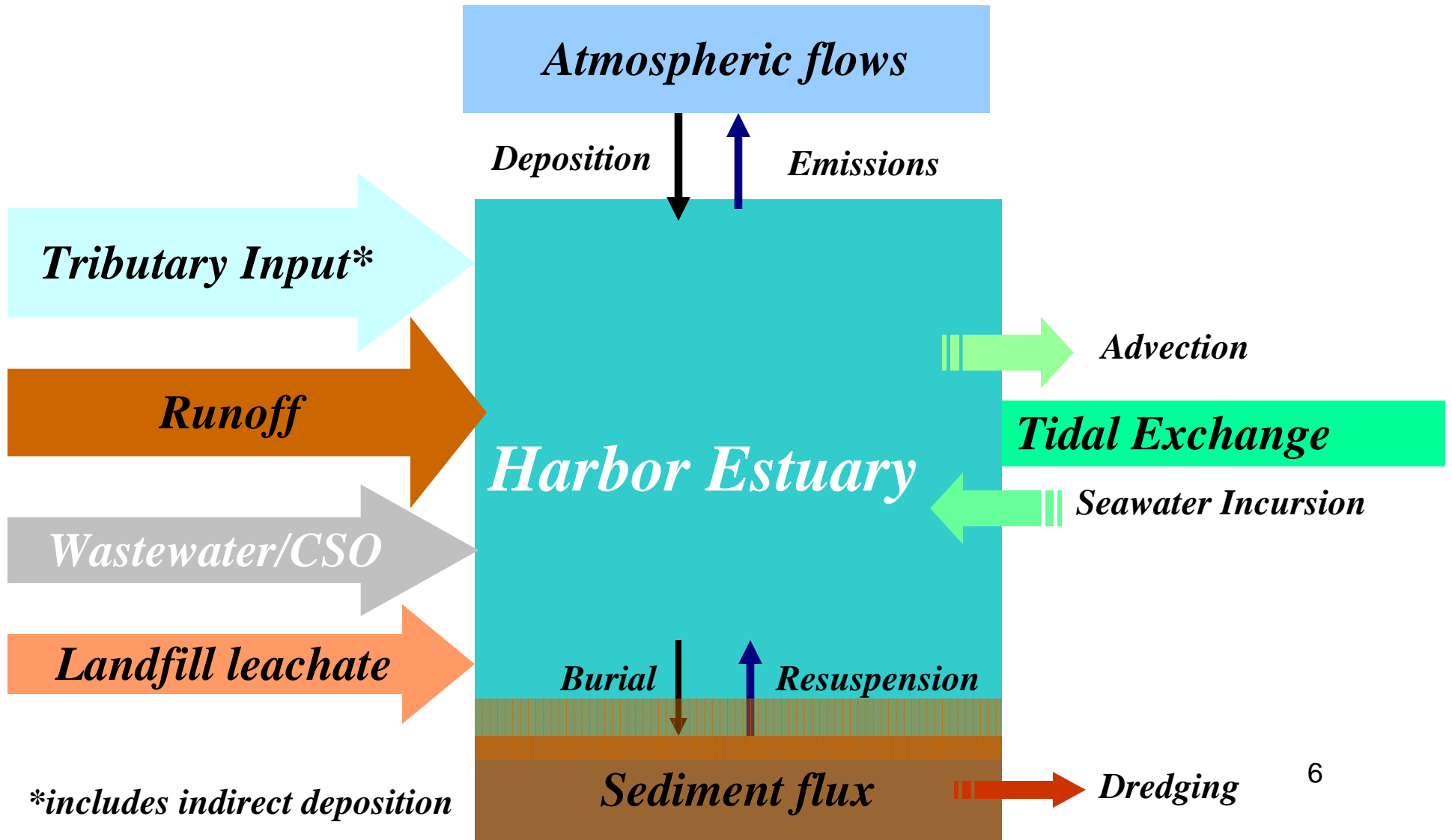
- A systems-based approach to the interrelationships of anthropogenic systems and their impact on the environment.
- Encompasses material and substance flow accounting, mass balance, and life cycle analysis.

Step 1: The Mass Balance

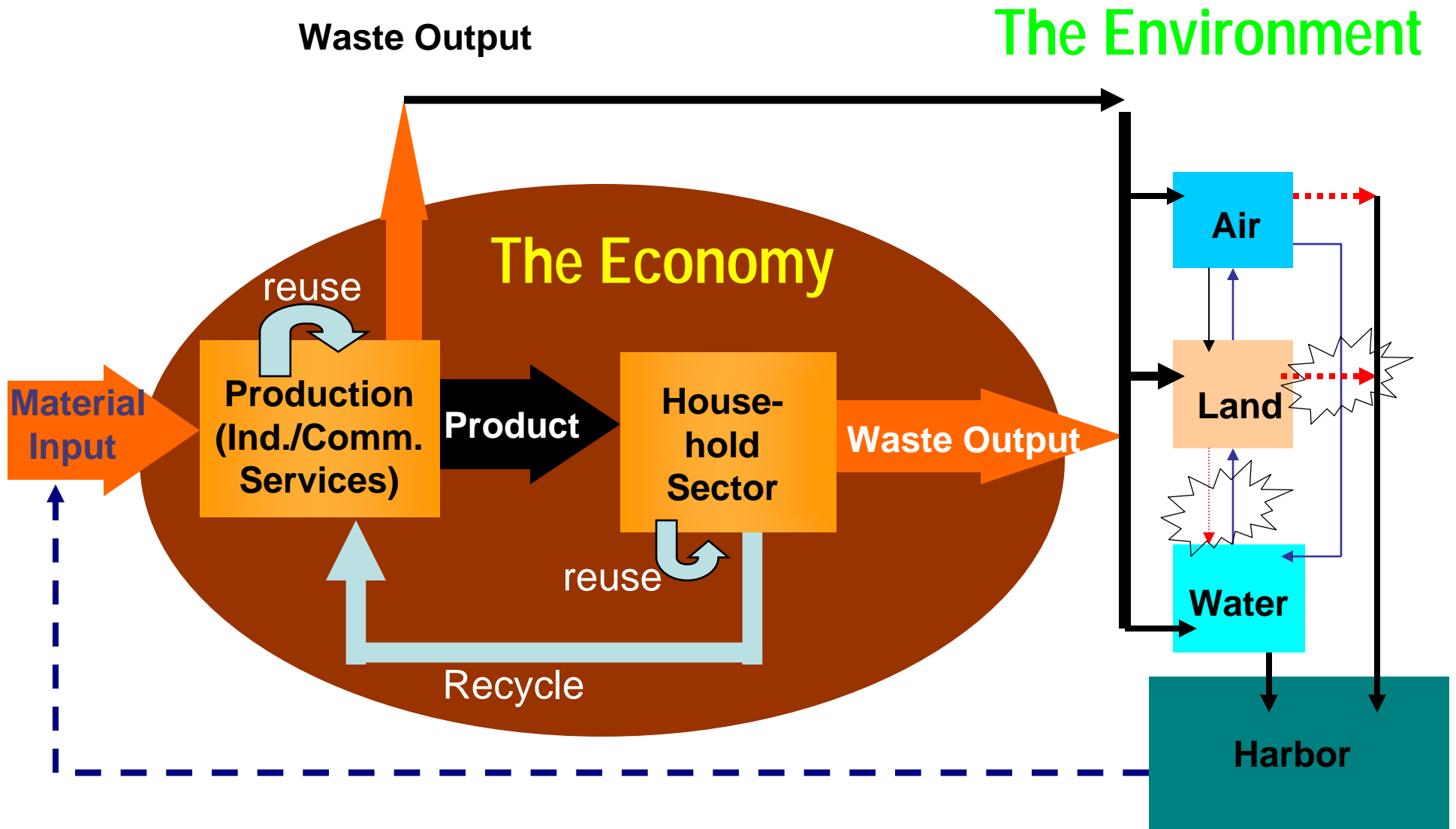
Step 2: Substance Flow Accounting (SFA)

Step 3: Mobilization of primary releases

Mass balance for the Harbor

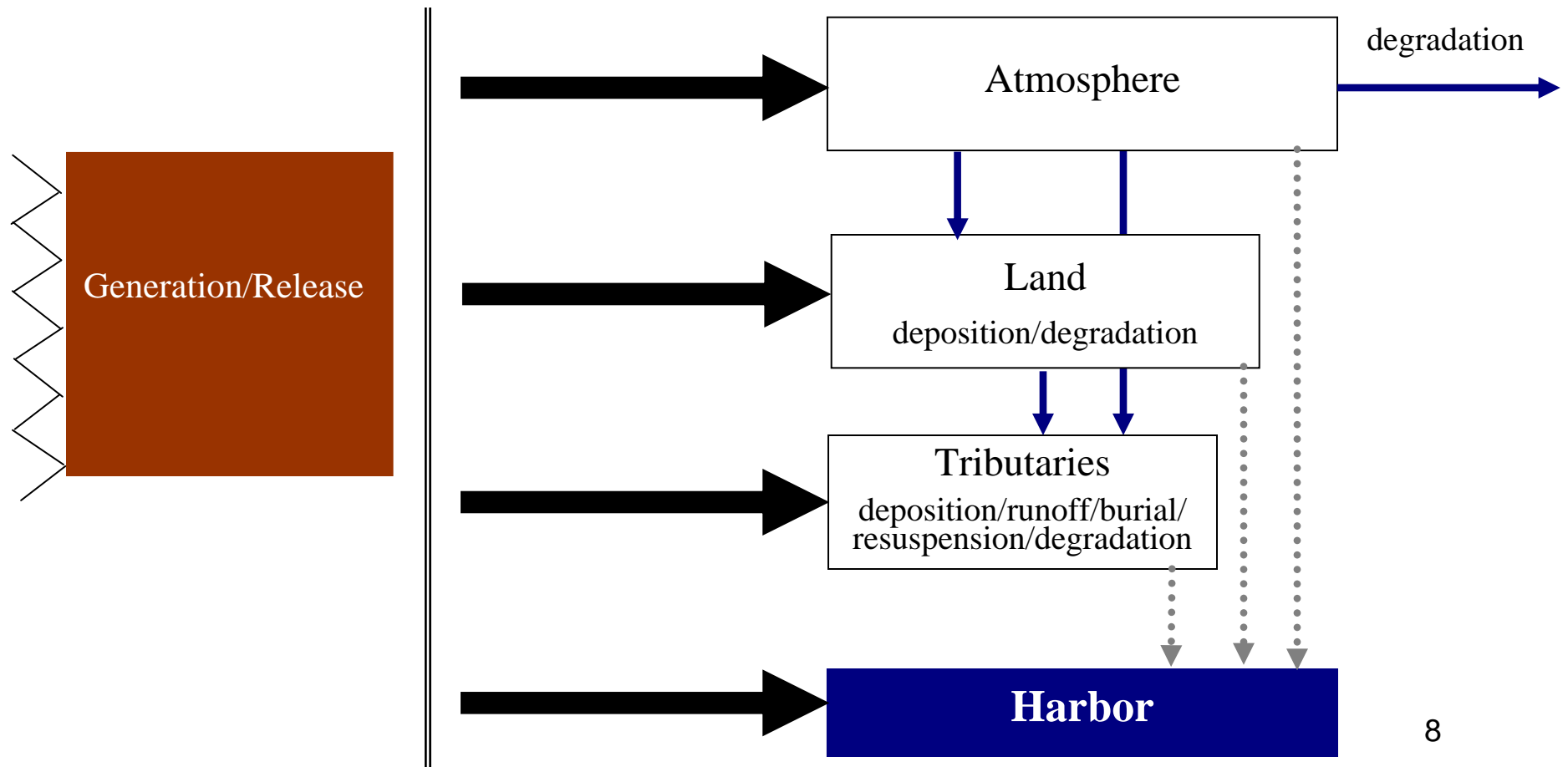


Modeling system interactions



Mobilization of Primary Releases- Fate and Transport of PAHs

New York/New Jersey Harbor Watershed Region

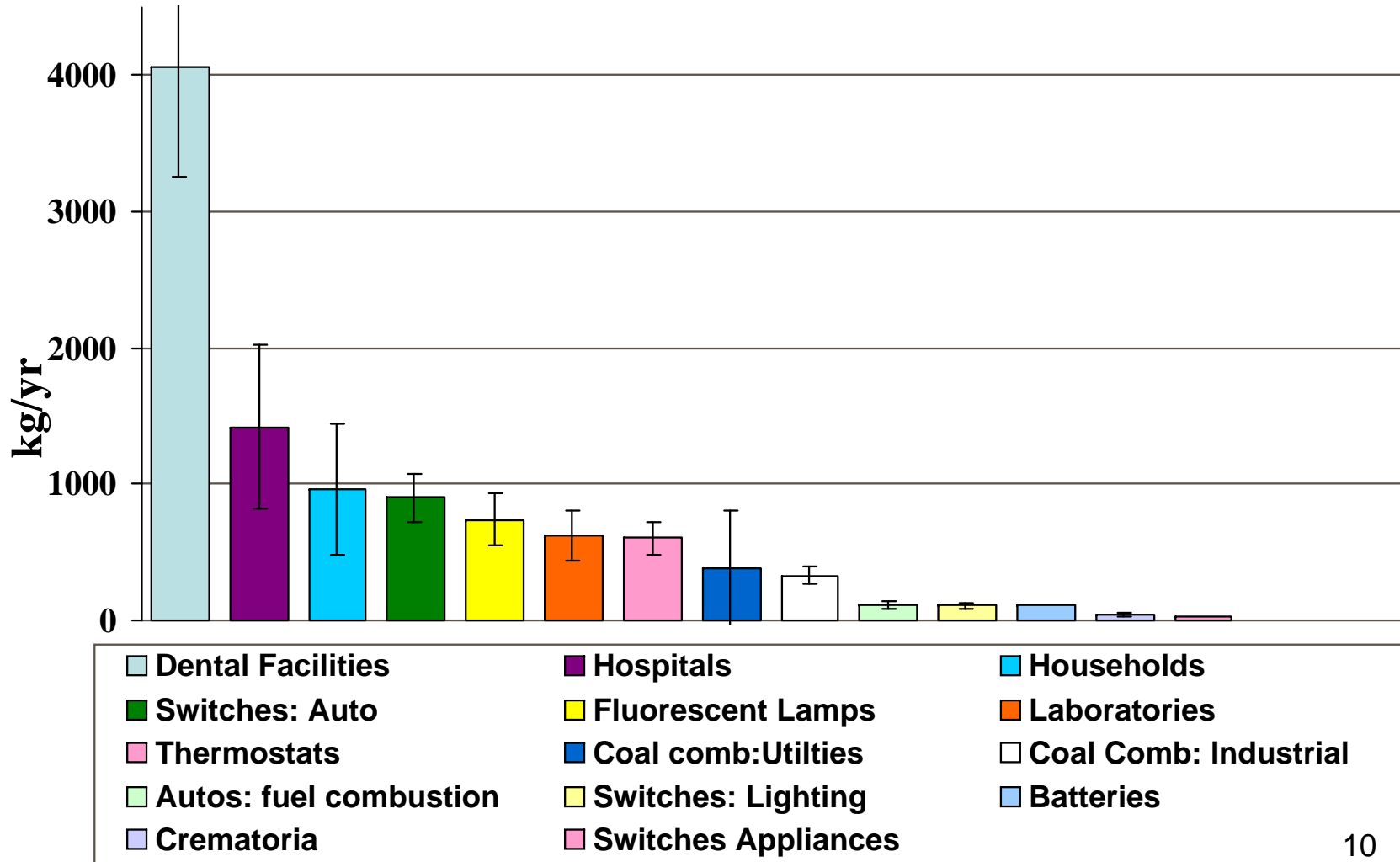


Case studies: Mercury (Hg)



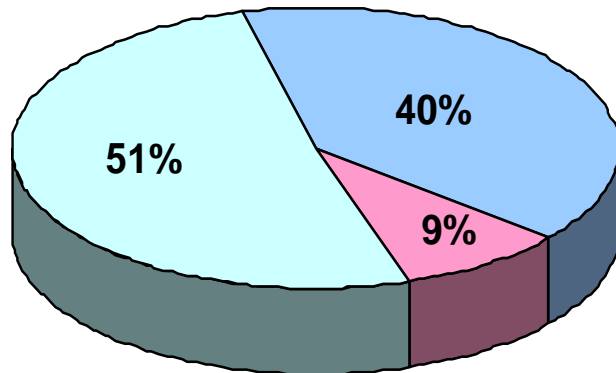
report published in 2002

Research Findings: Mercury (Hg) total releases by sector

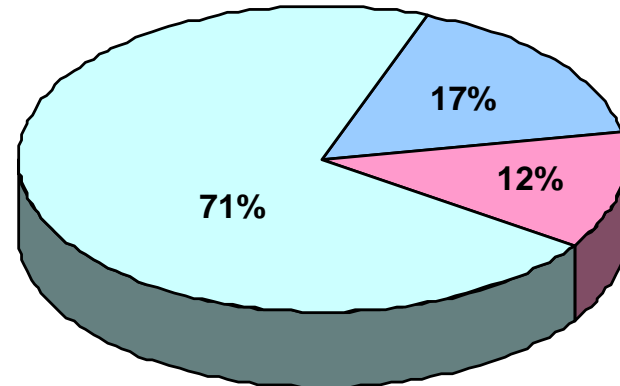


Pools of Mercury Contributing to the Harbor

Proportion of **Mercury**
Contributed by Each Pool

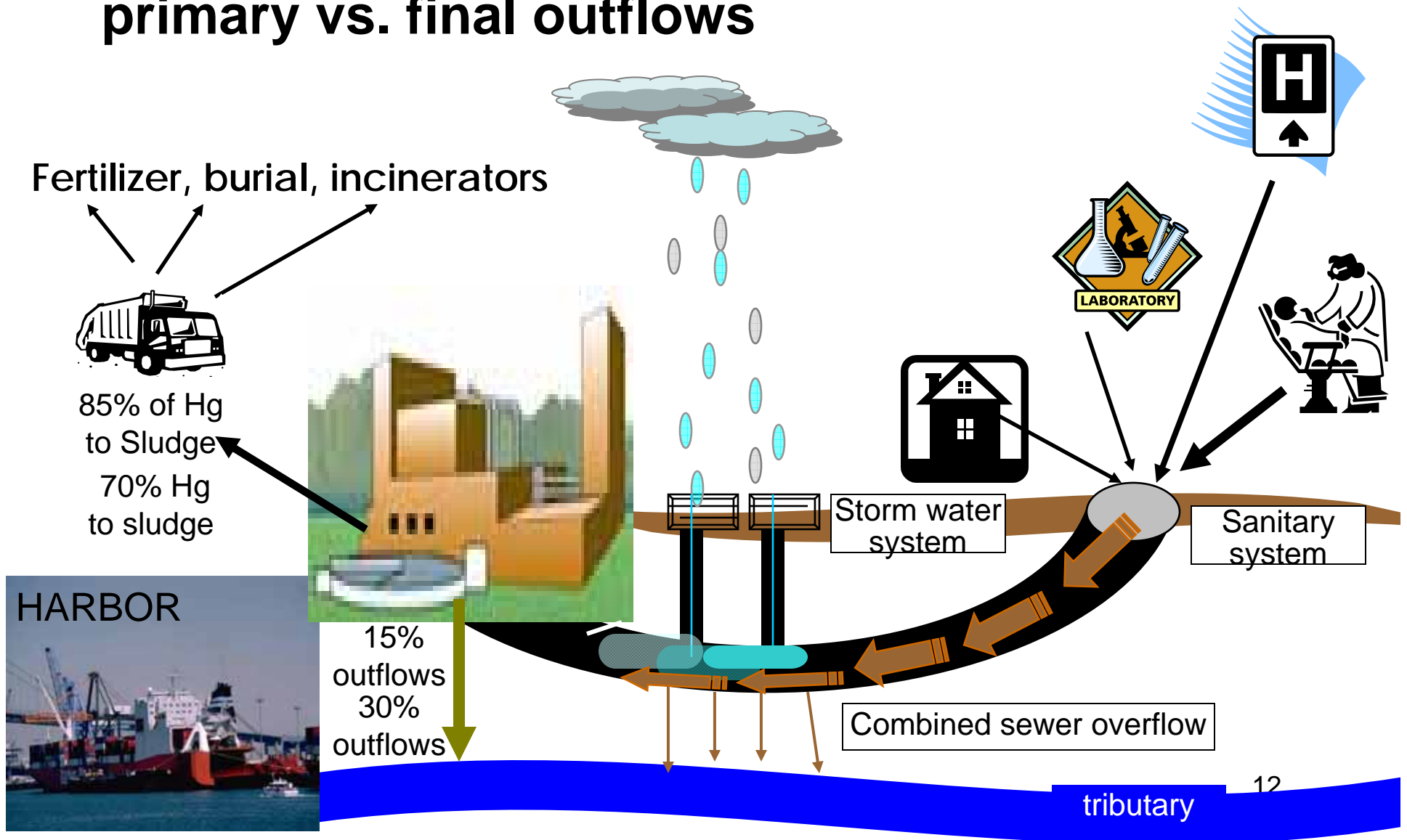


Proportion of **Methyl-mercury**
Contributed by
Each Pool



■ Landfill ■ Wastewater ■ Air

Releases of Mercury to Wastewater primary vs. final outflows



Key Findings: Mercury & Methylmercury

- Cumulative effect of Small Quantity Generators
 - 8,500 dental facilities in watershed
- **Role of WWTP in methylation of mercury**
- Follow materials from primary to secondary sources, to pools and sinks -
 - Atmospheric Inputs: incineration of products and combustion of fuels
- Economic indicators
 - Cost of treatment at source versus WWTP

Consortium member research: Mercury in sushi

- Mercury was front page news in the Jan 23rd NY Times



High Mercury Levels are Found in Tuna Sushi
By Marion Burros [NY Times Jan 23 2008]



Optimizing Individual Choices

Mercury In Tuna

	(ppm)
Canned Tuna (Light)	0.10
Canned Tuna (White)	0.41
Tuna Steak	0.61
Tuna Self-Caught (Bluefin, NJ)	0.43
Tuna Self-Caught (Yellowfin, NJ)	0.13

NYC Sushi--- stores	0.57
NYC Sushi- Restaurants	0.88



Mercury: Actions, Impacts and Implementation

- Dental School training
- **Hg report influenced NYSDEC regulation and NJDEP rule on dental waste**
- Consortium members also on NJ Mercury Task
- **NJ DEP requires car manufacturers to pay a bounty for each removed mercury switch**

Case studies: Cadmium (Cd)

Our second contaminant
Report published in 2003

Cadmium-Containing Products

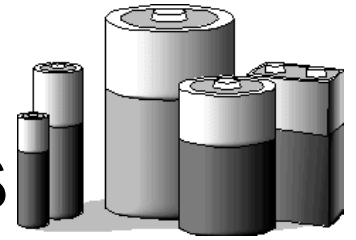
- **Rechargeable Batteries:** Nickel-Cadmium batteries in household appliances:

- Electric toothbrushes
- Certain toys with batteries
- Two-way radios
- Power tools (cordless)
- Tape recorders
- Phones: cellular, cordless
- Laptop computers – batteries



- **Fertilizer** (biosolids and phosphate fertilizer with trace amounts of Cd)

Cd: Key Findings & Recommendations and Actions



Cadmium in the Harbor has ↓ over the last 10-30 years:

- changes in the level of industrial activity in the region,
- better environmental management
- NJ seeing upward trend of Cd in wastewater

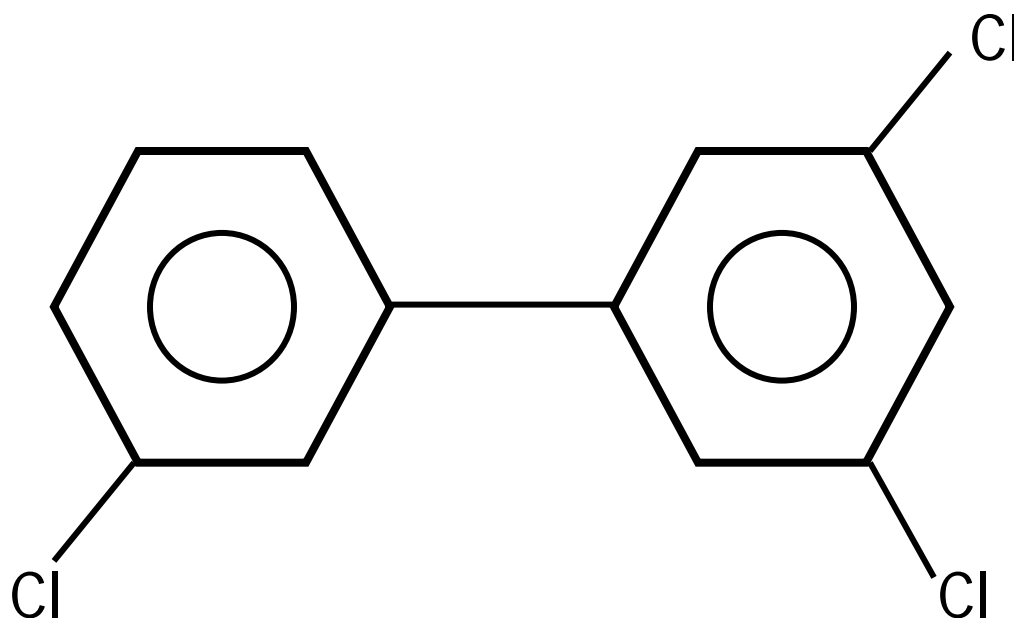
Market for Cadmium has changed

- Major use of Cd today is Ni-Cd batteries, low recycling rates
- Data gap: batteries imported in products no longer reported

Actions

New York City rule (2006) requires recycling of all rechargeable batteries

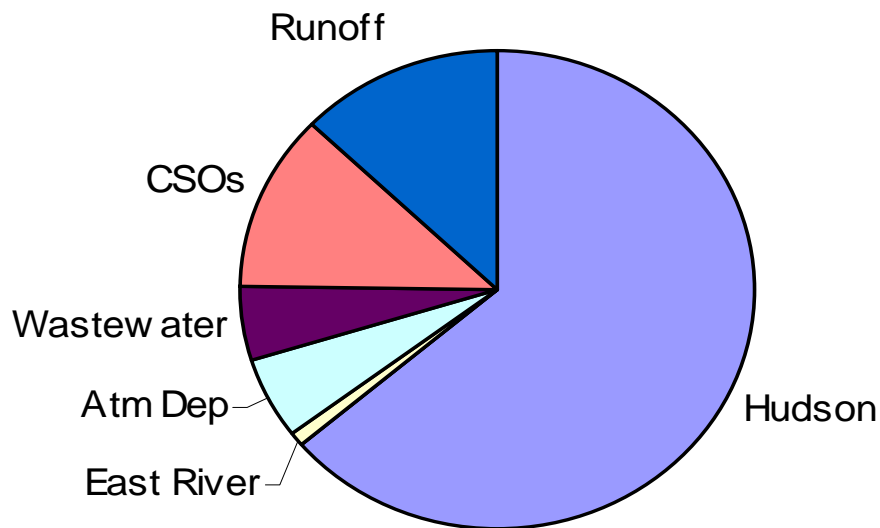
Case studies: Polychlorinated Biphenyls (PCBs)



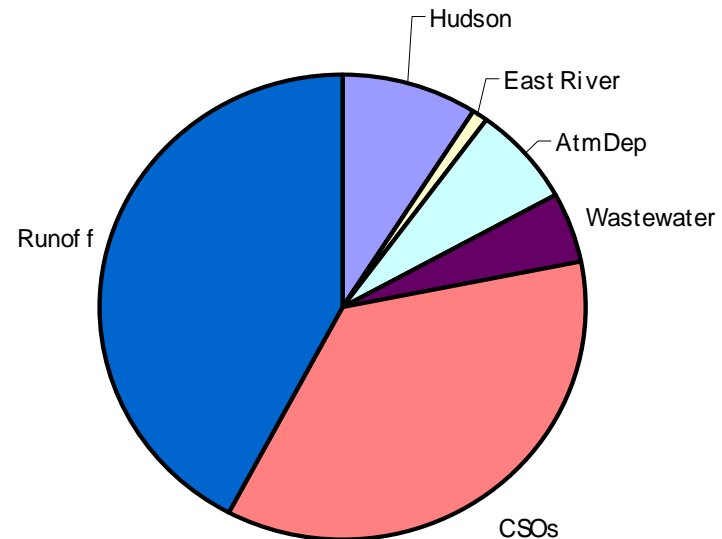
report published in 2005

PCBs: Mass balance findings

- Upriver sources ~50-55 % of inputs to the Harbor
- Local inputs 45-50%



Homologs 3, 4, 5



Homologs 7, 8, 9

Products containing PCBs

- Small capacitors in:
 - Fluorescent lamp ballasts
 - Older household appliances - refrigerators & microwave ovens
- Paints – old
- Carbonless paper – old
- Pigments and dyes
- Glossy papers with special inks
- Kaofin
- Flocculants used at POTWs

PCBs - key findings

- **Cumulative impact of small capacitors overlooked:**
- **Inadvertent production: ~ 10-15% of current PCB loadings**
- **Usage/disposal:**
 - uneven reporting requirements on usage/disposal (large capacitors)
 - Regulatory gap
 - Limited recycling opportunities
- **Impact of 179 Superfund sites in Harbor region**

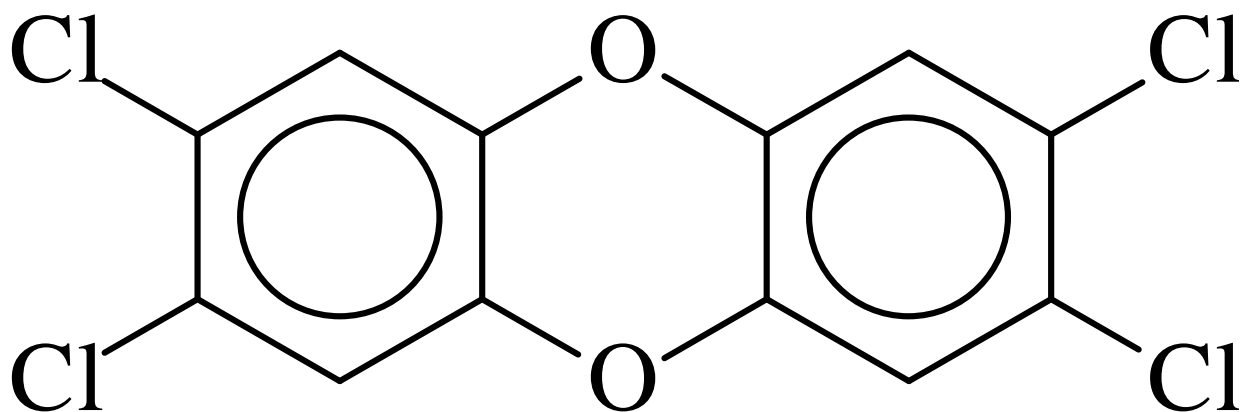
PCBs Actions and Key Issues

- **Inadvertently produced PCBs (Water treatment flocculants, pigments and paints)**
 - ⇒ **Provided BMPs to pigment and paint manufacturers and POTWs**

- **Small PCB capacitors in household appliances and demolition debris are not regulated**
 - **Underestimated the cumulative impact of small sources**
 - **60-70 metric tons of PCBs are likely to be disposed in next 5-10 years in our watershed**

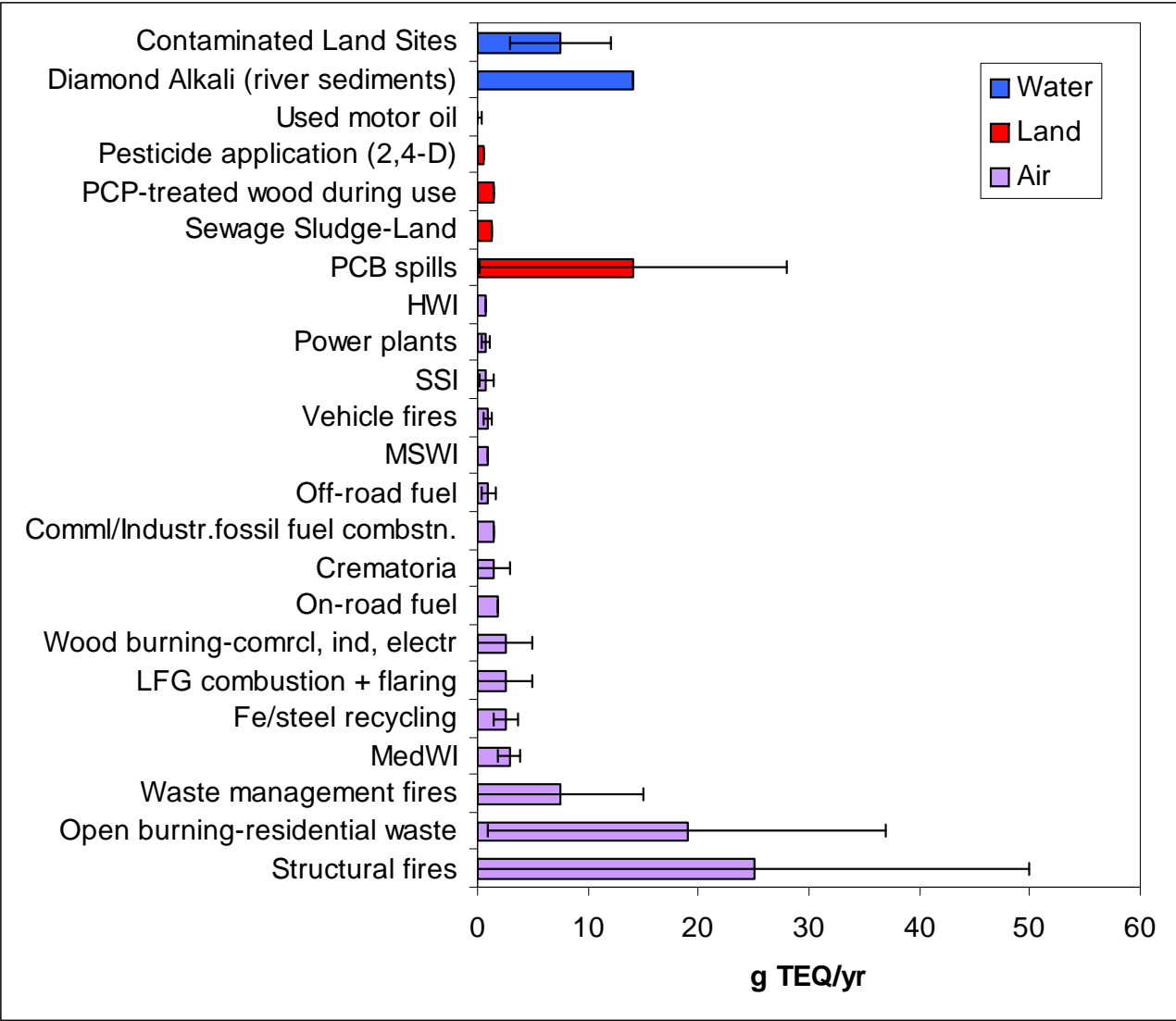
- **PCB contaminated mineral oil transformers**
 - **Contacted utilities to provide serial #s of transformers likely to be contaminated**

Case studies: Dioxins



report published in 2006

Dioxins: Local emissions



Pollution prevention strategies: Dioxins

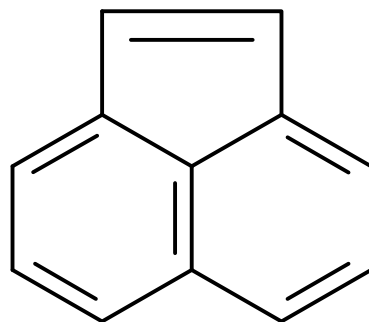
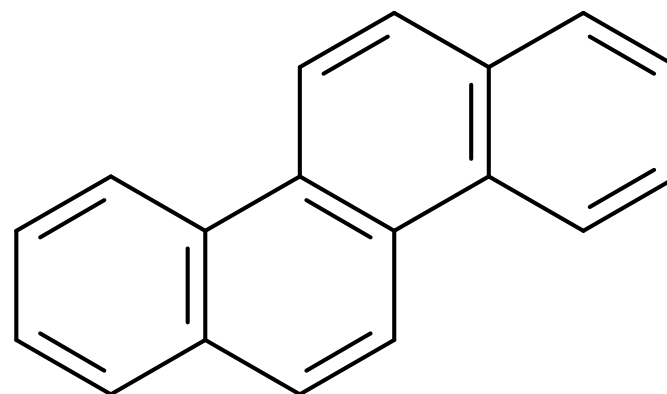
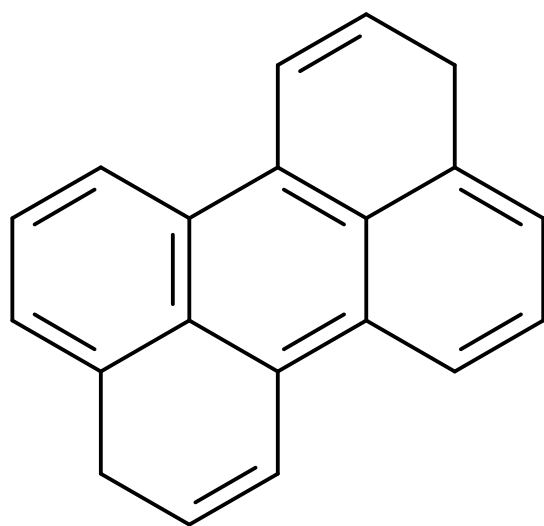
- Reduce the volume of waste:
 - Reduce waste generation, reuse, recycle, compost
 - Design for the environment (Production stage):
- Never use ash as fertilizer
- Properly dispose of products that may contain PCBs
 - Old paint, old appliances, lamp ballasts

Press for ban against burning of trash in NYS

New Finding: Importance of fires in solid waste facilities

Case studies: PAHs

report published in 2007



Materials & products containing PAHs

- Used-motor oil
- Driveway sealants (with coal tar)
- Heating oil
- Creosote (wood preservative)
- Dandruff shampoo (with coal tar as ingredient)



Processes that release PAHs:

- Vehicle driving
- Wood Stoves and Outside Boilers, BBQ
- Waste burning
- Tire combustion



Prioritization for the P2 deliberation

Source	Estimated Release- kg/yr	Estimated Loading-kg/yr
Coal-tar sealants	900-5800	300
Creosote treated wood	415,400	1,600
Tire wear	2,800	1,400
Oil leaks	5,000	2600
Resident. Fuel Combust.(wood & fossil fuel)	341,200	500
Vehicle Emissions	91,500	500
Non-road/stationary engine emissions	32,500	100
Used motor oil disposal	400	200
Oil Spills	70	70

Sectors addressed in dioxin report: Waste Incineration and Open Burning of Household Waste and Agricultural Plastics

Coal Tar Parking Lot Sealants

Background:

- Sealants used to protect asphalt surfaces (i.e. parking lots and driveways).
- Two types of sealant: Asphalt based and Coal-tar based. (*coal-tar sealants predominately used east of the Rockies*)

Concerns associated with coal-tar sealants:

- Contain PAHs (approximately 5% wet weight).
- Abrade from surface over time and may be transported via runoff.
- Must be reapplied every 1-5 years



Creosote-treated Wood

In 2004, 87 million gallons of creosote were used in the U.S. to treat wood

- 55% railroad ties, 30% utility poles, 14% fence posts, 0.17% marine piling

PAH content of Creosote:

-Contains ~80% PAHs
(approximately 20%-40% Priority PAHs)

➤ New York State and New Jersey State approved legislation to ban the use of creosote-treated wood in marine environments



Suspended Solids



report published in 2008

Why Suspended Solids?

- Identify additional opportunities to:
 - Curb pollutant loads to the NY/NJ Harbor and its watershed
 - Reduce the impacts of particles on the Harbor

Suspended Solids: scope of research

- Identify activities on land that have the potential to contribute suspended solids to the NY/NJ Harbor Watershed
- Characterize level of activity for each sector
- Compile:
 - BMPs to curb pollutant loads to the NY/NJ Harbor Watershed
 - Reduce the impacts of particles on the Harbor

Activities on land that Contribute to Suspended Solids

- Agriculture (cropping and grazing)
- Forest harvesting and deforestation
- Mining
- Construction activities
- Landscaping & golf courses
- Road abrasives
- Industrial activities
 - Contaminated sites
 - Landfills
 - Automobile dismantling operations
 - Metal shredding/recycling facilities
 - Clay/concrete facilities
 - Incinerators, coal-fired power plants, cement kilns



Suspended Solids: Highlights

- Identified practices and technologies to reduce suspended solids loadings
- Identified barriers to implementation of stormwater management practices, and drafted recommendations to address them
- Provided integrated view of impacts of land use and resource consumption on pollution to water

NYAS Harbor Program reports

Downloadable at: <http://www.nyas.org/programs/harbor.asp>



Other publications, reports,
outreach materials, maps

