Pollution Prevention for Sustainable Healthcare

Environmental Compliance Assistance Workshop
for Mississippi Hospitals & Healthcare Facilities
July 30, 2008
EPA says…

“Pollution Prevention is any practice that reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or released into the environment prior to recycling, treatment or disposal.”
Pollution Prevention

- Saves Materials
- Saves Energy
- Saves Time
- Reduces Expenses
Solid Waste Management Hierarchy

Source Reduction and Reuse

Recycling/Composting

Combustion with Energy Recovery

Landfilling and Incineration without Energy Recovery

Most Preferred

Least Preferred
Pollution Prevention Opportunities

- Environmentally preferable purchasing
- Inventory control improvement
- Raw material substitution
- Process or Procedure modification
- Energy efficiency improvement
- Training
- Maintenance/Housekeeping Practices
Environmentally Preferable Purchasing (EPP)

"products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose"
Use simple alcohols and ketones in place of petroleum hydrocarbons such as toluene and xylene

Substitute terpene based solvents or naptha isoparaffinic hydrocarbons for xylenes used for slide cleaning

Incorporate environmental language in your requests for proposals (RFPs) and purchasing contracts
Environmentally Preferable Purchasing/Inventory Control - Hospitals

- Purchase in totes or recyclable containers
- Ensure distribution throughout the facility through one person
- Develop plans for leftover chemicals with disposal as last resort
Raw Material Substitution

- **Substitutes for formalin**
  - Bleach, peracetic acid or other disinfectants might be used for dialysis machines/dialyzers

- **Evaluate specialty detergents, potassium hydroxide, or sonic baths** to replace chromic and sulfuric acid for cleaning glassware

- **Mercury-free products**

- **HK- use phenolic disinfectant alternatives**
Process or Procedure Modification

- Do not mix waste unnecessarily
- Evaluate sonic or steam cleaning instead of chemical sterilization
- Evaluate routine lab processes to determine if quantities of reagents are reducible
  - Calibrated solvent dispensers
  - Reduced reagent volumes
Energy Efficiency Improvement

Energy Star for Healthcare

SUPERIOR ENERGY MANAGEMENT CREATES ENVIRONMENTAL LEADERS

ENERGY STAR for Healthcare

Healthcare organizations spend over $2.5 billion on energy each year to meet patient needs. Every dollar a nonprofit healthcare organization saves on energy is equivalent to generating new revenues of $20 for hospitals or $10 for medical offices. Just a 5 percent reduction in energy costs in for-profit hospitals, medical offices, and nursing homes can boost earnings a penny per share.

What You Can Do

- Establish a comprehensive energy management program using ENERGY STAR's Guidelines for Energy Management.
- Join ENERGY STAR.
- Get started with the Healthcare Benchmarking Starter Kit and the Healthcare Fact Sheet.

Quick Finder

- Portfolio Manager Login
- Target Finder
- ENERGY STAR Challenge
- ENERGY STAR Leaders
- Purchasing & Procurement
Energy Star for Healthcare

“Rating Energy Performance with EPA’s Portfolio Manager for Healthcare Facilities”

Thursday, August 14
1:00 – 2:30

http://www.energystar.gov

- Tools and Resources Library
- Getting Started for Healthcare
Benchmarking Energy Usage

US EPA Energy Performance Rating System

Sample Acute care
177 bed facility
280,000 square feet
Service Providers Offer Automated Benchmarking

<table>
<thead>
<tr>
<th>Service Provider</th>
<th>Number of Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advantage IQ</td>
<td>29,550</td>
</tr>
<tr>
<td>LPB Energy Consulting</td>
<td>925</td>
</tr>
<tr>
<td>UtilityAccounts.com</td>
<td>805</td>
</tr>
<tr>
<td>Cadence Network</td>
<td>315</td>
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<tr>
<td>New Energy Technology</td>
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</tr>
<tr>
<td>Johnson Controls</td>
<td>125</td>
</tr>
<tr>
<td>EnergySolve</td>
<td>125</td>
</tr>
</tbody>
</table>

Ref: EPA EnergyStar as of 2/3/08
Training

- Waste Segregation
  Studies have shown typically 30-50% of what is disposed as Regulated Medical Waste could have been managed as Solid Waste

- Visual Reinforcement
  Posters, Placards, Signage
Recycling Opportunities

- Distilling of xylene, formalin
- Using reusable sharps container
- Reprocessing Medical devices
- Solid Waste – paper, plastic
- Fluorescent lights
- Batteries
Xylene recovery is common. Formalin recovery is becoming more common in health care facilities. Recycling formalin is economical when using about 5 gallons a week, factoring in neutralizer and waste disposal costs.

Non-technical staff can safely operate distillation and filtration equipment, which require little operator time. Transfers or chemistry adjustments should take place under a hood with carbon filters to prevent vapors from dispersing.
Reusable Sharps Container

- Most Service Providers calculate container requirements
- Containers are emptied mechanically – lessening potential for needlesticks (one survey 10—30% less)
- Per FDA, typical containers can be reused up to 500 times with proper disinfection
Reprocess “Single Use” Medical Devices

- Previously utilized devices
- Opened and unused devices
- Unopened devices whose expiration date has passed

- Arthroscopic shavers
- Scissors and staplers
- Biopsy forceps
- Clamps and dissectors
- Orthopedic drill bits and burrs
- Soft tissue ablators
- and more……..
More information on reprocessing:

The Association of Medical Device Reprocessors

www.amdr.org
Hospital Solid Wastes

Solid Waste – 16 lbs/day/patient

Paper & Plastic!!
## Cardboard Recycling

<table>
<thead>
<tr>
<th>Number of Beds</th>
<th>Estimated Cardboard Generation (tons/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>2</td>
</tr>
<tr>
<td>50-100</td>
<td>2-4</td>
</tr>
<tr>
<td>100-200</td>
<td>4-8</td>
</tr>
<tr>
<td>200-300</td>
<td>8-12</td>
</tr>
<tr>
<td>300-400</td>
<td>12-16</td>
</tr>
<tr>
<td>400-500</td>
<td>16-20</td>
</tr>
</tbody>
</table>

300 bed hospital

\[
\text{144 tons per year x $85/ton} = \$12,240 \text{ revenue}
\]

\[
\text{144 tons per year x $45/ton} = \$6,480
\]

TOTAL = $18,720
The two most common types of energy-efficient lighting that contain mercury are:

- fluorescent bulbs, including compact fluorescent light bulbs (CFLs) and
- high intensity discharge (HID) bulbs
  - mercury vapor bulbs, metal halide and high-pressure sodium bulbs
Batteries

- **Lead Acid**
- **Nickel-Cadmium**
  - Alarm systems, pagers, backup power sources in medical monitors and equipment
- **Mercuric oxide**
  - Hearing aids, smoke detectors, Monitors (oxygen, fetal, portable EKG)
- **Lithium**
- **Silver cadmium**
  - Medical electronics
- **Zinc-air**
  - Hearing aids, electronic pagers
Resources

EPA  http://www.epa.gov

SECTOR Info
- Fact Sheets
- Posters
- Case Studies
- Guidance Documents

TOPIC Info
- EPP
- Water Conservation
- Green Cleaning

http://www.epa.gov/region09/waste/p2/hospart.html
Recycling and Solid Waste Reduction Program

The Recycling and Solid Waste Reduction Program is part of the Office of Pollution Control at the Mississippi Department of Environmental Quality.

The program works with municipal, county, state and federal governments, commercial and industrial facilities, military facilities, schools, institutions including colleges, universities and hospitals, and the general public. The goal of the program is to:
HEALTH CARE WITHOUT HARM

A global coalition of 473 organizations in more than 50 countries working to protect health by reducing pollution in the health care sector

www.noharm.org/us
The Sustainable Hospitals Program is part of The Lowell Center for Sustainable Production located within the University of Massachusetts.

http://www.sustainablehospitals.org
Resources - Web

Subscriber Service – Practice Greenhealth (formerly H2E)

http://www.practicegreenhealth.org
GREEN GUIDE FOR HEALTH CARE
A best practices guide for healthy and sustainable building design, construction, and operations for the healthcare industry

www.gghc.org
Resources - Web

US GREEN BUILDING COUNCIL - LEED RESOURCES

www.usgbc.org/leed

Mississippi Chapter

FIRST FRIDAY EDUCATIONAL SERIES

http://chapters.usgbc.org/mississippi
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Mary Jean Gates  662-846-0448
maryjeangates@bellsouth.net
Case Study: Christ Hospital  
Cincinnati, Ohio  

- Recycles 390 tons of waste annually  
  - Net benefit of $75,000 in 2006  

- Energy  
  - Lighting audit resulted in $274,600 over 5 yrs  
  - Chiller optimization program - total deferred cost of $191,000 per year
Act Now!!

✓ Increase recycling rates to 20% of total waste volume (or higher!).
✓ Reduce RMW generation to less than 5 pounds per bed per day.
✓ Transition to a reusable sharps container program, significantly reducing Regulated Medical Waste.
✓ Recycle all fluorescent bulbs regardless of green tip status.
✓ Investigate reprocessing services where appropriate, to drastically reduce waste generation and conserve resources.
Integrate green building approaches and materials into any renovation or new construction projects.
Implement a Green Cleaning program to improve indoor air quality and reduce worker and patient exposures.
Implement a food waste composting program.
✓ Implement a best management practices approach to handling hazardous pharmaceutical waste.
WHERE DO I START?

HOW CAN I MANAGE EVERYTHING?
Environmental Management Systems

A “best practices” approach for continual improvement
“Senior management saw the EMS approach as the most effective and efficient way to achieve management of the environmental processes”
- Sheila Finch, DMC

First Hospital in the US to achieve registration in the environmental system (ISO14001)
WHY AN EMS?

✓ Moves “beyond compliance”
✓ Combines multiple environmental programs under one umbrella
✓ Provides structured format for continual improvement
EMS Components

- Policy
- Environmental Aspects and Impacts
- Training
- Communication
- Documentation/Document Control
- Operational Control
- Emergency Preparedness & Response
- Monitoring/Measurement
- Auditing
Environmental Management System

An EMS challenges hospital employees to identify and prioritize environmental aspects, take steps to minimize adverse environmental impacts, and set targets to continually improve performance.
## Sample Environmental Aspects & Impacts

<table>
<thead>
<tr>
<th>Activity</th>
<th>Aspect</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparing Antineoplastic/Cytotoxic Drugs</td>
<td>Biomedical Waste generation</td>
<td>Human health, Air Pollution (e.g. incineration), Waste (Hazardous)</td>
</tr>
<tr>
<td></td>
<td>Air Emissions (requires fume hood)</td>
<td>Human health, Air Pollution (chemical vapors)</td>
</tr>
<tr>
<td></td>
<td>Possible Occupation Exposure to Cytotoxic Material</td>
<td>Human health, Air Pollution (chemical vapors)</td>
</tr>
</tbody>
</table>
The Health Care Guide to Pollution Prevention Implementation through Environmental Management Systems

EPA/625/C-05/003

Example EMS procedures, forms, case studies, auditing tools
MDEQ’s Environmental Stewardship Initiative
MDEQ P2 Contacts (Again!)

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