

Successful Waste Minimization Through Laboratory Mercury Thermometer Replacement

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Mercury Thermometer Replacement Program Goals

- Protect the Environment
- Minimize Hazardous Waste
- Reduce Disposal Costs
- Protect Students, Faculty and Staff
- Ultimately Create a Mercury Thermometer-Free Campus

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Mercury Thermometer Replacement Program Accomplishments

- Replaced Nearly 1500 Thermometers
- Removed 89 Pounds of Mercury
- Received the 2002 “Environmental Achievement Award” from Region 9 Environmental Protection Agency

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Why Mercury?

- Mercury is a potent neurotoxin that bioaccumulates in the environment
- Mercury concentrations in San Francisco Bay are already high enough to threaten human health in addition to several rare and endangered species
- California Office of Environmental Health Hazard Assessment has issued a fish consumption advisory

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Why Mercury?

- Mercury is a priority for the California Regional Water Quality Control Board
- City of Palo Alto enforces a sewer discharge limit of 0.01 mg/L and is considering further reductions
 - One broken mercury thermometer in a sink could put Stanford University out of compliance

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Mercury Thermometer Replacement Program Development

- 1999 Task Force on Mercury
 - Identified and Evaluated all sources of mercury on campus:
 - Fluorescent light bulbs
 - Mercury-containing switches
 - Batteries
 - Sphygmomanometers
 - Lamps
 - Thermometers

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Mercury Thermometer Replacement Program Development

- Task Force evaluated the mercury sources based on:
 - Frequency of use
 - Abundance of process
 - Environmental impacts of process
 - Ease and efficiency of replacement
 - Hazardous waste risk factors
 - Potential for a replacement program

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Mercury Thermometer Replacement Program Development

- Thermometers were determined to be the most widespread source of mercury on campus with the most readily available alternatives
- Thermometers were also associated with high hazardous waste clean-up costs

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Mercury Thermometer Replacement Program Implementation

- Task Force Created a list of prioritized buildings based on:
 - Programs purchasing the most thermometers
 - Highest incidents of thermometer spills

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Mercury Thermometer Replacement Program Implementation

- **Center for Clinical Science Research (CCSR) in the School of Medicine**
 - New Building
 - 50 labs and 500 researchers
 - Informational packets were provided to researchers
 - Non-mercury thermometer alternatives for wide variety of applications

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Mercury Thermometer Replacement Program Implementation

- **Thermometer exchange based on a simple process:**
 - Researchers show interest
 - EH&S provides consultation on replacement alternatives
 - EH&S places order
 - EH&S exchanges mercury thermometers with non-mercury alternatives

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Mercury Thermometer Replacement Program Implementation

- **VWR Chosen as Supplier**
 - Wide variety of non-mercury thermometers available
 - Best exchange program
 - Accepts mercury thermometers back at no cost to Stanford University
 - VWR recycles the mercury

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Mercury Thermometer Replacement Program Funding

- Environmental Health & Safety funds the purchase of the non-mercury replacement thermometers
 - Non-mercury thermometers range in price from \$8.00-\$37.00, depending on application

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Mercury Thermometer Replacement Program Funding

- Initially, Stanford's Utilities Department funded staffing to research
 - Vendor options
 - Various thermometer uses
 - Available alternative thermometers
- EH&S now manages the entire program

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Mercury Thermometer Replacement Program Health Benefits

- Improved Working Environment for Researchers
 - Mercury vaporizes at room temperature and can cross the blood-brain barrier into the central nervous system, causing:
 - Fatigue
 - Weakness
 - Memory loss

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Mercury Thermometer Replacement Program Health Benefits

- Long-term exposure to mercury can cause:
 - Renal toxicity
 - Skeletal muscle degeneration
 - Gastrointestinal irritation
 - Pulmonary edema
 - Elevated blood pressure
 - Fever and flushing of palms/soles

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Mercury Thermometer Replacement Program Environmental Benefits

- Reduced spills result in lower risk to the environment:
 - Mercury bioaccumulates, causing an increase in concentration in higher organisms
 - After mercury has been ingested by fish and subsequently by humans, elemental mercury converts to methyl mercury

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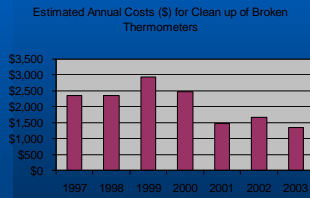
Mercury Thermometer Replacement Program Environmental Benefits

- Methyl Mercury causes a range of health effects, including:
 - Neonatal brain damage
 - Nephritis (inflammation of the kidneys)
 - Paresthesia (tingling skin sensation)
 - Muscle fasciculation (twitching muscles)
 - Abnormal heart rhythms
 - Chromosomal aberrations
 - Dermatitis

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Mercury Thermometer Replacement Program Environmental Benefits

• Reduction in Clean-Up Costs



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Mercury Thermometer Replacement Program Model for Other Institutions

- Potential for environmental release and human exposure exists wherever mercury thermometers are employed
- It is in the best interest of employees and employers to reduce the use of mercury wherever possible

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Mercury Thermometer Replacement Program Management Support

- Support by management evident by:
 - Initial funding of \$15,000 to start the program
 - Additional funding to expand beyond the pilot areas
 - \$25,000 to date for 1500 thermometers ranging in cost from \$8.00-\$37.00 each

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Mercury Thermometer Replacement Program Future

- Program currently expanding to include Departments of Chemistry, Engineering and other areas
- EH&S does no advertising – word of mouth from satisfied participants has kept the program going strong

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Mercury Thermometer Replacement Program Future

- EH&S is considering including mercury manometers
- EH&S partnered with the City of Palo Alto to act as a drop-off point for residents to exchange their home mercury thermometers for a free digital replacement

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Mercury Thermometer Replacement Program Contact Information

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