

Georgia's Own Robins Air Force Base Wins National P2 Award

Robins AFB Captures Air Force P2 Award Fourth Time Since 1993

by Linda Larson, Integrated Solid Waste Program Manager, Pollution Prevention Division, Robins AFB

The Robins AFB Pollution Prevention Program was recently selected as winner of the 2001 Air Force General Thomas D. White Pollution Prevention Award (Industrial Category). As the Air Force winner, Robins is now competing for the DoD-level Secretary of Defense Environmental Security recognition in this category.

Pollution prevention is no easy undertaking at a huge industrial complex such as Robins—the employment location for almost 26,000 workers and home to hundreds of military members and their families. This is an installation-wide award, as pollution prevention efforts from the flightline to family housing curbside recycling contributed to this recognition.

New P2 efforts are using technologies such as Flashjet,

a xenon flash lamp and carbon dioxide pellets, to remove paint coatings from aircraft and composite parts, reducing dependence on chemicals such as methylene chloride. A process improvement of flightline industrial vacuums has resulted in separating the water from the oil, sending the water to the installation industrial wastewater treatment plant and reducing hazardous waste disposal by one-half of the old process. Nonhazardous waste reduction is just as impressive: 47 percent of Robins' solid waste stream is diverted from disposal by reusing, recycling, and composting.

The Secretary of Defense Environmental Security Award winners are expected to be announced in early April.

Why Not Make Your Garage Clean and GREEN this Spring?

by Stephanie Busch, Program Manager, P²AD

Look around your garage—it probably has cans of paint, thinner, and gasoline sitting around. Well here are a few tips that P²AD staff learned on a project that can help you organize and make your garage greener and safer while you're spring cleaning.

P²AD staff recently helped design a "green garage" for the 2002 New American Home. The New American Home, built for the International Builders' Show in Atlanta in February, is a state-of-the-art home, showcasing the latest products and technologies in home building. Since the home was open to the public after the Builder's Show, the "Green Garage" was a perfect location to educate the public about recycling and household hazardous waste.

The environmental features of the green garage (shown in the picture) include a flammable storage cabinet, recycling center, safety /

first aid area, and a storage cabinet for non-flammable, household hazardous products. Cabinets were installed to keep incompatible products separated. The steel



Note the proper flammables storage and safety kit

flammable storage cabinet has passive ventilation and a fire-proof, double-wall that ensures safe storage of household flammables such as gasoline, kerosene, paint thinner, and paint. The floor cabinets (to the right of the flammables cabinet) were designed to store acids, bases, fertilizers, and other non-flammable materials. A wall separates the acids from the bases. The bottom shelves in the floor cabinet hold absorbent materials to use on spills and a product called "Paint Dispose" for solidifying paint prior

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Director's Column

by G. Robert Kerr

P²AD's mission is to "develop programs and activities to facilitate reduction of pollution at the source, and instill a pollution prevention ethic that is consistent with the protection of human health and the environment." In the past, this mission was addressed primarily through our programs with businesses and industries in the state of Georgia. In our last issue, we looked at how we have expanded our approach to addressing this mission through our work with Georgia state agencies. In this issue, you will learn more about how we are also reaching out to the public through education and outreach.

"Instill a pollution prevention ethic..." We believe that instilling this ethic in the general public as well as the business community is critical in order to truly conserve our natural resources and see significant reductions in solid waste generation in the state. Several P²AD programs are geared towards education of homeowners on a variety of pollution prevention issues for that purpose. On page 1 of this issue, we describe the model Green Garage designed by P²AD as a part of the 2002 New American Home program. This article talks about key elements to making your garage safe and free of environmental hazards. Our

article on page 4 examines mercury in the home. Mercury is a Persistent, Bioaccumulative and Toxic (PBT) chemical, which is unfortunately all too common in most

homes. Through its Household Hazardous Waste Program, P²AD is working to support U.S. EPA in its goal to eliminate this particularly dangerous substance.

In addition to educating citizens about proper management of household hazards, P²AD collaborates with other state and local agencies to disseminate information regarding ways to conserve water and energy at home. With the continuation of the Georgia drought this spring and summer, education about what we can all do to conserve water is a priority for us. On pages 5 and 6 of this issue, we have included an easy reference to clip and save on water efficiency. This reference includes average water usage for various home activities; informative websites; and a chart of simple solutions for any budget. We hope that this tool will help all of our readers implement some easy conservation measures, and save money too!

Speaking of tools, we haven't forgotten our industrial clients in this issue. On page 3, our engineers continue their series of articles on Systems Approach Tools, focusing this time on Root Cause Analysis. These tools are used by our engineers in assessments, and can be used internally by clients with the same benefits of institutionalizing pollution prevention concerns. Stay tuned to future issues for information on other resources for your "Pollution Prevention Toolkit." Please visit our website, www.p2ad.org, or contact our staff at (404) 651-5120, if you would like more information on these topics.



From the Source

From the Source is a quarterly publication of the Pollution Prevention Assistance Division (P²AD) of the Georgia Department of Natural Resources (DNR). P²AD provides free, confidential technical assistance in the areas of pollution prevention, resource conservation, waste reduction, by-product reuse, and recycling. Our clients include manufacturing industry, commercial businesses, institutions, the military, consultants, government, agriculture, and the citizens of Georgia.

Please contact us with address corrections, inquiries and opinions. Articles in *From the Source* may be reprinted with permission from P²AD. This publication is also available at our website, www.p2ad.org.

For more information about P²AD services, contact the division at (404) 651-5120, (800) 685-2443 (Outside Atlanta), or via email at info@p2ad.org.

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Getting to the Root of the Problem

Root Cause Analysis: Part 3 of our series on Systems Approach Tools

by John Allen, Pollution Prevention Engineer

Earlier articles in a series on the use of the Systems Approach have explained the value of the approach when dealing with pollution prevention issues and have explored the use of process mapping to give a team a better understanding of the process they wish to address. Once the team members understand the process, they will be ready to look at the actual causes for waste they produce.

Before a team can reduce waste in a process, it must first identify the actual, or root cause of the waste. Until the root cause is found, a company could spend a great deal of time and money fixing a symptom of the problem, only to have that same symptom pop up over and over again. This cycle continues because fixing the symptom is often the fastest way to get a process back up and running and therefore finding the root cause is a task usually left for another day.

What is the root cause of a problem? The following is modified from an example in an article on cause and effect by Robert Pojasek where the root cause is discovered by continuing to ask the question “Why?”:

Problem: A particular machine produces an unacceptable amount of waste.

Why is the machine producing waste?

The machine stops regularly, producing excess waste.

Why has the machine stopped?

A circuit breaker tripped because of an overload.

Why was there an overload?

There was not enough lubrication for the bearings.

Why was there too little lubrication for the bearings?

The pump was not pumping enough.

Why was there not enough lubricant being pumped?

The pump shaft was vibrating because of abrasion.

Why was there abrasion?

There was no filter, which allowed chips of metal to get

into the pump.

Solution: Installation of a filter solves the problem.

In this example, the tripping of the circuit breaker was just a symptom of the real waste-producing problem. Likewise, dealing with any of the steps in between, such as lubricating the bearings or replacing the pump, would only serve as a temporary “Band-Aid” and not a real solution. Until the root cause was found and corrected by the installation of a filter, the breaker would continue to trip and the machine would continue to stop, leading to waste.

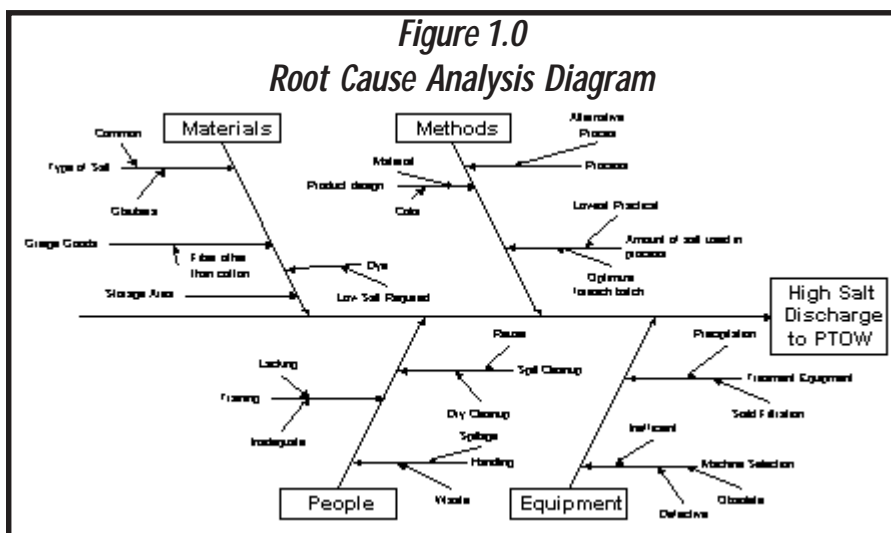
Of course, tracking down the root cause can be easier said than done. One of the most valuable tools for finding the root cause is a cause and effect diagram.

Figure 1.0 below is modified from an example by Robert Pojasek (*Pollution Prevention Review*, Summer 1996). This diagram is also known as the Ishikawa diagram after its founder, or the fishbone diagram because it looks like a fish skeleton. In this example, a team began to examine the cause of high salt levels from a textile finishing facility.

The diagram is made up of four main categories: People, Methods, Materials, and Machines. The team can examine each of these individual areas and find causes for the problem within that area. The category of People includes all worker and management related factors such as experience, training, and attitudes. The Methods category addresses workflow and standard operation procedures. In the Materials category, the team looks at the raw materials and inputs to the process. The category of Machines includes all the equipment used in the process as well as adjustments and maintenance on the equipment. A cause and effect diagram can also look at a Measurements category, which includes all values that can be measured, and the category of Surroundings, which includes things such as lighting and room temperature.

As mentioned in previous articles, the most effective team draws its members from a diverse cross-section of company employees. This is especially true when building a cause and effect diagram to ensure that all of the right questions needed to find the root cause are asked. While working on the diagram, the team should focus on solving only a single problem or addressing a single issue. An attempt to examine too many things at one time will lead to a cause and effect diagram with so many causes that it will be hard for the team to find the root.

After identifying the problem to be



See Root Cause, page 7

Mercury... Aren't you curious?

A Look at the Myths and Hazards of Mercury in our Environment

by David Gipson, Pollution Prevention Specialist

Ever wonder where the old saying “mad as a hatter” came from? Or, what made the Mad Hatter in “Alice’s Adventures in Wonderland” (Lewis Carroll’s 1865 classic) “mad”? Why did these hat makers or “hatters” have a reputation for strange, unpredictable behavior? The answer is, they were suffering from mercury poisoning.

In the 1800s, mercury nitrate was used in the felting process. Exposure to the chemical affected the workers’ nervous systems, causing them to display symptoms of chronic mercury poisoning: excitability, mental instability, a tendency to weep, fine tremors of the hands and feet, and personality changes.

Mercury is no longer used in the felting process, but it is still a common ingredient in many household and workplace items. If these items are broken or managed improperly, they can release mercury vapors into our homes, workplace, and environment.

Mercury affects the brain, spinal cord, kidneys, and liver. It affects the ability to feel, see, taste, and move. Long-term exposure to mercury can result in symptoms that get progressively worse and lead to personality changes, stupor, and coma.

The most common routes of exposure are inhalation and ingestion

Inhalation exposure can occur while cleaning up a broken mercury-containing item. Ingestion usually occurs from eating contaminated fish.

Large, long-lived fish meat can contain toxic methyl mercury

Once in a water body, bacteria transform mercury into its most toxic form, methyl mercury. Mercury does not break down; it only accumulates as it moves up the food chain toward humans. Since it’s in the tissue (not the fat) trimming and cooking don’t change it.

This does not mean you should stop eating fish. It’s a good source of protein and low in saturated fat. Moderation according to the type of fish, its origin, and your health status is the key.

Pregnant women should exercise extra

caution as the fetus is highly susceptible to methyl mercury poisoning. Affected children show lowered intelligence, impaired hearing, and poor coordination.

The FDA has recommended that pregnant women, women of childbearing age, and young children avoid shark, swordfish, king mackerel, and tilefish/ocean whitefish. FDA advises these women to select a variety of other kinds of fish — including shellfish, canned fish, smaller ocean fish or farm-raised fish — and that these women can safely eat 12 ounces per week of cooked fish.

Beware—children think it is fun to play with!

Several children have developed mercury poisoning after playing with small vials of mercury they found at home or school.

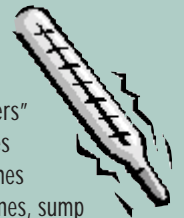
Page 7 includes a list of ways to prevent mercury pollution through source reduction. Recycling mercury is the only proper means of managing mercury waste. For more information about cleaning up mercury spills and details about recycling options, go to www.p2ad.org.

See Mercury, page 7

Products that Contain Mercury

You might think of these:

- ✓ Thermostats
- ✓ Thermometers with silver bulbs
- ✓ All fluorescent and HID lamps, neon, and “bug zappers”
- ✓ Batteries: mercuric oxide and some alkaline batteries
- ✓ Various switches and relays in electronics (e.g., clothes irons, curling irons, computers, cellular/portable phones, sump pumps, and some appliance lid lights)
- ✓ Pilot light flame sensors
- ✓ Gauges (e.g., barometers, blood pressure)
- ✓ Automotive HID and Xenon headlamps, interior lights, hood/trunk lights, and entertainment systems
- ✓ Mercurochrome®/merbromin (topical disinfectant)
- ✓ Dental fillings (amalgam)



But what about these?

- ✓ Thimerosal (preservative found in some nasal sprays and older contact lens solutions)
- ✓ Weight/counterweight in grandfather clocks
- ✓ Jewelry (usually glass ampules made in Mexico)
- ✓ Spiritual/ritual use in some Caribbean/Hispanic communities
- ✓ Some greeting cards that light up or make noise
- ✓ Vintage toys (e.g., the Mercury Maze game)
- ✓ Some chemistry sets
- ✓ And some people have jars of elemental mercury (a silver liquid) just sitting around!

Conserving water means big savings for the pocket & planet

Individual actions can have meaningful effects

by Judy Adler, P.E., Pollution Prevention Engineer and Susan Hooper, Pollution Prevention Specialist

Georgia's water resources are facing threats on several fronts. High growth rates are putting extra pressure on an already limited water supply. The state has been in a drought since May 1998. Saltwater intrusion threatens the Upper Floridan Aquifer, coastal Georgia's water supply. In the Apalachicola-Chattahoochee-Flint river system, future water withdrawals will be limited by the allocation formula of the tri-state compacts between Georgia, Alabama, and Florida.

Water is a precious resource—our lives depend on it, yet many of us still take this resource for granted. In Georgia, average consumption (for residential, commercial, and industrial uses but not agricultural purposes) is 168 gallons of water per person per day—10% higher than the U.S. average of 153 gallons.

The average adult needs less than one gallon of water per day for drinking, yet residential water use in the U.S. averages 101 gallons per person per day (compared to 20 to 30 gallons per person per day in developing countries).

Water conservation is everyone's responsibility. We can significantly reduce our water usage and water and sewer bills by making a few behavioral changes, retrofitting some of our plumbing fixtures, and implementing simple water efficient landscaping practices. On the next page are a few water conservation tips to help you get started!

Save \$\$\$ & H₂O with Low-flow Fixtures

Did you know that all new plumbing fixtures are water efficient? The Energy Policy Act of 1992 established maximum water usage rates for plumbing fixtures manufactured after Jan. 1, 1994. Because of this legislation, water use will decline by an estimated 81 million gallons of water per day in the Apalachicola-Chattahoochee-Flint river system by 2010.

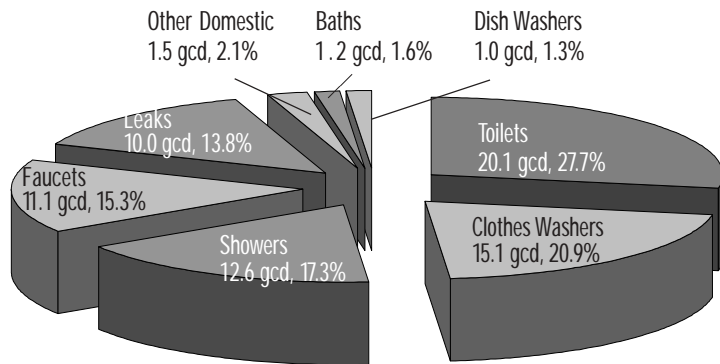
Fixture	Max. Water Usage
Toilets	1.6 gpf
Urinals	1.0 gpf
Showerheads	2.5 gpm @ 80 psi
Faucets	2.5 gpm @ 80 psi

Typical single-family home water use

Source: WaterWiser.org © 1999 American Water Works Association

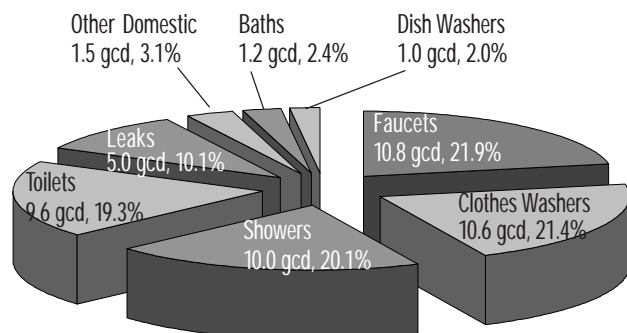
Without Conservation

Total: 72.5 gallons per capita per day (gcd)



With Conservation

Total: 49.6 gallons per capita per day (gcd)








References

- William Y. Davis, "ACT-ACF Comprehensive Study: Municipal and Industrial Water Use," 1996.
- Georgia Environmental Protection Division, 1998-2000 Georgia Drought Report, 2000.
- Amy Vickers, Handbook of Water Use and Conservation, WaterPlow Press, Amherst, MA, 2001.

Web Resources

- Water Saving Products
www.niagaraconservation.com
- Do-it-Yourself Plumbing Guide
www.doityourself.com/plumbing
- Rain Barrels
www.gardeners.com
www.brookstone.com
- National Water Efficiency Clearinghouse
www.waterwiser.org
- Water Efficiency for Industrial, Commercial, and Institutional Facilities
www.p2ad.org/watereff.html
- Water Efficient Landscaping
www.watersmart.net
- Georgia Drought
www.georgiadrought.org
- Georgia Water Resources Toolkit
www.dca.state.ga.us/solidwaste/toolkit.html
- General Composting Information
www.ces.uga.edu/pubcd/c816-w.html
- Food Waste Composting
www.wormpoop.com
www.wormwoman.com

Simple steps to reduce water use at home. . . for any budget

	No Cost	Low Cost	Moderate Cost
Bathroom	<ul style="list-style-type: none"> • Turn off water while brushing your teeth, washing your face, and shaving • Collect water from showers/sinks while waiting for the temperature to heat up, and use it to water plants  <p>Low-flow showerhead</p>	<ul style="list-style-type: none"> • Add a toilet retrofit device to reduce toilet flush volume. Toilet displacement bags, toilet dams, early closing flappers, and fill diverters can save more than 1,000 gallons per person per year. • About 20% of toilets leak. Check for a leak by adding food coloring to the tank. Wait 10 minutes, if the color appears in the bowl you have a leak and need a new flapper. • Install low-flow aerators on bathroom faucets. Aerators only cost a few dollars, and are available in flow ratings of 0.5 to 2.5 gallons per minute. • If your showerhead was purchased prior to 1994, install a new 2.5 gpm showerhead with a control valve to turn off the water when you soap up 	<ul style="list-style-type: none"> • If your toilet was purchased prior to 1994, replace it with a new model to save 8,000 to 21,000 gallons per year for the typical household. • If your hot water heater is far from your shower and sinks, install a hot water demand recirculation system  <p>Toilet displacement bag</p>
Kitchen	<ul style="list-style-type: none"> • Only run the dishwasher when full • Use your dishwasher's water and energy saving cycle (light cycle vs. normal or pots and pans) • Save up to 15 gallons by soaking dirty dishes before rinsing them off • Don't pre-rinse dishes except in cases of sticky or burnt food • Plan ahead and defrost food in the refrigerator, not under running water 	<ul style="list-style-type: none"> • Compost food waste instead of using garbage disposals that use large amounts of water • Install a 2.5 gpm aerator on the kitchen faucet. Fingertip controls on some aerators allow you to adjust the water flow.  <p>Faucet aerator</p>	<ul style="list-style-type: none"> • Purchase a water and energy efficient dishwasher that uses ≤7 gallons of water per load.
Laundry	<ul style="list-style-type: none"> • Run only full loads • For washers with variable settings, select the proper water level • Use a shorter wash cycle for lightly-soiled clothes 		<ul style="list-style-type: none"> • Purchase a high efficiency, front-loading clothes washer to save 12 to 29 gallons per load
Leaks		<ul style="list-style-type: none"> • Identify and repair leaks. A dripping faucet can waste 2,000 to 4,000 gallons per year. To identify leaks, turn off all water taps in your home and check the water meter to see if water is still flowing. 	
Outside	<ul style="list-style-type: none"> • Pay attention to the weather! Don't water when rain is in the forecast • Water in the early morning hours to reduce evaporation <p><i>Photos of water-saving devices courtesy of Niagara Conservation.</i></p>	<ul style="list-style-type: none"> • Plant drought-tolerant native species • Use compost and mulch to retain moisture in the soil • Water slowly and deeply with soaker hoses • Install automatic shutoff nozzles on hand-held hoses • Minimize grass areas • Collect rainwater from your gutters in a rain barrel to irrigate lawn and plants 	<ul style="list-style-type: none"> • Install a drip irrigation system for water savings of 25-75% over conventional sprinkler systems.  <p>Auto-shutoff nozzles</p>

Get Ready for Governor's Award 2002

The Governor's Award is presented each year to organizations who demonstrate outstanding leadership and commitment to Georgia's environment through innovative pollution prevention efforts. Winners are acknowledged for their role in reducing waste at the source and obtaining superior results in pollution prevention.

Projects meeting the definition of pollution prevention will be considered for the Governor's Award (see www.p2ad.org for more detail). Recycling projects are not eligible.

Any Georgia manufacturing industry, government facility, academic institution, commercial business, nonprofit group, or farmer is eligible to apply for the award. Applications will be due in August 2002, and the winners will be honored at a luncheon and awards ceremony in September 2002. For more information about the Governor's Award and to obtain an application, contact P²AD at (404) 651-5120 or www.p2ad.org.

Root Cause, continued from page 3

solved, the team can start with any category and begin to list potential causes for that problem that come from that area. After the team has listed several causes from one category, it can move to another. The team should continue to list causes, going from one category to another as the team members ask more questions. Questions can include: Why is the machine producing off-quality goods? What are employees doing to address the problem and why? Do the employees have the proper training and resources needed to deal with the situation? What are the procedures for dealing with this situation?

When the team members have listed all of the potential causes that they can think of in the various categories, the team can then review its work. At this point, some causes should begin to stand out, especially those causes that cross over into more than one category. When looking at these causes ask: "Why is this a cause?" Continuing to ask "why" will lead the team to the root cause. After the team feels it has reached the root, it should verify the finding by backtracking all the way to the initial problem. When the team members are confident that they have identified the root, the team can start working on a solution.

Putting together a cause and effect diagram can be difficult and time consuming until a team becomes comfortable with the process. Someone trained in the process can be helpful the first few times that the team uses this tool. P²AD staff members have experience in facilitating root cause exercises. Contact us with any questions about the Systems Approach at (404) 657-7442.

Green Garage, continued from page 1

to disposal in the trash (cat litter can also be used for solidifying paint).

Above the cabinet is a safety center that contains a first aid kit, eye wash solution, gloves, goggles, and emergency phone numbers. A fire extinguisher is also mounted to the wall and within easy reach of the user.

The garage has an area specially designed to accommodate the City of Smyrna's commingled recycling container. To maximize space in the container, a can crusher is conveniently mounted on the wall near the container. In addition, the countertop in the green garage is a recycled-content cast stone product made with post-consumer glass, reclaimed industrial water, and post-industrial fiberglass. General information on recycling and where to find information on local recycling programs was displayed during the home tour.

While not everyone can design their own green garage or buy storage cabinets, here are a few pointers from our project that you can use in your garage:

- Keep flammables away from reactives and flames.
- Separate acids (e.g., metal cleaners) from bases (e.g., bleach).
- Keep chemicals out of reach of children and pets. Don't store products overhead in unsecured cabinets.
- Store products in a container, such as an aluminum roasting pan, to contain leaks and spills.
- Keep a fire extinguisher, first aid kit, and emergency phone numbers posted in the garage.
- Designate an area to keep protective equipment, such as gloves and goggles, as well as absorbent material for spills.
- Designate a place for collecting recyclables.

If you are interested in learning more about how you can reduce or properly store household hazardous products, go to P²AD's Web site at www.p2ad.org/hhw.

3 Simple Ways to Prevent Mercury Pollution

1. Conserve energy

Most mercury pollution comes from burning coal in power plants. Conserving energy will reduce mercury pollution along with greenhouse gases and other pollutants.

2. Don't buy mercury-containing products unless absolutely necessary

Instead of...	Use...
Mercury (silver bulb) thermometer	Digital or red bulb thermometer
Thermostats with mercury	Programmable thermostats
Normal fluorescent bulbs	Low-mercury bulbs (green end caps)
"Silver" dental amalgam	Tooth colored resin
Mercuric oxide button batteries	Zinc-air or other mercury-free button batteries

3. If nothing else, install a programmable thermostat!

Most non-digital thermostats contain much more mercury than thermometers and other household mercury containing products.



See www.p2ad.org for more details on all listed events...

Calendar of Events

- May 2, 2002 Georgia Water & Pollution Control Association (GWPCA) is hosting the **2002 Water Conservation—Public Education Workshop** at the Gwinnett Civic & Cultural Center in metro Atlanta. For more details see www.gwpca.org.
- May 7-8, 2002 P²AD is hosting an **Environmental Management System Mentoring Workshop for the Metal Finishing Industry** at the Wyndham Atlanta Midtown Hotel. Attendants will work with industry EMS mentors Eaton Corporation and Yamaha Motor Manufacturing Corporation of America; gain an understanding of ISO 14001EMS requirements; and learn tools for implementing an EMS. For registration information, see www.p2ad.org.
- May 23, 2002 P²AD is hosting a **Hospital Pollution Prevention Conference** at the Sheraton Atlanta Hotel. Contact Becky Smullin at (404) 651-5120 or Rebecca_Smullin@p2ad.org for more information.
- June 3-4, 2002 Multi-State Working Group is sponsoring **Moving to Higher Environmental Performance Using EMS and Other Tools** at the Wyndham Orlando Resort in Orlando, FL. See www.mswg.org for more details and registration information.
- June 19-20, 2002 The Global Environmental Management Initiative is sponsoring **GEMI 2002—Securing Our Future: The Path Forward** at the Swissotel in Atlanta, GA. Visit www.gemi.org for more information.
- June 25-27, 2002 **The Region 4 DoD Environmental Conference** will be held at the Westin Peachtree Plaza Hotel in Atlanta, GA. Attendees will include DoD, EPA and State environmental officials and Major Command and Military Installation staff. Contact the Southern Regional Environmental Office of the Army Environmental Center for details, at (404) 524-5061.

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