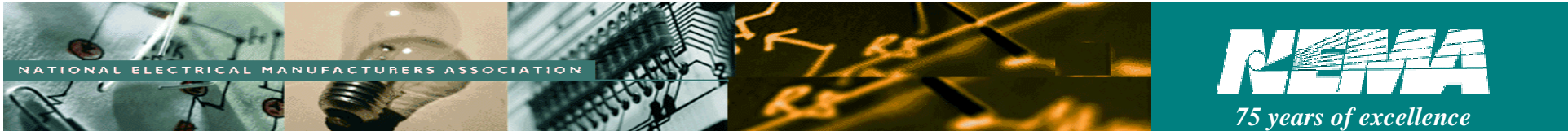


Great Lakes BiNational Toxics Strategy Mercury Workgroup Meeting

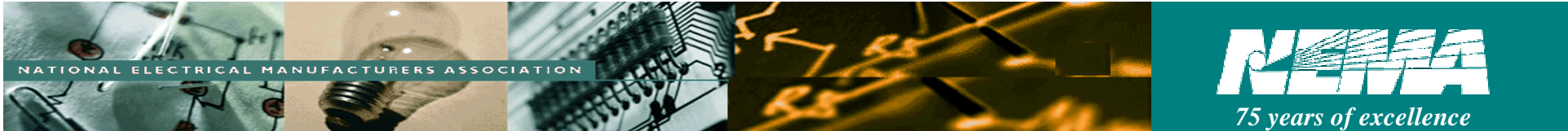
MERCURY REDUCTION IN THE ELECTRICAL PRODUCT INDUSTRY

MARK A. KOHORST
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
December 2005



NEMA VITAL STATISTICS

- Created 1926, Largest U.S. Trade Association of Electro-Industry Manufacturers
- Industry Standards, Advocacy, Data Collection & Analysis
- Membership Exceeds 400 US Manufacturers
 - 8 Industry Division, 54 Product Sections:
 - Batteries to Lamps to Surge Arresters to X-Rays, etc.
 - Product Shipments Totaling \$100 billion
- More than 500 Industry Standards; Internally and With ANSI and IEC



YOUR HUMBLE PRESENTER

- Senior Manager, Environment, Health & Safety
- Executive Director, Thermostat Recycling Corp
- 20 Years as Consultant in EH&S Issues
- Formerly Environmental Economist, US EPA Hdqs, Officer of Water



INDUSTRIAL MERCURY CONSUMPTION

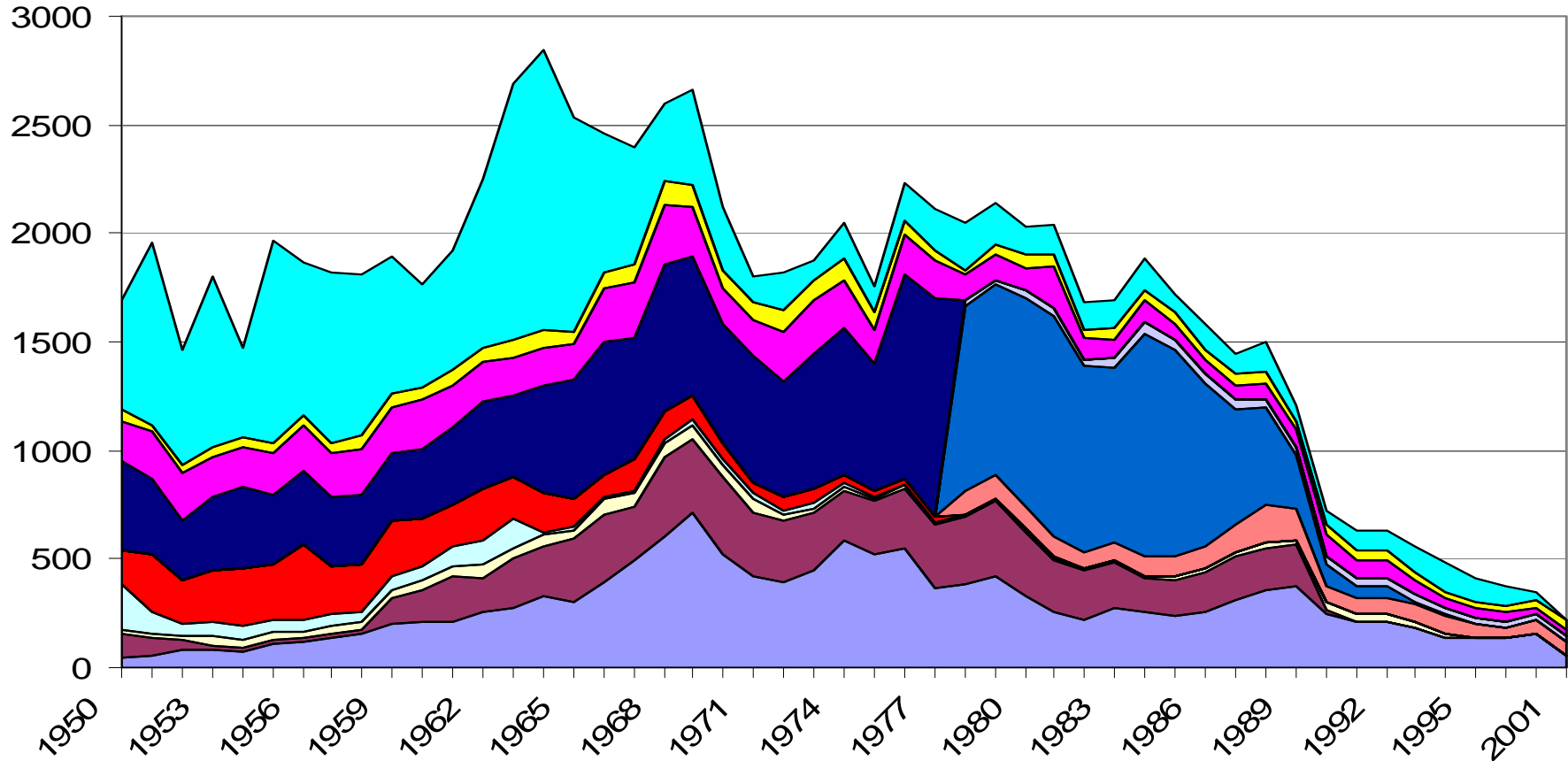
** INDUSTRY USE OF Hg HAS FALLEN DRAMATICALLY **

- Industry Consumption = ~2,000 Tons in 1980
- USGS Estimated 350 Metric Tons in 1997 ¹
- EPA Estimated 200 Metric Tons in 2001
- GLBTS Estimate: " . . . it appears that mercury use declined more than 50 percent between 1995 and 2003, assuming that mercury use by other sectors has remained constant since 1997."

[April 2005 Draft Mgmt Assessment for Mercury, Pg. 5]

1. Last year for which USGS provided industrial consumption data

U.S. mercury consumption, by end use; metric tons

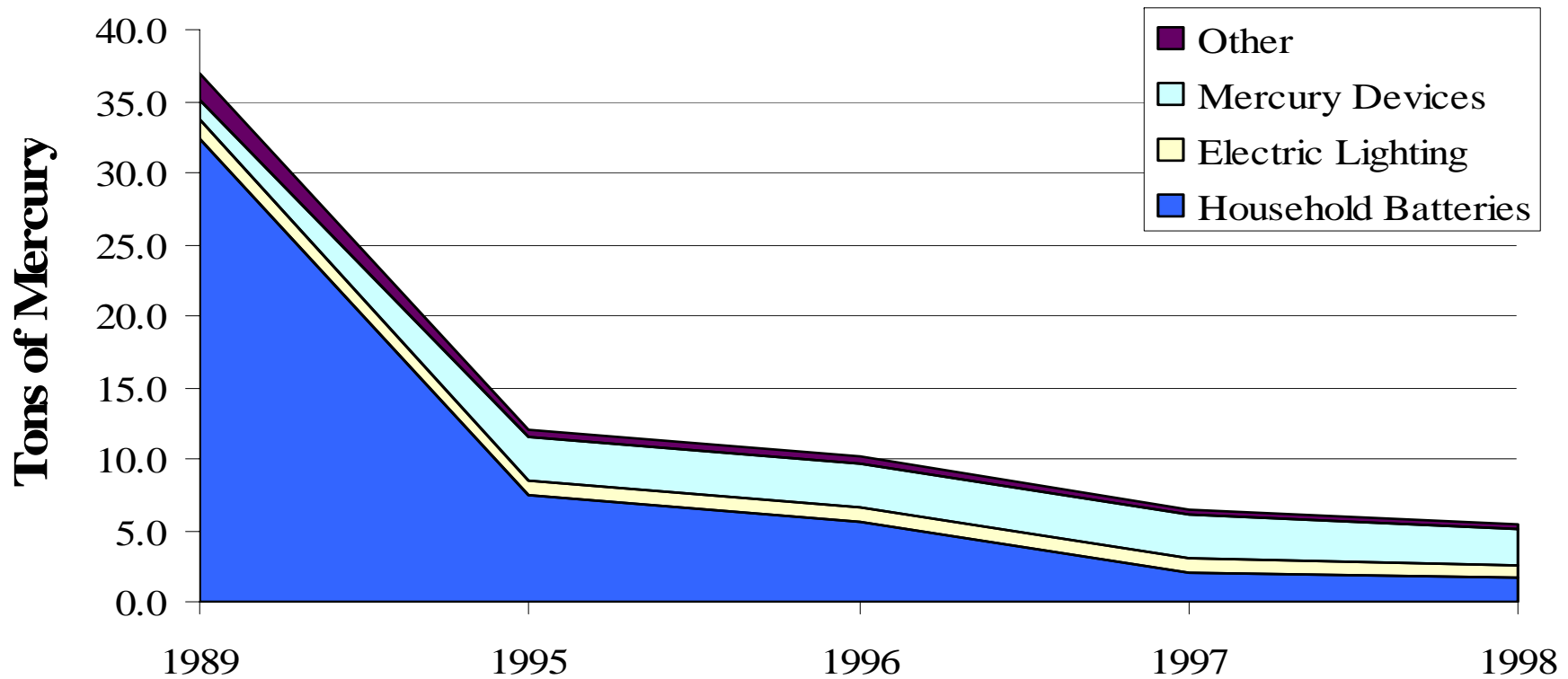


- Other
- Dental uses
- Measuring & control instruments
- Electrical, total; includes wiring devices, batteries, lighting prior to 1977
- Lighting
- Batteries
- Wiring devices & switches
- Agriculture
- Pharmaceuticals
- Laboratory uses
- Paint
- Chlorine & caustic soda mfr.

Source: U.S. Bureau of Mines: EPA (2001)

INDUSTRIAL CONSUMPTION Contd

Estimated Discards of Products Containing Mercury into Florida Municipal Solid Waste





IMPACT ON MERCURY DEPOSITION - MSW INCINERATORS -

** INCINERATOR EMISSIONS DOWN DRAMATICALLY **

- Source Reduction
- Increased Recycling
 - Draft EPA Estimate: 40-80 tons/year
- 1990 Clean Air Act Incinerator Controls
- EPA Data
 - 1990 - 42 tons
 - 2001 - 2 tons (< 2% of US anthropogenic emissions)



- LANDFILLS -

** LANDFILL EMISSIONS SMALL CONTRIBUTOR **

- 1998 EPA MERCURY REPORT TO CONGRESS
 - Landfill Emissions < 0.1 ton in 1994-95
- 2002 NEW JERSEY MERCURY REPORT:
 - "Low concentration of mercury in landfill gas....argues that no efforts to control this source are necessary at this time." [Vol III, Ch 3, pg 157]
- 2004 SWANA REPORT [Solid Waste Assn of North America]
 - "MSW landfills can provide for the safe, efficient and long-term management of disposed products containing RCRA heavy metals without exceeding limits that have been established to protect public health and the environment . . . for extremely long periods of time if not forever."
- 2005 RHODE ISLAND COMMISSION REPORT
 - "Emissions of mercury from Rhode Island landfills would be less than 1 lb"

MERCURY PRODUCTS - BATTERIES -

**** LEADERS IN REDUCING MERCURY CONTENT ****

➤ Industry Consumption 1980s: >1000 Tons Hg/Year

- Alkalines 8,000-12,000 PPM
- Zinc-Carbon ~100 PPM
- Mercuric Oxide 35-40% Mercury by Weight

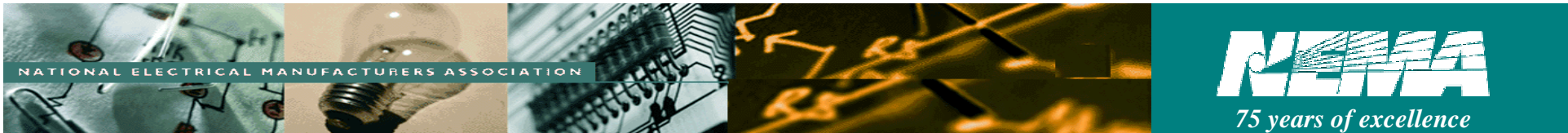


➤ Manufacturers PHASED OUT Mercury by 1993

➤ Predated Federal Ban by 3 Years

- *Mercury-Containing and Rechargeable Battery Management Act* (Public Law 104-142; 42 USC 14301 et seq.)
- Formalized Mercury Phase-Out
- Banned Mercury in All but Button Cells





BATTERIES Contd

** BATTERY WASTE STREAM REFLECTS Hg DECLINE **

➤ NEMA "Battery Sorts"

- Conducted Annually Since 1996-1997
- Camden Cty, NJ; Hennepin Cty, MN; Lee Cty, FL
- Typically 500 - 1000 lbs of Waste Batteries

➤ Focus is AGE and TYPE of Batteries in Waste Stream

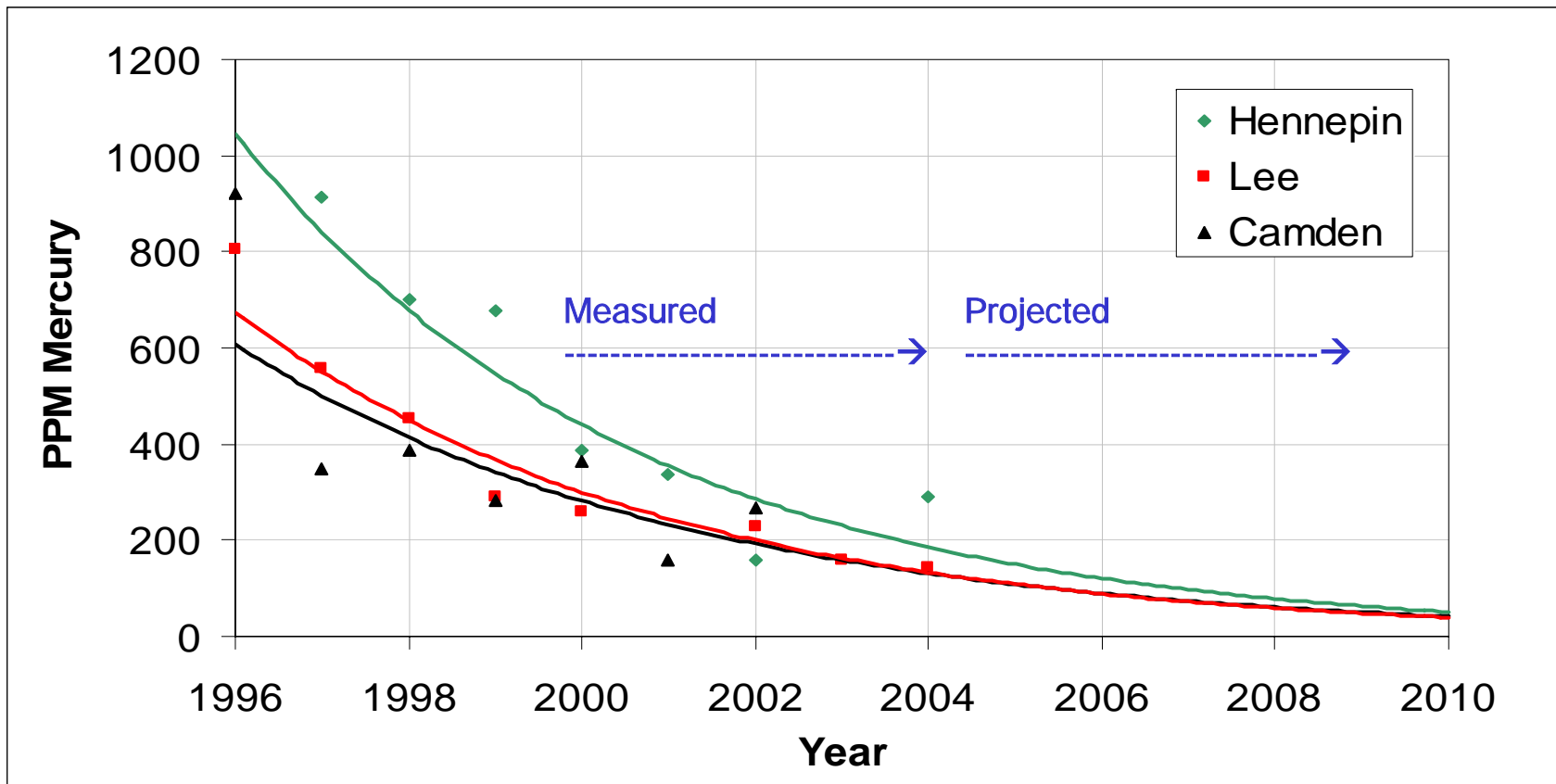
➤ Hg Content Computed Based on Battery Type, Year Produced

➤ Results: Percentage Hg-Free Batteries in Waste Stream

	<u>1996</u>	<u>2004</u>
▪ Camden:	67%	98.7%
▪ Hennepin:	66%	93%
▪ Lee:	62%	98%

BATTERIES Contd

Trend in Average Mercury Content: Alkaline Batteries



BATTERIES Contd

** BUTTON CELLS **

- Only Remaining Mercury Containing Batteries
 - Used in hearing aids, digital thermometers, insulin pumps, portable medical monitors, hospital pagers, watches, toys, and calculators
- By Fed Law: Cannot Exceed 25 mg Mercury per cell
- Three BC Battery Chemistries
 - Silver oxide (watch) 2.5mg
 - Zinc air (hearing aid) 8.5 mg
 - Alkaline (misc.) 11 mg



BATTERIES Contd

- 53,000 Average Hearing Aid Batteries = 1 Lb Mercury
- Annual Total = ~ 2.5 tons mercury
- Why Not Zero Mercury?



- Small size and need to provide maximum energy leaves little room for gas buildup before cell begins to bulge, possibly resulting in leakage and/or rupture

WWW.NEMA.ORG, WWW.RBRC.ORG

MERCURY IN LAMPS



- Fluorescent
 - Schools, Offices, Stores
- High Intensity Discharge
 - Metal Halide
 - High Pressure Sodium
 - Cold Cathode ("Neon")
 - Mercury Vapor
 - Street Lights, Floodlights, Industrial Lighting, Entertainment

LAMPS Contd

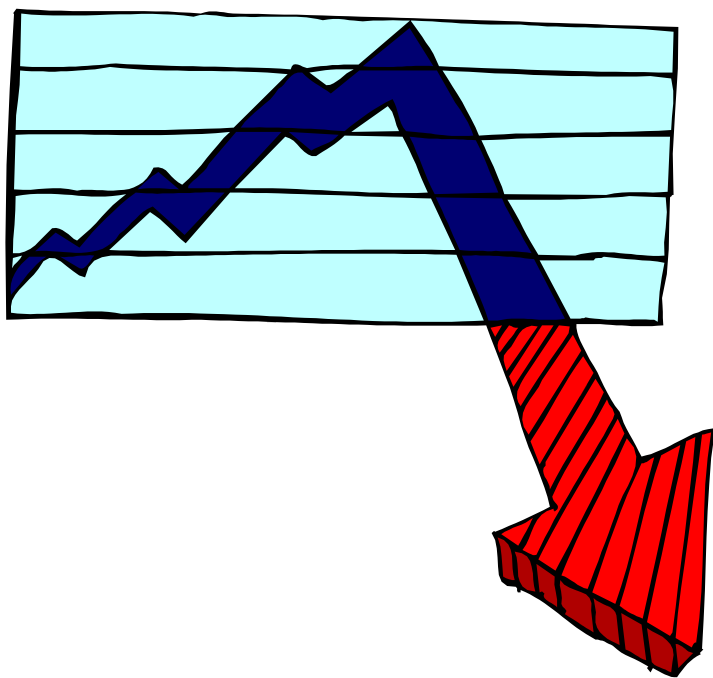
- **Hg Contributes to Efficient Operation of Fluorescent Lamps**
 - Efficiently generates ultra-violet energy, which is absorbed by phosphor coating on glass. Phosphor fluoresces, emits visible light
 - Metal halide and most HPS use mercury as starting aid and voltage control

- **U.S. Lighting Industry Mercury Use (Est. Tons)**

<u>1995</u>	<u>1997</u>	<u>2003</u>
33	32	7

LAMPS Contd

Since 1990, Industry Has. . . .



Reduced mercury in shipments by:

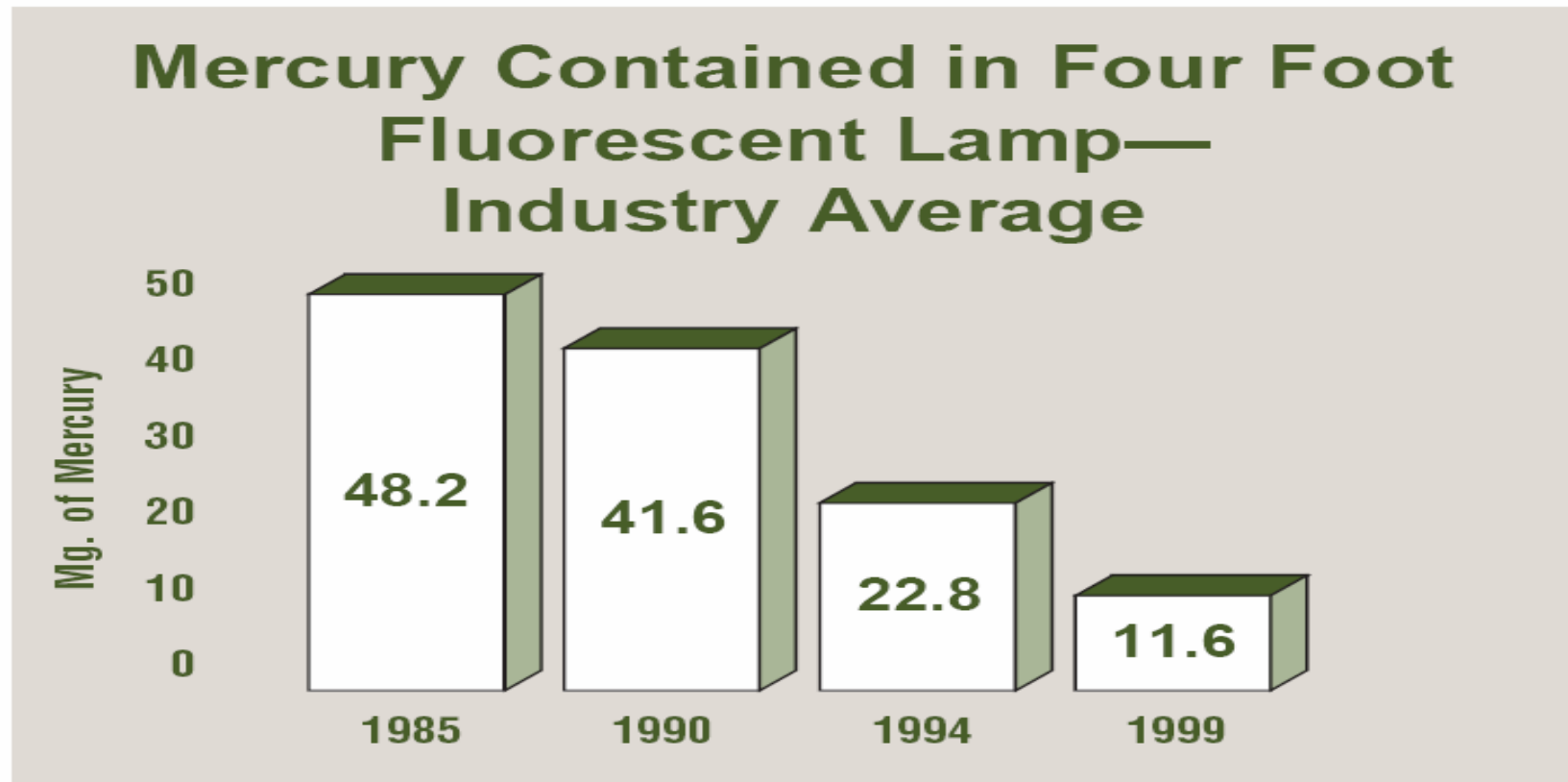
> 67%

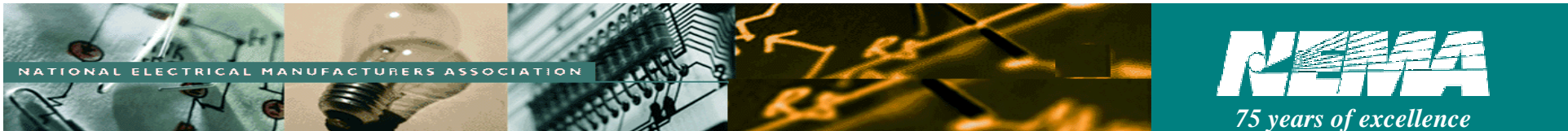
Reduced avg. 4-foot mercury dose by:

> 80%

LAMPS Contd

**** Lamp Industry - Steady Progress in Reducing Hg Content ****





LAMPS Contd

**** NOTE: Remaining Hg in Products Helps Reduce Overall Hg Emissions ****

➤ **CFLs Burn Many Hours Longer, Are More Efficient**

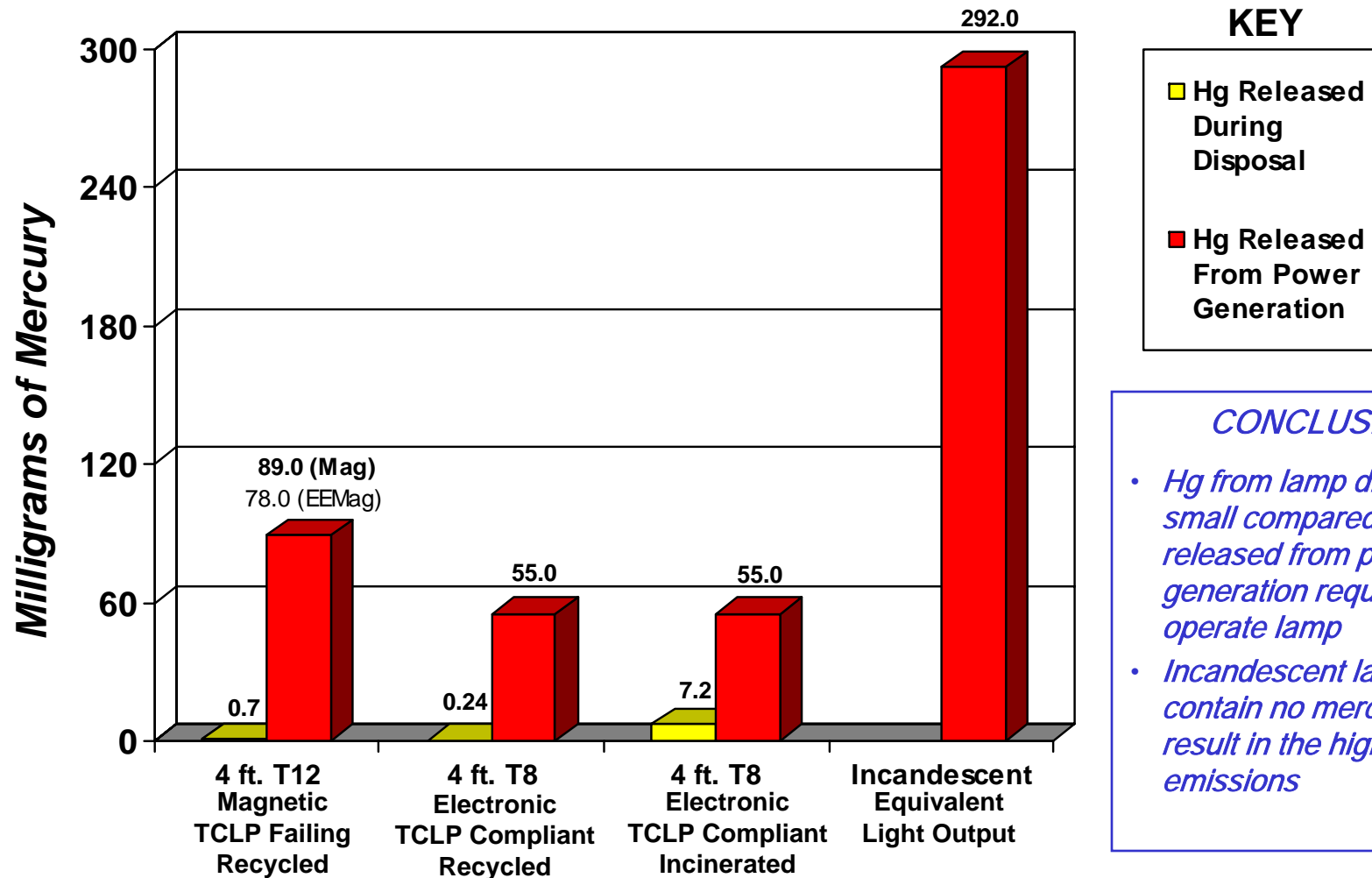
Higher Efficiency + Fewer Replacements = Less Energy Use
Less Energy Use = Reduced Power Plant Emissions
Lower Emissions = Less Mercury in the Environment

➤ **A "No-mercury" Fluorescent Lamp Loses ~ 70% Efficiency**

➤ **EPA, ENERGY STAR Program**

- "If every household in the US replaced one light bulb with an ENERGY STAR qualified CFL, it would prevent enough pollution to equal removing 1 million cars from the road."

Lifetime Mercury Emissions*



*Based on 20K burning hours, Hg content of 23 mg per T12 lamp, and 8 mg per T8 lamp. Hg content of fuels is the US weighted average for fossil and non-fossil fuels, calculated from "Environmental and Health Aspects of Lighting: Mercury" J.IES 1994. Disposal emissions assume 3% in residuals of recycling, 90% from incinerators.



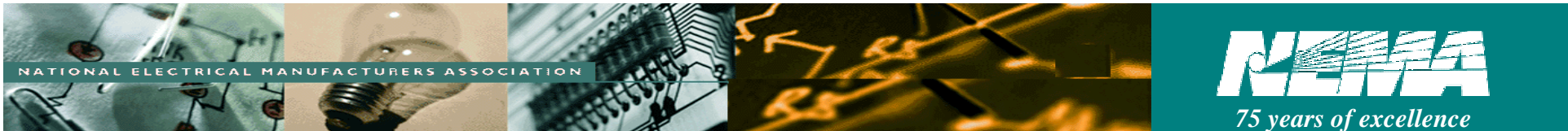
LAMPS Contd

** LAMP RECYCLING **

- WWW.LAMPRECYCLE.ORG and WWW.ALMR.ORG
 - Sponsored by NEMA Lamp Manufacturers, Lamp Recyclers
 - Contains State and Federal Rules
 - Lists Recycling Contacts Across the US
 - Promotes Recycling
- EPA Recycling Outreach
 - \$2 Million appropriation
- National Lamp Recycling Rate
 - Est at ~24% Nationwide
 - Higher for Industry, Govt; Lower for Hshlds

THERMOSTATS

- ** Mercury Switch Mechanical Thermostats ****
- ~ 2.8 grams/Switch, 1.4 Switches/Thermostat
 - Mercury Rolls Freely in Glass Tube of a Switch; Breaks or Makes Electrical Circuits; Signals for Heat or Cooling
 - Non-Mercury Stats Can Have Disadvantages
 - Reliability, Durability
 - Energy Efficiency
 - Retrofitability
 - Cost
 - Difficult for Visually Impaired, Handicapped
 - But What About Disposal??



THERMOSTAT RECYCLING CORPORATION

- Founded 1997 By Three Major Manufacturers:
 - Honeywell
 - White-Rodgers
 - GE

- Began in 9 States, 2001 Went to All Lower 48

- Cost-Efficient Program Utilizing Universal Waste Rule
 - UW rule requires collection of whole thermostat
 - Ampoule collection -- occupational health issues

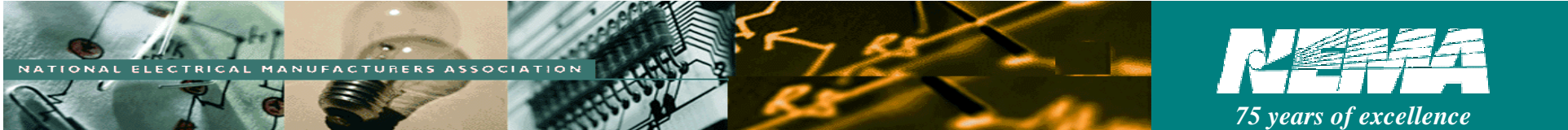
**** TRC LOSES MONEY– MERCURY HAS LITTLE VALUE ****



THERMOSTAT RECYCLING CORPORATION Contd

- TRC Signs Up Wholesalers AND HVAC Contractors
 - Almost 1200 Wholesalers Currently Participating
 - More Than 115 Chain Stores
 - 50 Contractors Thru Aug 2005
- Participant Pays One Time \$15 Fee per Container
 - Plastic Container, 1x1x2 Feet
 - Inner Plastic Liner, Ties
 - Instructions
 - Mailing Labels
- **Manufacturers Pay all Transport and Hg Recovery Costs**





THERMOSTAT RECYCLING CORPORATION Contd

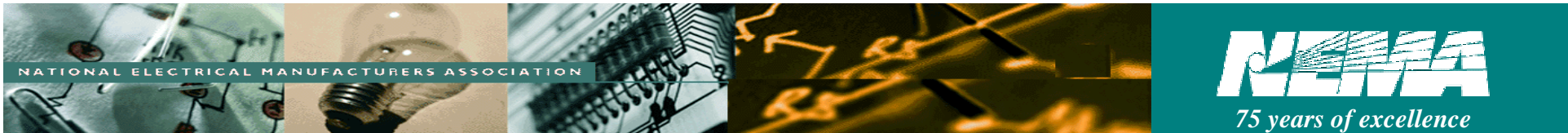
- Full Bin is Shipped Free to Clipping Site - Honeywell
 - 50 - 100 Stats
- Clipped Ampoules Sent to Bethlehem Recovery Site
- TRC Maintains Count of Stats, Lbs of Mercury
- Publishes Results; WWW.NEMA.ORG/TRC

THERMOSTAT RECYCLING CORPORATION Contd

** TRC Collection Results **

	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>
THERMOSTATS	27,780	31,611	48,104	90,501	64,957	80,094
LBS MERCURY	237	256	401	762	626	729.4

- Total for Program: 393, 465 Stats, 3,473 Lbs Mercury
(Through July 2005)
- Projection for 2005: 100,000 Stats, 925 Lbs Mercury



THERMOSTAT RECYCLING CORPORATION Contd

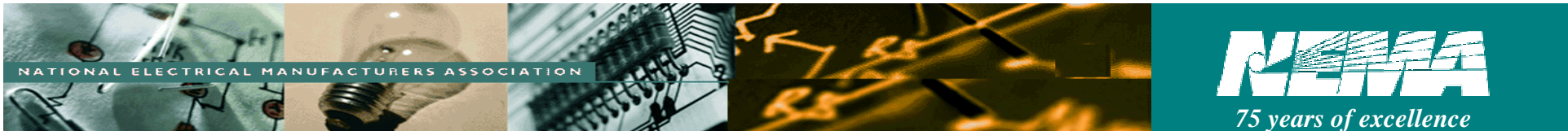
** TRC Expansion Initiatives **

- Working Closely With Product Stewardship Institute
 - www.productstewardship.us
- 2004: Opened Program to Contractors Directly
- 2006 Financial Incentive Pilot Project
 - Two States: Indiana and Oregon
 - Funding from TRC, EPA Region V, PG&E
 - 50 Contractors Thru Aug 2005

CONCLUSION

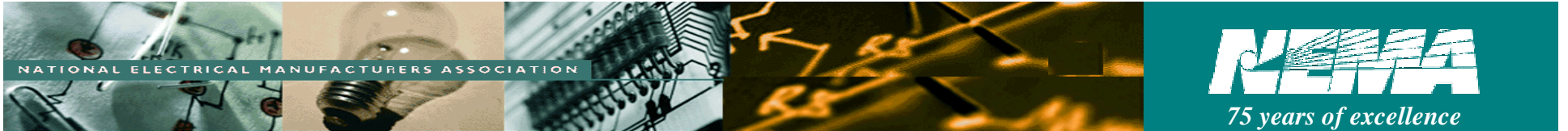
- Efforts to Reduce Amount of Mercury in Environment Stemming from Products Have Been Successful
 - Source Reduction
 - Recycling
 - Regulatory Controls

- Mercury in Electrical Products Is Very Small and Declining Source of Mercury Deposition



CONTACT INFORMATION

- Mark A. Kohorst
- 703-841-3249
- Mar_kohorst@nema.org
- NEMA
Suite 1752
1300 North 17th Street
Rosslyn, Va. 22209



FINAL THOUGHT

Get your facts first, then you can
distort them as much as you please."

- Mark Twain -