



New Frontiers in Green Buildings

Toxins in Building Materials

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INFORM

- 30-year-old, national, non-profit environmental research and outreach organization
- Key research areas:
 - Chemical Hazards Prevention
 - Solid Waste Prevention
 - Sustainable Transportation

INFORM works with government agencies, schools and businesses to facilitate business practices that are environmentally preferable.

New Frontiers Project

- EPA funded research and outreach projects
- Began with work in New York and New Jersey
- Focus on persistent bioaccumulative toxins – mercury, lead, cadmium, PCBs, dioxins... – (PBTs)

Toxins in Products

- 92% of PBTs leave factories in products
- In 2001 over 151 tons of mercury was added to products*
- 14 billion pounds, or 75%, of polyvinyl chloride manufactured is used in building materials**
- There is no requirement to label products that contain PBTs

*Maine Department of Environmental Protection “A Strategy to Reduce the Mercury Content of Products” January 2003

** Healthy Building Network “PVC Fact Sheet”

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PBTs in Building Products

- Mechanical systems
- Lighting systems
- Vinyl in plumbing, roofing, interior finishes, window frames, house siding...
- Brominated flame retardants in furniture and electronics
- Cadmium in solders and metal plating

Mercury in Mechanical Systems

- Heating
- Cooling
- Ventilation
- Site water control
- Fresh water supply
- Water purification
- Sewage
- Gas supply

Including:

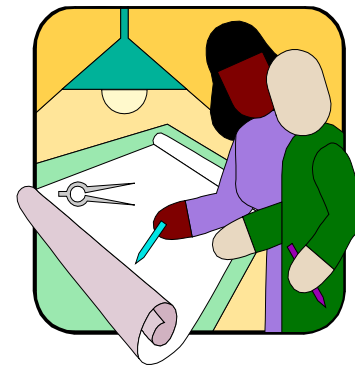
- Tilt switches
- Flow controls
- Aqua stats
- Pressure stats
- Fan limit controls
- Many other examples

Mechanical Systems Regulators Use Mercury

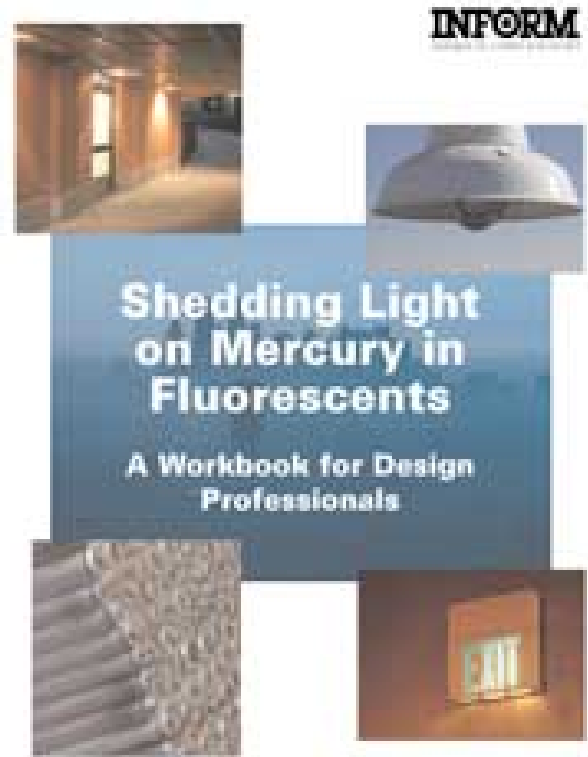
- Regulatory and measuring devices contain from a single gram up to a pound of mercury
- Overall information on mercury content is not available

Mercury-Free Mechanical Systems

- Cost effective alternatives meet performance specification
- Write clear mercury restrictions
- Ask for mercury-free specifications



Shedding Light Report



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Lighting uses of Mercury

- In 2001 12%, or 18 tons, of mercury intentionally added to products went into lighting
- 680 million lamps, containing 13 tons of mercury entered the waste stream in 2004
- Up to 80% of these went to municipal landfills and incinerators

Energy Efficiency

- Coal-fired electric power plants are the nations single-largest source of mercury emissions
- Energy efficient technology relies on mercury

Milligrams Matter

- Reducing the the amount of mercury per lamp will reduce environmental mercury releases
- Lamps can break during use, sending volatilized mercury into the air we breath



Low-Mercury Lighting Solutions

- Incorporate low-mercury along with energy efficiency and lamp life into specifications
- Technology improvements – ex: induction lamps, HO T5 lamps

These lighting products will meet design criteria, are cost competitive, and energy efficient.

Mercury Content of T8 Lamps

Manufacturer	Mercury Content
Philips Alto	3.5 milligrams
GE	6 milligrams
Sylvania	6 to 8 milligrams
Medium-Sized Retailer	200, 10,000 Square Foot Facilities
Philips Alto, 3.5 mg	250 mg in 10 yrs
GE or OSI, 6 mg	350 mg in 10 years

T5 High-Output Fluorescents

- Replace metal-halides in high-bay applications
- Save money in electrical costs

Medium Sized Retailer	<u>200 facilities:</u> <u>10,000 square feet each</u>
High-output T5	81 – 290 grams Hg per decade
Metal-halides	580 – 940 grams Hg per decade

Fluorescent Induction Lamps

- Rated life of 100,000 hours
- Resist extremes of temperature, vibration

Medium Sized Retailer	<u>200 - 10,000 square foot facilities</u>
Fluorescent Induction Lamps	130 -160 Grams Hg per decade
Metal Halides	580 – 940 Grams Hg per decade

Mercury in Existing Buildings

- Most mercury in buildings is in existing structures
- Clearly label all mercury added devices
- Write demolition specifications



Vinyl Products

For more information see:

- Healthy Building Network *PVC Fact Sheet* at: <http://www.healthybuilding.net/pvc/index/html>
- *Environmental Impacts of Polyvinyl Chloride Building Materials* by Joe Thornton, Ph.D.
- Upcoming INFORM PBT report

Vinyl

- Toxins in Manufacturing
- Lethal additives
- Use risks
- Recycling issues
- Alternatives

Toxic Manufacturing

- Unavoidably generated in manufacture:

- Polychlorinated dioxins and furans
- PCBs
- Hexachloroethane
- Hexachlorobutadiene

All of the above chemicals are on the EPA's 31 Priority Chemicals List

- Present in at least trace amounts in chlorine gas:

- Hexachloroethane
- PCB
- Octachlorostyrene (OCS)

Additives

- Stabilizers and plasticizers including
 - Lead
 - Cadmium
 - Phthalates

Use Risks

- Stabilizers and plasticizers can leach, flake or outgas – increasing risks of asthma, cancer, and lead poisoning
- Deadly fire hazard – releases hydrogen chloride and dioxin
- Toxins in products used to maintain flooring

Can not Be Readily Recycled

- Additives in PVC cause problems in recycling
- In some cases is considered a contaminant
- Best cradle-to-cradle scenario is a same-product loop

Uses and Alternatives

- Piping – replace with cast iron, steel, vitrified clay or high-density polyethylene
- Siding – replace with fiber-cement board, stucco, wood, brick or polypropylene
- Roofing – replace with TPO, EPDM, metal roofing

Uses and Alternatives

- Electrical insulation and sheathing – replace with linear low-density polyethylene, thermoset crosslinked polyethylene (XLPE)
- Windows and doors – replace with wood, fiberglass or aluminum

Uses and Alternatives

- Resilient flooring – replace with linoleum, bamboo, ceramic, wood, recycled rubber, concrete or nonchlorinated plastics
- Carpet backing – replace with unbacked carpet or natural fiber backing
- Wall covering – replace with natural fibers
- Wall protection – replace with wood, or metal

INFORM Mercury Fact Sheets

- Specifying and Sourcing Mercury-Free HVAC and Building Equipment
- The Low-down on Mercury in Fluorescent Lamps
- Mercury-Containing Lamps and EPA's Toxicity Characteristic Leaching Procedure
- Environmentally Preferable LED Exit Signs: Saving Money and Protecting the Environment Through Energy Efficiency
- High-bay Lighting: Opportunities for Mercury Reduction and Energy Efficiency

New Frontiers in Green Building: Toxins in Construction

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