

# INNOVATIONS IN HEALTH CARE ENVIRONMENTAL MANAGEMENT

## *A Compendium of Effective Practices for Health Care Facilities*



# PREFACE

Hospitals generate waste. A mundane observation, but one which lies at the center of a growing national concern. All institutions, of course, produce trash; but the waste produced by hospitals and other health care facilities — the institutions most concerned with our health — can, paradoxically, pose a potentially serious threat to the environment and, therefore, to the health of the communities surrounding them.

The dangers are not unknown. There is an expanding body of research on the environmental impact of health-care waste. There are growing grass roots efforts to highlight the need to manage hospital waste effectively. Hospital incinerator emissions and the disposal of infectious waste are both covered by government regulations.

But there is not yet a broad based consensus in the field concerning which practices are most effective in reducing the unwanted environmental and health impacts of hospital waste. *Innovations in Health Care Environmental Health and Safety*, held at the Tufts University School of Medicine in Boston on June 1 and 2, 1998, specifically addressed this issue. Sponsored by the Tufts Institute of the Environment at Tufts University and the Massachusetts Public Health Association, the conference was funded by Bristol-Myers Squibb Company as part of its ongoing efforts in the area of environmental protection. One hundred and thirty people, including speakers, attended the conference.

During his remarks to the conference participants, Thomas M. Hellman, Bristol-Myers Squibb Company's vice president of environment, health and safety, pointed out that his company is "in the health care industry....We take pride in our ability to save lives and promote well-being, by developing effective and safe pharmaceutical products....It is incongruous for a company with these goals not to be protective of the environment." The same can be said for the health care industry as a whole. Ignoring the environmental consequences of health care waste simply doesn't work.

*The conference was endorsed by:*

Health Care Without Harm

The Greater Boston Chapter of  
Physicians for Social Responsibility

The Massachusetts Toxics  
Use Reduction Program

The Vermont Department of  
Environmental Conservation

The Toxics Action Coalition

In order to examine how hospital waste could be better managed to reduce its environmental impact, four tasks were set for the *Innovations* conference:

1. To identify sources of environmentally harmful waste in order to clarify the nature and extent of the problem of health care waste.
2. To provide hands-on tools for reducing or eliminating health care waste for the benefit of patients, employees, the community, and the environment.
3. To explore the roles of physicians, nursing staff, and administrative departments in eliminating and reducing health care waste.
4. To identify possible cost benefits achieved through waste reduction efforts.

By addressing these issues, the conference sponsors hoped to isolate practices that have proven most effective in decreasing the environmental and financial impact of health care waste. From the outset, Bristol-Myers Squibb Company insisted that a summary of these practices, available for wide distribution, should be published after the conference concluded. This compendium meets that mandate.

It should be pointed out, though, that the compendium is not a summary of the conference as a whole. *Innovations* included compelling information on why health care facilities are increasingly concerned about environmental, health, and safety management. There were presentations on the dangers of mercury and dioxin in hospital waste streams. There was a panel discussion on the importance of having major players in a hospital (physicians, nurses, administrators) work together on environmental issues. There was an update on incinerator regulations at the federal and state level. There were discussions of latex allergies and of safe handling practices for both hazardous drugs and hazardous waste.

Each of these presentations was important and the information useful. However, because of space limitations, this compendium is focused on the implications of waste management and reduction. Much of the background detail is therefore not included here.

Put another way, this compendium does not present evidence that health care waste can be harmful to the environment, although evidence was plentiful at the conference. Indeed, it starts with the recognition of that fact. The compendium instead proceeds to a discussion in practical terms of what can be done, based on the successful experiences of health care institutions to control and manage waste in environmentally sound ways.

The presentation of these practical conclusions is divided into two parts. The first, called "Lessons from the Front," summarizes general conclusions — drawn from a careful look at all of the presentations — concerning the issues of motivation, costs, obstacles, and characteristics of successful, environmentally safe waste management programs.

## –FOCUS–

- *Effective Practices*
- *Implementation Issues*
- *Financial Impacts*

The second section, called "Case Studies: Innovative Approaches to Waste Management," addresses specific opportunities for waste management improvement and presents particular practices useful in responding to the opportunities. Each opportunity is formulated as a challenge to which the workshop presenters recommend certain responses. Motivations for meeting the challenge are listed, and then the response is summarized. Finally, financial impact information, in so far as it is available, is given.

Bristol-Myers Squibb Company, the Tufts Institute for the Environment, and the Massachusetts Public Health Association hope that this compendium will help turn attention to the issue of health care waste and contribute to developing a consensus on waste management practices that reduce environmental and safety impacts.

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# LESSONS FROM THE FRONT

## *What We Can Learn from Innovative Institutions and Individuals about Environmentally Sound Waste Management Practices*

### **Introduction**

The waste management programs described in the workshops at **Innovations in Health Care Environmental Health and Safety** highlighted the complexity of managing the waste streams produced by medical facilities. Solid, medical, and hazardous waste streams were each examined in some detail, with particular components — from paper to solvents to mercury — and general categories of waste both receiving close attention.

Speakers explored how best to reduce the environmental impact of health care waste, proposing a surprising array of effective methods. Some were simple — at least conceptually: merely sorting waste correctly results in huge savings, for example. Others, such as Robert Pojasek's systems approach to eliminating the root causes of waste, are more complex but promising. But even the simple approaches can be complicated to implement. Correctly determining what is and isn't medically regulated waste isn't always straight forward, and promoting staff participation has its challenges.

Nevertheless, the good news from the conference was that despite the complications, frustrations, and obstacles, the environmental impact of waste from medical facilities can be reduced — sometimes dramatically.

### **Motivations**

The reasons for embarking on programs to improve waste management were varied. As could be expected, the need to comply with government regulations played a part in motivating many facilities to improve their waste management programs. That, however, is not

the important discovery of the conference. Many of the individual practices, as well as general waste management programs, go well beyond regulatory requirements.

Why medical facilities exceed government requirements is the real story. Practical considerations often play a role. Harvard Pilgrim Health Care's paper conservation program was motivated in part by space and time concerns: storing paper, especially paper records, takes space, and managing paper is time consuming.

This program, though, like most of those discussed, was also motivated by a genuine concern for the environment. As Dan Ruben, the program's creator and director, pointed out, 53,000 trees were needed to produce the paper Harvard Pilgrim was using each year before the conservation project was put into place. That fact carried weight when he proposed his paper conservation project to Harvard Pilgrim. The Massachusetts Hospital School's Jonathan Goldberg pointedly refers to his institution's waste management practices as an "environmental stewardship program," highlighting a commitment to the environment that goes far beyond regulatory motivations.

In some workshops, public health issues were also a factor in motivating changes in waste management, especially with regard to eliminating mercury and polyvinyl chloride (PVC) from the waste stream. Both ethical considerations and the need to be a good neighbor bolstered this public health concern. Claude Rounds, Vice President of Plant Management, Albany (NY) Medical Center, went further, citing the Medical Center's commitment to a "community leadership model" in waste management.

Finally, staff initiative turned up repeatedly as an important motivator. At Holy Family Hospital in Methuen, Massachusetts, the staff saw the need for and demanded recycling in the employee cafeteria. REMEDY, Yale-New Haven Medical Center's program that sends used but working medical equipment abroad, originated with a physician. Dartmouth-Hitchcock's exemplary waste management systems began with observations from the nursing staff who lobbied their administrations for environmentally conscious waste management practices.

So among the institutions represented at **Innovations**, regulation was but one of several important factors that motivated medical facilities to examine their waste management practices and modify them to improve their environmental impact.

## *But How Much Is It Going to Cost?*

In these days of managed care, cost containment, and consolidation, the best of motives will run up against the issue of expense. Given the difficulty of funding non-clinical programs, making a case for environmentally sound waste management practices requires a sure grasp of the financial issues involved.

In some cases, the financial advantages are clear cut. Harvard Pilgrim will save \$2.7 million a year putting reports on-line and expects additional millions in savings when its complete paper conservation program is in place and routinized. Compared to savings of this magnitude, the cost of funding an administrator to develop and run the program is minimal.

The financial advantages of programs to sort red bag waste correctly are equally apparent. In 1997, Dartmouth-Hitchcock spent \$120 a ton to autoclave infectious (red bag) waste

and \$45 a ton to send solid waste to the landfill. The cost of disposing mis-sorted waste, then, is substantial, especially considering that at most hospitals, according to Dartmouth-Hitchcock's Laura Brannen, 30 to 40 percent of the waste generated is medical waste. Brannen's recommended red bag waste target of 15 percent of total waste will produce significant savings, regardless of the size of the institution.

The economic benefits of waste management programs are not always so impressive or easy to track. The recycling program run by Darin E. Leeman at Holy Family is breaking even, after up-front costs. For administrators who fear that recycling programs will cost needed dollars, this information is important. Even without dramatic savings, pursuing programs that have non-financial advantages is easier when there are no losses to be justified.

Often, looking beyond the boundaries of the program itself is needed to get a clear picture of costs or savings. Dan Ruben cited postage, storage space, and waste removal as indirect costs of paper use. In the case of Harvard Pilgrim, the indirect savings, though, are small compared to the direct savings discussed above.

That is not always true. James Harvie from the Western Lake Superior Sanitary District pointed out that it is very costly to clean up mercury spills and that purchasing officers need to take this into account when costing out alternatives to products that contain mercury. Laura Brannen cited the \$53,000 that Dartmouth-Hitchcock spent cleaning up chemical spills as an example of the need to include potential clean-up or disposal costs when making purchasing or program implementation decisions.

## Obstacles

The obstacles discussed in the workshops fell into two primary categories: those that are organizational in nature and those that have to do with resources, or the lack of them.

Key among the organizational obstacles is lack of administrative support. Without that support, the programs that were described at this conference would never have gotten off the ground; but finding or generating administrative support was mentioned again and again as an initial difficulty.

Turf issues were raised in some workshops, where the need to tread carefully across departmental boundaries was stressed. This problem is related to the general issue of resistance to change that is characteristic of organizations and individuals. And both of these problems are related to the general difficulty of changing the culture of an institution from one that ignores the potential environmental harm of its waste to one that pays careful attention to it.

The main resource obstacle is financial. Money is tight, and administrators are reluctant to give approval to programs with uncertain or (it is feared) negative financial consequences. While economic arguments may not be the decisive factor in deciding whether to implement a program or not, they were always an important part of the decision-making process.

Space problems were mentioned in a few workshops, especially when recycling or reusing was being discussed. Recycling and reuse programs require storage space, which at most facilities is tight.

Human resources, or the lack of them, were mentioned repeatedly. The watchword was, "Who's going to do the work?" In some cases, the financial benefits more than justified the

outlay required to pay for additional people to administer programs. In other cases, the problem of too much work and too few hours had to be approached differently.

In addition to the organizational and resource obstacles, there was one striking external obstacle that bears mentioning. A number of speakers mentioned the need to work with purchasing departments in order to gain control of the waste stream at its source. However, alternative products and services are not always available. It's difficult to find reusable packaging. Viable alternatives to products containing PVC or other potentially hazardous materials don't always exist. Even when they do exist, vendors frequently won't cooperate in finding them or selling them.

Finally, keeping the programs running is difficult. If programs have shown significant savings in the beginning, some administrators, unrealistically, want new savings demonstrated year after year. There is also a problem with momentum. Participation sometimes tapers off as the novelty wears off.

## WASTE MANAGEMENT OBSTACLES

- *Lack of Administrative Support*
- *Finances*
- *Space Problems*
- *Insufficient Human Resources*
- *Purchasing Department Cooperation*

## What Makes a Program Work?

*Seven components emerged from the workshops as crucial to the success of programs designed to decrease the environmental impact of hospital waste. In spite of the many obstacles that stand in the way of improving hospital waste management, programs with these characteristics have succeeded.*

- 1. Knowledge.** The successful programs discussed at this conference relied on knowing the nature of the waste that a health care facility generates, understanding where the waste comes from and how it is generated, recognizing the environmental damage that it can do, and appreciating the details and importance of the economic factors involved.
- 2. Commitment.** This characteristic is important on two levels. First, without the commitment of the organization and its top officers, waste minimization programs are not likely to succeed. Second, even though commitment of top officers is needed, a number of the programs discussed began somewhere in the ranks, not at, or even near, the top. The commitment of individual staff members or groups of staff frequently played a role in initiating, developing, and ultimately implementing successful programs.
- 3. Clearly Assigned Responsibility.** Several speakers addressed the need to establish a position responsible for overseeing a program. Each institution has its own variation on how the lines of authority run, but, in the most successful programs, the lines of authority are clear and the power to make the necessary changes is assured.
- 4. Organizational Inclusion.** This characteristic also operates on more than one level. First of all, successful programs cut across departments. Every department that comes into contact with the waste stream has to take part in some way if waste and its adverse environmental effects are to be minimized. Second, successful programs make an effort to include people from all levels within the hospital, not just manage-

ment personnel, in the planning, implementing, and monitoring of programs.

- 5. Education.** Beginning a program requires that key administrators accept and support it. In many cases, the administrators, with multiple responsibilities, need education about the specific issues involved, and this education may need to be extensive and detailed. But in order for the program to succeed, everyone in the medical facility must participate. Participation is won by excellent, ongoing educational efforts. Efforts must also be made to keep administrators educated about the status of ongoing programs. In this regard, reporting is most important. As one speaker said, "The administration won't notice or be aware of your savings impact unless you document it and report it in writing. You constantly have to pat yourself on the back, or no one will notice."
- 6. Simplicity.** Several speakers noted the need to start with something simple, recycling in the cafeteria or changing margins on documents, for example. Others stressed the need to make recycling as easy as throwing an item away or to make proper sorting as simple as tossing that pizza box into a red bag. While the total waste minimization project, by necessity, will be complex, what is required of each individual to participate fully must be kept as simple as possible.
- 7. Passionate Leadership.** The need for strong, passionately committed leadership of "environmental stewardship" programs was a constant theme. It was clear from the presentations that much of what has been accomplished in health care facilities to reduce the impact of their waste is the result of leadership. This leadership is provided by people in responsible positions who have strong convictions and a desire to act on them within their organizations.



# CASE STUDIES

## INNOVATIVE APPROACHES TO WASTE MANAGEMENT

In the case studies that follow, the names of presenters and contact information are included as a tool for fostering the continued development of a national network of professionals concerned with the environmental impact of health care waste. The inclusion of their names, however, is not intended to imply authorship of the text that follows.

The information describing each practice is a compilation, based on notes taken by assigned moderators and, in some cases, provided by the presenters themselves. Separate presentations have sometimes been conflated into single summaries, and in some instances material has been reorganized by the editors to fit the format of the compendium. For the sake of clarity, the editors have also taken the liberty of drawing conclusions from presentations that may have been only implicit in the spoken remarks.

In taking this approach, the editors have been motivated by a desire to make the material as clear and accessible as possible for a reading audience that does not have the benefit of the question and answer periods that followed the formal presentations. It is our hope that in the process, accuracy has not been sacrificed.

# GAINING AND KEEPING SUPPORT

## Changing the Culture of Hospital Waste Management

Based on a Presentation by: **Laura F. Brannen**, Waste Minimization Coordinator

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### Challenge

To change the prevailing culture in a health care facility so that waste minimization programs can succeed.

### Response

Institute organizational changes that assign responsibility for waste management. Establish employee education programs.

### Motivation

Health care facilities generate 1 percent of all waste in the United States, and the health care waste stream is toxic. Laura Brannen believes it is the responsibility of the health care industry to aggressively manage this waste stream and the responsibility of the community to demand that the industry do so. She stresses that well-run waste management programs can pay for themselves.

### Summary

“Out of sight, out of mind.” According to Brannen, this was the prevailing culture in her hospital when efforts began to focus on minimizing the environmental impact of the hospital’s waste. This culture, still frequently encountered in medical facilities, must change.

Despite a growing awareness within the industry of the environmental problems posed by health facility waste, there are barriers within the hospital culture to addressing waste issues successfully. First, non-clinical programs are not generally funded. Putting money into pollution prevention programs requires a shift in thinking about the economics of waste management. Second, programs that attempt to achieve “excellent environmental stewardship” are not compliance driven but go well beyond the requirements of regulatory agencies. Third, there is a lack of knowledge

throughout the hospital about its waste stream and the environmental hazards it poses. Fourth, even if everyone agrees that environmental stewardship is the right way to go, there is still the question of who’s going to do the work.

A combination of organizational and educational responses to these obstacles contributed to overcoming them at Dartmouth-Hitchcock. A position was created to oversee the program, and a task force was established to “develop and support an environmental commitment.” It was important that the task force had the authority to make changes. Representatives from housekeeping, engineering, facilities, administration, and clinical staff were included. Recycling and HITS (hazardous, infectious, training, and safety) coordinators were appointed at the departmental level. Housekeepers were empowered to become waste experts.

Educational initiatives include in-services, e-mail notices, new employee orientations, and flyers on aspects of the waste minimization program. These supplement a detailed Waste Management Manual. New employees are taken on a tour of the hospital where they see how waste is managed. Efforts have also been made to assure that the purchasing department understands that the total cost of items must include disposal costs. On a more individual level, courtesy notes are sent to key people when waste problems in their departments are identified.

### Financial Impact

Brannen reports an annual savings of \$150,000.

# GAINING AND KEEPING SUPPORT

## Training for Success: Building Employee Support

*Based on a Presentation by: Michele Plante, Environmental Health Officer*

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### Challenge

To insure the success of the facility's Hazard Communications and Waste Management Programs, reduce waste management costs, decrease the liability of the institution, help reduce waste generation, and meet legislative mandates.

### Response

Implement extensive employee training programs.

### Motivations

Why train? First there is a significant body of regulations that need to be explained to employees. Sources of these regulations include the (Massachusetts) Department of Environmental Protection (DEP), the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the Joint Commission on Accreditation of Health Care Organizations (JCAHO), the Department of Transportation (DOT), the Department of Public Health (DPH), and the institution itself. Training reduces confusion about these regulations and the institution's expected responses to them. It, therefore, helps with program implementation. Training also increases safety and helps control costs.

### Summary

Tufts-New England Medical Center has instituted an extensive, institution-wide employee training program on environmental issues. Currently run by Michele Plante, the program includes education for nurses, in cooperation with the Nurses Education Department, and physicians, as part of their required annual credentialing. Physicians are also given special training when they are hired. The type and

extent of training is based on the needs of particular individuals or departments. For example, the training given many employees on the basics of separating waste will differ in both content and time required from the training given a new member of a response team.

Despite the differences, however, training sessions share important common elements:

1. **An explanation of the reasons for the program.** The motivations listed above are examples of the kinds of reasons that might be cited.
2. **A clear objective.** It isn't enough to plan a generalized program on the need to reduce waste. A specific and obtainable objective needs to be identified. For example, "to clarify what should and should not go into red bags" is a clear objective.
3. **A review of the points to be made.** This helps participants follow the presentation.
4. **A description of the change(s) desired.** Using the example above, a desired change might be to get employees to dispose of solid waste in appropriate containers and to stop throwing inappropriate trash into red bags. It is effective to point out the consequences of employee actions to support the need for the change. Depending on the action involved, the consequences can include fines, civil and criminal liability, poor public relations, environmental complications, unsafe conditions, increased costs, or decreased efficiency.

5. ***A review of contingency plans.*** For example, in the case of a chemical spill, the contingency plan would include information on: a) what to do, b) who to call, c) where to meet, d) incident reports, e) how and when the space will be cleared for re-entry, and f) how and when to notify state agencies.
6. ***Open lines of communication and opportunities for interaction.*** Trainers call for employee involvement, and ask for ideas and suggestions about both the training itself and the waste management program. Trainers ask staff to report problems and concerns and provide necessary contact information (phone numbers, e-mail addresses) for doing so.
7. ***Problem identification and evaluation.*** Building on the open communication with staff gather feedback on opportunities to improve the training and waste management programs.

In addition, Ms. Plante had specific suggestions for assuring that staff get the most from a training session: "Keep their attention." To do that "pick a convenient time and place. Use examples that are practical. Use humor...make them laugh...be clear on expectations. Do not beat a dead horse. Do not talk down to the audience. Move around and use illustrations."

### ***Financial Impact***

NEMC's cost of training is approximately \$6 to \$10 per employee. At NEMC, approximately 4,000 to 5,000 employees are trained annually. The cost for training is not charged back to the department.

## COMMON ELEMENTS of EFFECTIVE TRAINING

- *Explanation of Rationale*
- *Clear Objective*
- *Overview*
- *Describe Desired Changes*
- *Contingency Plan Review*
- *Communication and Interaction*
- *Problem Identification and Evaluation*

# GAINING AND KEEPING SUPPORT

## Developing Recycling Teams

*Based on Presentations by:*

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### Challenge

To assure that all recyclables in the waste stream are recycled and not thrown away.

### Response

Establish recycling teams to plan, implement, and monitor recycling programs.

### Motivations

1. In 1990, Holy Family's cafe switched from using china to polystyrene. The change, while economically beneficial, raised fears among the staff about its environmental impact.
2. That same year, recycling became a Quality Assurance Goal for the hospital.
3. The administration recognized that there were potential regulatory issues at stake.

### Summary

Holy Family Hospital began its recycling program with polystyrene in the cafe in January 1991, and by 1993 had recycled 13 tractor trailer loads of it. During 1995, the program was expanded to include paper, glass, and cardboard throughout the facility. Recycling teams were created to plan, implement, and monitor the program.

In the beginning, the teams were made up of managers only, from administration, engineering, environmental services, food services, and materials management. Today, they consist of a cross section of employees, including non-managers. Representatives from nursing and infection control have been added.

To insure the success of such teams, Holy Family's recycling staff recommends specific steps:

1. **Clarify purposes.** Holy Family's teams were expected to address environmental concerns, regulatory compliance, environmental impact, and issues of social acceptance.
2. **Identify and involve stakeholders.** These might include managers, customers, visitors, the community, co-workers, regulatory agencies, suppliers, nurses, and staff from materials management, environmental services, finance, and administration, as well as medical staff. Their concerns, interests, and expectations included business results, customer satisfaction, ease of use, value, regulatory compliance, affect on them, growth opportunities, and change.

Involving the stakeholders helps identify better solutions to problems, create more acceptance, avoid pitfalls, identify limits, and aid in getting important information.

The presenters had two important tips:

- (1) *The better you communicate to stakeholders, the better your chances for success, and*
- (2) *Think broadly about who your stakeholders might be — other departments, groups outside the organization, regulatory agencies, vendors, and the like can influence your success.*

**3. Establish clear limits and expectations** to help the team meet organizational goals, address important aspects of work, minimize conflict and confusion, and balance stakeholder expectations. The team needs to clarify its limits and expectations with the administration, clearly understand them, and use this information to guide the actions of the team.

Limits and expectations might have to do with money and budgets, time lines and deadlines, workloads and priorities, selection and participation of team members, other resources, training, decision-making authority, access to information, process boundaries, and products or areas that will or won't be included.

**4. Specify the roles of team members.** Roles are partially determined by department at Holy Family. For example, members from administration provide program guidance and support and identify limits and expectations. Team member roles are also assigned based on the products over which a team member and his or her department have responsibility. For example, engineering is responsible for construction waste such as copper, brass, and other metals; food service is responsible for plastics, polystyrene, bottles and cans, and compost. All team members are responsible for reviewing literature on recycling and participating in the monitoring and improvement program.

Time and space presented the primary obstacles to Holy Family's plan. All team members have other work. It was important, therefore, to work efficiently, set clear deadlines, and bring discussions to closure to minimize meeting time. Recycling also takes up space, which is scarce in hospitals. Storing recyclables requires special efforts to keep the storage space clean and free of pests.

### *Financial Impact*

Holy Family is breaking even on its entire recycling program, after covering up-front costs. The cost of disposing regular trash has gone down, money is being consistently saved on cardboard, building and maintenance materials are sold and make money, bottles and cans also are sold and make money, but recycling polystyrene costs the hospital money. Dollar figures were not given.

## SUCCESS STEPS for the RECYCLING TEAM

- *Clarify Purposes*
- *Identify and Involve Stakeholders*
- *Establish Clear Limits and Expectations*
- *Specify Team Member Roles*

# MANAGEMENT TECHNIQUES

## *Auditing and Tracking the Waste Stream*

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### **Challenge**

To know what is in the waste stream, what happens to each category of waste, and where there is room for improvement.

### **Response**

Perform a waste audit and establish waste tracking systems.

### **Motivations**

How much waste do you generate? Is it sorted properly from both an environmental and economic perspective? Is waste separated from recyclable and reusable material? These important questions that face waste management administrators can best be answered by conducting waste audits and establishing waste tracking systems.

### **Summary**

Audits identify where improvement is possible and provide a baseline for evaluating the success of a waste management program. Tracking systems help monitor the ongoing success of the program.

An audit is conducted by tagging garbage bags over a period of time (Vikke Jas reported using a 36-hour period) and assessing what is in them. This process helps to identify the kinds of waste that are a problem: Are you throwing away recyclables or reusable equipment? Are you red-bagging pizza boxes? Hollie Shaner stressed the need to audit by areas or depart-

ments to determine which ones have the most room for improvement. She cited the example of an operating room that switched to disposable drapes, increasing waste by 32 tons a year.

Once an audit is complete and problem wastes, sorting practices, and departments are identified, tracking systems help with the ongoing evaluation of the management of each problem. A tracking program should use the baselines identified by the audit, and specific types of waste (mercury, red bag, etc.) should each be tracked. Recycling and reuse programs should be tracked as well. Full cost accounting should be a part of the tracking system, and that requires that tracking should begin with purchasing.

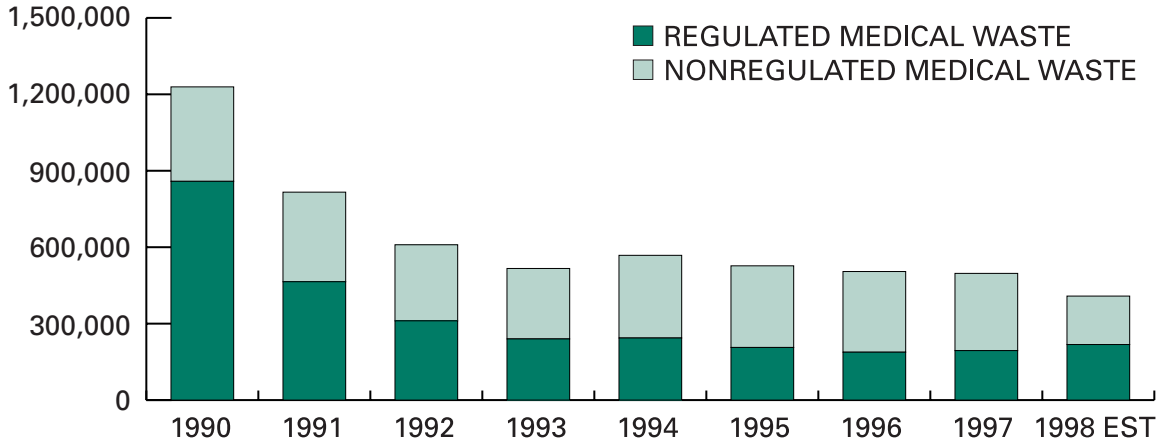
### **Financial Impact**

The financial impact of the audit can only be gauged in conjunction with the waste management program that grows out of it. Tracking systems provide a tool for determining financial impact. Performing an audit and setting up a tracking system require staff time and perhaps, consulting fees. Tracking software may also need to be purchased or developed.

That said, Janet Brown provided data demonstrating the savings reductions achieved through waste management programs at Beth Israel Medical Center in New York.

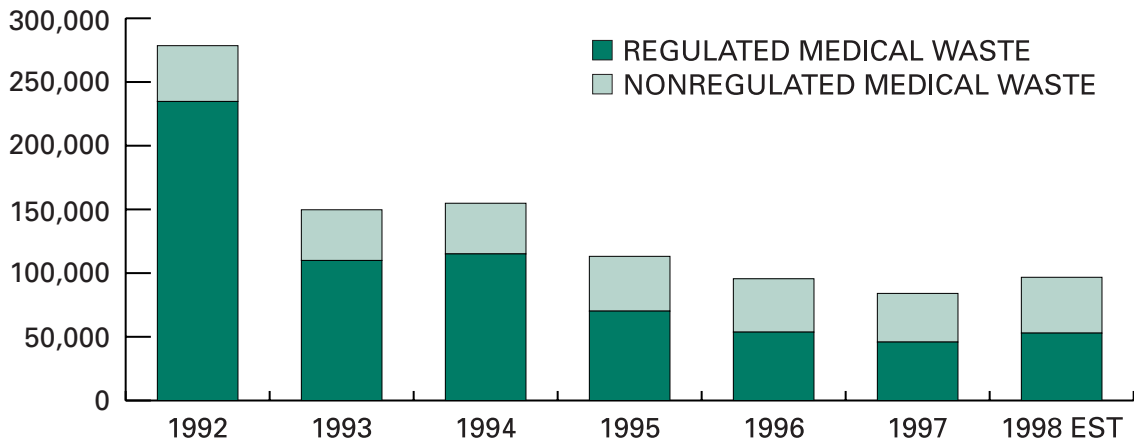
## Regulated and Nonregulated Waste Cost History Beth Israel Medical Center

### PETRIE CAMPUS - 800 BEDS



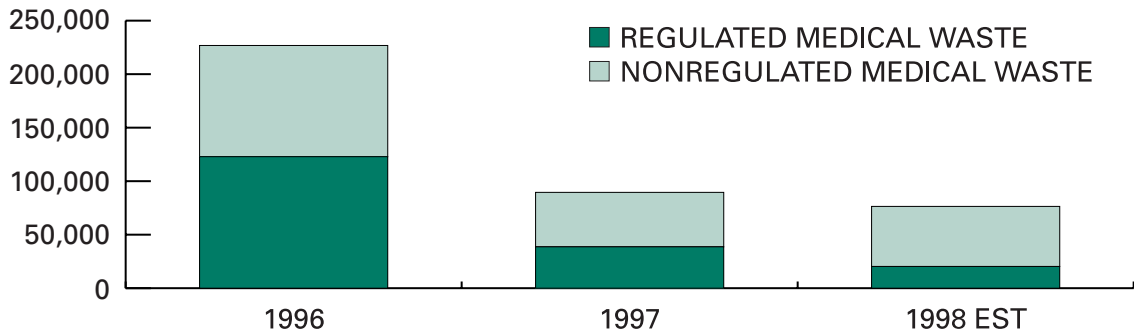
Note: Regulated Medical Waste (RMW) cost includes haulage of regulated medical waste, pathological waste, bulk blood, residual cytotoxic drugs and sharps. 1998 estimated annual cost based on first 4 months data.

### NORTH DIVISION - 200 BEDS



Note: RMW cost includes haulage of regulated, pathological, bulk blood and residual cytotoxic drugs. Does not include sharps.

### KINGS HIGHWAY DIVISION - 200 BEDS



Note: Programs implemented August 1996. RMW includes haulage of regulated, pathological, bulk blood and residual cytotoxic drugs. Does not include sharps.



# MANAGEMENT TECHNIQUES

## Changing Work Practices to Eliminate Root Causes of Waste

*Based on a Presentation by: Robert Pojasek, Ph.D., President*  
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website: <http://www.hsph.harvard.edu/courses/eh270cd>

### Challenge

To avoid producing waste.

### Response

Perform a systematic analysis of work processes that identifies what processes produce waste and identifies changes that will eliminate it.

### Motivation

Recycling and reuse programs don't attack the causes of waste. The need to recycle comes from failing to control the processes that produce the waste in the first place.

### Summary

Robert Pojasek, a private consultant and professor at the Harvard School of Public Health, advocates using a systems approach to eliminating waste. He refers to his approach as "prevention-focused" and contrasts it to "waste-focused" approaches. In his view, "waste-focused" approaches begin with the waste, analyze it, and work backwards to its sources to determine where it comes from. Recycling efforts are major components of waste-focused pollution prevention programs.

In contrast, Pojasek's prevention-focused programs target the processes and operations that produce waste and not the waste itself. They are anticipatory, looking at the circumstances that lead to waste or loss. They recognize that recycling only returns pennies on the dollar and, hence, attempt to avoid the need for recycling wherever possible.

Pojasek has taken tools originally developed in the field of total quality management and adapted them to use in examining institutional processes in order to find opportunities

for reducing or eliminating waste. For the most part, these tools use diagrams to illustrate graphically and clearly where and how waste occurs. There are six stages, each with its own distinctive tools.

- 1. Analyze the process. Process maps** chart the course of any process, picturing each stage, noting all resources used, and indicating points where waste might occur. An example of a process could be the painting of a piece of equipment or performing a particular type of surgery.
- 2. Isolate the most serious problems. Pareto analysis and other rank ordering tools** provide ways to examine the information provided by a process map, determine where the most serious (i.e., costly or time-consuming) waste is occurring, and establish priorities for attacking problem areas. In the simplest terms and in the context of this conference, a Pareto analysis (named for its developer) will help identify the 20 percent of a process that results in 80 percent of its waste. That 20 percent of the process would receive priority treatment.
- 3. Find the fundamental causes of the most serious problems. Root cause analysis** tools take those portions of processes targeted for priority treatment and examine them to determine why the waste is being generated. For example, cause and effect diagrams can be used to examine all of the causes of a known effect and how those causes are interrelated.

4. **Write a definitive statement of the problem** based on information provided by the root cause analysis.
5. **Generate alternative solutions to the problem.** Alternative generating tools can then be brought into play. Pojasek used “brainwriting,” a variant on brainstorming, as an example, but also cited other tools such as computer simulation and affinity diagrams. The alternatives generated will need to be prioritized.
6. **Write an action plan.** Action plans derived from the prioritized alternatives make it possible to move from analysis of a problem to the implementation of its solution. An action plan, according to Pojasek, “details who will do what, by when; organizes tasks that implement the alternative; allows for discussion of timing, personnel, and other resources that are needed; sets performance standards and targets; and allows for tracking of progress and reasons for deviance.”

Pojasek ended with a series of recommendations that included:

- 1) Never be satisfied with recycling—look for ways to prevent.
- 2) Consider use of a formal program, like the systems approach, instead of “walk through” assessments.
- 3) Certify each department for the “right” to generate waste or use regulated materials.
- 4) Consider centralized purchasing of all materials that are regulated in use or loss.
- 5) Charge back for waste generation with the purchase of materials.
- 6) Always use the “true” cost of waste management and disposal.

### *Financial Impact*

The workshop did not present examples of overall savings using this approach. However, Professor Pojasek pointed to a 27 percent reduction of waste printing paper in an office by putting a kill switch on a printer.

## STAGES for REDUCING WASTE

- *Analyze the Process*
- *Isolate Serious Problems*
- *Locate Causes of Serious Problems*
- *Write a Definitive Statement of the Problem*
- *Generate Alternative Solutions*
- *Write an Action Plan*

# MANAGEMENT TECHNIQUES

## *Purchasing with the Environment in Mind*

*Based on a Presentation by: Jonathan Goldberg, Support Services Administrator*

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### **Challenge**

To eliminate sources of waste.

### **Response**

Consider potential waste generated by both the product and its packaging when making purchasing decisions.

### **Motivation**

Purchasing decisions significantly impact down stream waste generation within health care facilities.

### **Summary**

The Massachusetts Hospital School has one of the most extensive environmental stewardship programs encountered at the conference. The program has components dealing with a wide range of issues: asbestos control, PCB and CFC removal, elimination of underground storage tanks, recycling, composting, designing specifications for ensuring safety, indoor air quality, water conservation, photovoltaic panels, infectious waste, and the use of alternative fuel vehicles.

Purchasing with a view to controlling waste is an important part of this overall program. Under Jonathan Goldberg's direction, the Massachusetts Hospital School has worked to develop mutually beneficial partnerships with suppliers and vendors who want to test or are selling environmentally sound products. These efforts have worked to protect staff and the environment. For example, significant success has been achieved with cleaning chemicals. By working with infection control, housekeeping, and purchasing, the school has reduced usage of these chemicals by 50 percent.

### **Financial Impact**

The purchase price of a product may not accurately reflect the full cost of using that product. The product with a higher purchase price may be more cost effective because of lower handling and disposal costs.

### **Additional Resources: Focus on Alternative Products**

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Eric Weltman made a presentation on problems with products containing PVC and recommended the use of alternative products where possible. The link between PVC and dioxin was discussed and the dangers of dioxin stressed. Weltman and Dr. Ted Schettler, of the Greater Boston Chapter of Physicians for Social Responsibility, have co-authored a report, [Preventable Poisons: A Prescription for Reducing Medical Waste in Massachusetts](#), which contains substantial information on key products that contribute to the toxicity of hospital waste, including PVC and mercury. Contact the Toxics Action Center for details.

# SPECIFIC TARGET AREAS

## Paper Conservation

*Based on a Presentation by: Dan Ruben, Environmental Coordinator*

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### Challenge

To reduce waste paper by means other than recycling.

### Response

Implement an integrated program to reduce the use of paper.

### Motivations

1. Saving paper is lucrative.
2. Managing paper is time consuming.
3. Saving paper improves space efficiency by reducing storage needs.
4. The environmental consequences of paper use are severe.

### Summary

Dan Ruben's goal at Harvard Pilgrim Health Care was not to recycle as much paper as possible, but to eliminate the need to recycle by eliminating the use of paper wherever possible.

In order to succeed, he needed significant support from three sources. First was administration. Senior management had to buy into and actively support the program. Changing habits is difficult in any context, and without administrative support, there is little incentive for staff habits to change. Second was information technology, because much of the paper savings in his program is generated by using computerized communications and record keeping. Finally, he needed the general support of the staff in order to win participation and thus assure success.

Financial arguments were crucial in winning the support of administration, and those arguments were based on careful documentation of how much paper was being used — 322 million pieces at a total cost of \$8.5 million a year. Indirect costs, such as postage associated with mailing unneeded paper, storage space, and waste removal, were included in the cost calculations.

The analysis helped identify and target high-cost departments and materials, and provided the background needed for developing the strategies used.

These strategies fall into three general categories.

1. **Increase the use of computerized communications and record keeping.** Develop and use on-line reports and forms wherever possible, recognizing that some reports don't lend themselves to on-line use. Increase the use of the internet, shared network drives, and bulletin boards. Use the internet to communicate and engage in transactions with customers wherever possible.
2. **When paper is used, use less of it and make sure it is more environmentally friendly.** Work with the information technology department to develop standards for using paper efficiently. Reset software defaults to use narrower margins and typefaces that take less space.  
Eliminate the distribution of unneeded reports. Pare down distribution lists. Charge recipient departments for reports. (Meeting with high-volume report recipients is sometimes necessary.)

Analyze high cost documents, looking for ways to reduce content or change layouts for better paper use efficiency. Purchase paper with less brightness, because it uses less bleach (bleach produces dioxin emissions when waste paper is incinerated.) Restrict access to color copiers.

3. ***Get the support of the staff.*** Help employees think about the cost of paper. (Harvard Pilgrim formed a green team of employees to come up with ideas about how to conserve paper better.) Develop specific instructions on how to conserve. When trying to win the support and participation of staff, it helps to make small, easy changes that generate big results. Make a poster with copying instructions (such as: Make two-sided copies). Create incentive programs. For example, staff who reduce their paper usage for 3 months by a certain amount receive a prize — the best is a half-day off.

### ***Financial Impact***

Harvard Pilgrim will save \$2.7 million a year just putting reports on-line and anticipates saving millions of dollars each year on paper conservation. These savings are expected to be seen in just a couple of years.

## **STRATEGIES for the REDUCTION of PAPER WASTE**

- ***Increase the Use of Computerized Communications and Record Keeping***
- ***Conserve and Use Environmentally Friendly Paper***
- ***Gain Staff Support of Paper Saving Strategies***

# SPECIFIC TARGET AREAS

## Making the Most of Surplus Equipment

*Based on Presentations by:*

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**Sigrun Leonhardt**, REMEDY Program Coordinator  
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**Frank Eaton**, Director of Purchasing/Risk Manager, New Hampshire College  
Coordinator of Donation Depot, 2500 North River Road, Manchester, NH 03106  
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### Challenge

To keep working equipment that can no longer be used in the United States out of the waste stream and prolong its usefulness.

### Response

Collect and send the equipment abroad for use in undersupplied medical facilities.

### Motivations

Reduce waste and provide assistance to medical personnel in countries not able to purchase equipment. There is also a positive public relations aspect to the reuse projects discussed.

### Summary

The REMEDY program at Yale-New Haven Medical Center was started as a result of Dr. William Rosenblatt's observation that much of the medical equipment making its way into the waste stream at the hospital was still serviceable, even though it was no longer needed or could not be used at Yale-New Haven. Rosenblatt recognized that much of this equipment could be put to good use at under equipped medical centers abroad, especially in developing countries with limited resources. His goal was to keep this equipment from becoming waste in the United States and to get it to hospitals and clinics elsewhere.

Crucial to making the program a reality was gaining administrative support, locating key individuals to provide assistance, and finding space to store the equipment prior to shipping it abroad. More fundamental was the need for a distribution channel that had the logistical expertise to ship the equipment and the political and medical know-how to assure that equip-

ment went to places with a real need. The Albert Schweitzer Institute in Wallingford, CT, provides this channel for REMEDY.

Among the primary responsibilities of the distributing organization is to know the local recipients well enough to prevent the equipment from falling into the hands of black marketers. The distributing organization also must make sure that project personnel accompany the materials, to ensure that the materials will be used correctly and safely.

Details of the program can be obtained from Dr. Rosenblatt.

Donation Depot at New Hampshire College in Manchester, NH, provides a similar service for a wide range of supplies and equipment, including, but not limited to, medical equipment. Donation Depot is distinguished by both its wide range of donors and its distribution channels. Its donors include not only organizations looking for ways to dispose of working, but unneeded, equipment, but also companies with excess or discontinued products that still have some use value, even though they can't be sold.

### Financial Impact

Frank Eaton reports that one of the reasons that he has the support of his college administration for Donation Depot is that, as Director of Purchasing, he has the right of first refusal on all donations. Paper or office furniture donations may be used by the college, thus significantly reducing the need to purchase such items. The money saved by giving the college first refusal more than covers the cost of running the rest of the program, which distributes useful goods, including medical equipment, around the world.

# SPECIFIC TARGET AREAS

## Reducing Red Bag Waste

*Based on a Presentation by: Laura F. Brannen, Waste Minimization Coordinator*

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### Challenge

To reduce red bag waste.

### Response

Establish an infectious waste minimization program.

### Motivation

1. Reduced disposal cost.
2. Reduced toxic incinerator emissions.
3. Reduced liability for toxic emissions.

### Summary

In 1995, Dartmouth-Hitchcock's incinerator was shut down, forcing the medical center to send out all infectious waste at a cost of \$640/ton. With the construction of an on-site autoclave, the cost dropped to \$120 a ton, but solid waste cost only \$45 a ton to send to the land fill. At 46 percent of the total waste stream at DHMC, red bag waste was targeted for reduction, and a goal of 15 percent of total waste by weight was set. DHMC has attained a red bag waste level of 14 percent of total waste and has now set a target of 10 percent.

Proper sorting was crucial to reaching and exceeding this goal. Infectious waste had to be carefully segregated from hazardous waste, solid waste, and recyclable materials. An audit helped determine how much of each was finding its way into the infectious waste stream, and the proper segregation of infectious waste became a crucial element in a hospital-wide waste reduction program.

Both organizational and educational efforts contributed to the success of the program. The organizational efforts included the appointment of Recycling Coordinators and HITS (hazardous, infectious, training, and safety) Coordinators at the departmental level. Housekeeping was empowered to become waste experts.

Educational efforts focused on infectious waste definitions and safety awareness. Distinguishing solid waste and recyclable materials from infectious waste is relatively straight forward, but distinguishing hazardous waste from infectious waste is more difficult. Hazardous waste can be defined as a liquid or solid or gas that is toxic, flammable, corrosive, or reactive while infectious waste is primarily waste containing wet blood. It is the latter that should be red bagged.

There is, however, a gray area where infection control staff can help define the circumstances under which waste with traces of blood need not be red bagged. This gray area needs careful examination, because both waste management and occupational safety issues are at stake.

Proper staff education is the key principle in the success of any red bag waste program. Information on the red bag waste program is included in the human resource manual given to all employees at the time of employment. Mandatory in-service presentations on what goes into red bags — and what doesn't — are run annually in all departments. Throughout the hospital there are posters with the same information. In addition, DHMC documents bad practices with Polaroid photographs, which are posted for employees to see. These photos have proven to be an effective educational tool.

### Financial Impact

Brannen cited a total savings for DHMC's waste reduction program of \$150,000 a year.

# SPECIFIC TARGET AREAS

## Striving to be Mercury Free

*Based on Presentations by:*

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**James Harvie, P.E.**  
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### Challenge

**For MASCO:** To meet a 1 part per billion (ppb) standard in waste water.

**For WLSSD:** To achieve zero discharge of mercury.

### Response

Determine where the mercury is coming from and eliminate the sources.

### Motivations

As part of efforts to clean up Boston Harbor, the Massachusetts Water Resources Authority (MWRA) established a 1 ppb standard for the level of mercury in waste water. This standard required significant action on the part of hospitals in the MWRA system. In addition to this regulatory motivation, the hospitals involved recognized their ethical obligation to limit the mercury in their waste water because of the public health hazards associated with it. There were also public relations benefits, as well as economic motivations: avoided clean up, regulatory compliance, and hazardous waste management costs.

### Summary

In order to meet the 1 ppb standard, a collaborative relationship between the MWRA and the hospitals was established to reduce mercury discharges into waste water. The MWRA agreed not to use data that was gathered for enforcement purposes. It would issue notices

of non-compliance and violation of standards, but fines would not be assessed to the hospitals involved in the project.

This agreement made it feasible for the hospitals to establish an internal benchmark for discharges where mercury loadings for the participating institutions were compared to the whole MWRA mercury loading. It was found that the participating hospitals contributed 20 percent to 25 percent of the MWRA's total mercury, a percentage that has now been reduced to 7 percent. This figure represents a 70 percent reduction in mercury discharges from the participating hospitals.

To attack the problem, MASCO established three subcommittees to study the mercury discharge problem. The first was operational, and its purpose was to find the sources of mercury in the hospitals themselves. The second dealt with the infrastructure, and it looked for sources of mercury in the pipes, traps, and drains. The third studied possible end-of-pipe treatments. All three were responsible for providing education about their findings and for identifying ways to eliminate some of the mercury.

At the conclusion of MWRA's work, it was determined that the best solution was to eliminate the sources of mercury. The end-of-pipe subcommittee was unable to find a way to eliminate residual mercury that remained at



the point the waste water left the facility. The infrastructure subcommittee reported that elemental mercury was collecting in traps and pipes and recommended that the pipes be cleaned only *after* mercury use has been eliminated. Otherwise mercury would continue to accumulate in the pipes and leech back into the waste water. This subcommittee further recommended that new plumbing not be attached to the old pipes to avoid contaminating waste water that leaves its point of origin clean and that sedimentation tanks be installed. These tanks helped the MASCO hospitals meet their 1 ppb goal.

As an aid to eliminating mercury at the source, Gary Alpert at Harvard has developed a database of 7,000 commonly used products. The database contains information on the mercury content of each product. The database can be accessed via the MASCO website at [www.masco.org/mercury](http://www.masco.org/mercury), where the subcommittee reports and other useful information can also be found. In addition, David Eppstein, who can be contacted at the e-mail address listed at the beginning of this summary, announced that he will have a guide book on the elimination of mercury prepared this year.

James Harvie in Minnesota advocates an even more stringent standard than that required by MWRA in Massachusetts: a commitment to zero discharge of mercury. Meeting this commitment means eliminating most sources of mercury and managing the remaining ones carefully.

Where hospital consortia of the MASCO type do not exist, Harvie recommends establishing individual mercury reduction teams that explore all aspects of mercury use in the hospital and establish guidelines for its use and elimination. There also needs to be extensive education about mercury for both employees and the general public.

With regard to identifying mercury sources, Harvie recommends asking vendors for certificates of analysis of products used in the hospital. Asking staff where they have used mercury and mercury containing products and then sampling the traps in those areas has proven to be an effective educational tool.

He cited the example of a hospital lab where trap sampling turned up significant amounts of mercury, which were traceable to fixatives used there. As a result, the hospital tested a variety of alternative fixatives and eventually went mercury free.

Other recommended areas of attention include boiler chemicals, florescent lights, batteries, and dental traps.

### *Financial Impact*

Both presenters pointed to avoided clean-up costs, potential regulatory compliance costs, and hazardous waste disposal costs as financial advantages of going mercury free. David Eppstein referred to a fine of \$118,000 for violation of MWRA standards.

# SPECIFIC TARGET AREAS

## Controlling Chemical Wastes

*Based on Presentations by:*

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### Challenge

Hazardous material minimization and pollution prevention with a goal of zero waste, energy conservation, and improved environmental quality.

### Response

Establish programs to control chemical waste using a variety of techniques, including chemical reclamation, product substitution, battery recycling, and better handling of chemicals.

### Motivations

To meet regulatory demands and avoid fines, to reduce risks, and to avoid clean-up costs.

### Summary

The solution to controlling chemical wastes involved a three-phase, product-oriented model.

**Phase 1** included the establishment of a plan, the organization of a team, the development of a process to be followed, and a system that would allow results to be tracked.

**Phase 2** dealt with issues in the patient care setting, including hazardous waste management and reduction, waste prevention, product management, value analysis, partnerships and coalitions, and the value of composting.

**Phase 3** involved issues having to do with hazardous waste minimization, including red bag waste, chemical reclamation, product substitution, battery recycling, and better handling of chemicals.

Albany Medical Center benchmarked its progress with organizations outside of the industry. These included the biggest hotel/restaurant in Albany and one of the biggest offices and warehouses.

One obstacle to the process was establishing convenient storage for homeless chemicals. This concern was addressed by establishing set, brief hours for gaining access to storage space and by establishing accountability. In order to overcome these and other obstacles, the presenters felt the need to present the issues in the language of the audience, and to incorporate purchasing in all decisions so that purchasing orders were environmentally approved. The current challenges include holding the gains that have been made, the issue of how to deal with biological agents, and new regulations.

### Financial Impact

The presenters reported estimated savings of approximately \$250,000 in annual waste cost avoidance. The initial cost of the program was approximately \$60,000, with a payback time of about eight months.

# AFTERWORD

As those of us who planned and administered this conference have reviewed the material presented, it has become clear that most of the approaches described can be adapted for use in almost any organization. This is good news. Developing a strong, ongoing environmental stewardship program in a health care facility doesn't appear to require massively expensive new technology. In fact, based on what was presented, environmentally sound waste management practices – when taken in the aggregate – seem to cost no more in the long run than environmentally harmful practices do. There may be up front costs to absorb, but, in the programs described, these costs are frequently recaptured as time goes on. Some aspects of sound waste management pro-

grams are more costly than others; but when viewed as part of a total waste management program, the costs of one segment of the program are often offset by savings in another part. For those of us who hope to see environmentally sound waste management practices spread throughout the health care industry, these conclusions are cause for hope.

We are grateful to Bristol-Myers Squibb Company for making the conference possible and, thereby, helping us see an optimistic future for the cause of health care environmental, health, and safety management.

Additional copies can be obtained by contacting Michael Reff at 315-432-2861 or by e-mail at: [mreff@usccmail.bms.com](mailto:mreff@usccmail.bms.com).

## *Special Thanks is extended to:*

***Jim May*** who managed the conference and also wrote this compendium, and  
***Barbara Winter-Watson*** who provided editorial assistance.



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# INNOVATIONS IN HEALTH CARE ENVIRONMENTAL HEALTH AND SAFETY SPEAKERS

Monday, June 1, 1998

## Welcome

**William Moomaw**, Director, Tufts Institute of the Environment, Professor, Fletcher School of Law and Diplomacy, Tufts University

**Laurie Stillman, MMHS**, Executive Director, Massachusetts Public Health Association

**James E. Kearney, CIH CSP**, Associate Director, Environmental Health, Worldwide Medicines, Bristol-Myers Squibb Company

## Keynote Addresses

### **A Clean Environment is Essential for Successful Health Care**

**Anthony D. Cortese, Sc.D.**, President, Second Nature

### **Nobody's Exempt: We All Have a Job to Do**

**Jan Schultz**, President, Jan Schultz & Associates

**Ted Schettler, MD**, Greater Boston Physicians for Social Responsibility

**Kathy Gerwig**, National Manager, Resource Conservation, Kaiser Permanente

Moderator: **Michael J. Reff, R.Ph.**, Environmental Health Specialist, Worldwide Medicines, Bristol-Myers Squibb Company

## Concurrent Workshops

### **Changing the Culture of Hospital Waste Management**

**Laura F. Brannen**, Waste Minimization Coordinator, Dartmouth-Hitchcock Medical Center

Moderator: **Arthur Mazer, MPH**, Massachusetts Public Health Association

### **Alternative Products and Services Your Hospital Can Use to Reduce Harm**

#### **PVC Alternatives**

**Eric Weltman**, Program Director, Toxics Action Center

#### **Mercury Alternatives**

**James Harvie, P.E.**, Western Lake Superior Sanitary District

#### **Purchasing with the Environment in Mind**

**Jonathan Goldberg**, Support Services Administrator, Massachusetts Hospital School

Moderator: **Elizabeth Barbeau, Sc.D.**, Massachusetts Public Health Association

### **Controlling Chemical Wastes**

**Claude Rounds**, Vice President of Plant Management, Albany Medical Center

**Vikke Jas**, Manager of Biosafety and Environmental Programs, Dartmouth-Hitchcock Medical Center

Moderator: **John Robson**, Bristol-Myers Squibb Company

### **Paper Conservation**

**Dan Ruben**, Environmental Coordinator, Harvard Pilgrim Health Care

Moderator: **Laurie Stillman, MMHS**, Executive Director, Massachusetts Public Health Association

### **Developing Recycling Teams**

**Darin E. Leeman**, Operations Manager, Sodexo Marriott Services

**Paul A. Pezone**, Director of Maintenance, Holy Family Hospital

**Mary-Camille Abdoo**, Director of Integrated Services, Holy Family Hospital

Moderator: **Arthur Mazer, MPH**, Massachusetts Public Health Association

### **Safe Handling of Hazardous Drugs**

**Diane Corso**, Clinical Coordinator, Division of Pharmacy Services

Moderator: **Michael J. Reff**, Bristol-Myers Squibb Company

## **Auditing and Tracking the Waste Stream**

**Vikke Jas**, Manager of Biosafety and Environmental Programs, Dartmouth-Hitchcock Medical Center

**Hollie Shaner**, President, CGH Environmental Strategies, Inc.

**Janet Brown**, Medical Waste Manager, Beth Israel Health Care System

Moderator: **Beth Rosenberg, Sc.D.**, Massachusetts Public Health Association

Tuesday, June 2 1998

## Welcome

**Thomas M. Hellman**, Vice President, Environmental Health and Safety, Bristol-Myers Squibb Company

## Keynote Address

### **Making the Pieces Fit: Essential Components of a Hospital Environmental Program**

**Hollie Shaner**, President, CGH Environmental Strategies, Inc.

## Concurrent Workshops

### **Training for Success: Building Employee Support**

**Michele Plante**, Environmental Health Officer, New England Medical Center

Moderator: **Jerry Schinaman**, Bristol-Myers Squibb Company

### **Reducing Red Bag Waste**

**Laura F. Brannen**, Waste Minimization Coordinator, Dartmouth-Hitchcock Medical Center

Moderator: **Laurie Stillman, MMHS**, Massachusetts Public Health Association

### **Striving to be Mercury Free**

**David Eppstein**, Director, Policy and Special Projects, Medical, Academic and Scientific Community Organization

**James Harvie, P.E.**, Western Lake Superior Sanitary District

Moderator: **Barbara Berney, MPH**, Massachusetts Public Health Association

### **Safe Handling of Hospital Waste**

**Evelyn I. Bain, Med RN COHN-S**, Associate Director, Occupational Safety and Health Specialist, Massachusetts Nurses Association

**Bill Picard**, President, Lightning Environmental Recovery Systems, Inc.

Moderator: **Barbara Berney, MPH**, Massachusetts Public Health Association

### **Making the Most of Surplus Equipment**

**William H. Rosenblatt, MD**, Associate Professor, Yale University, President/Founder, REMEDY: an alternative for unused disposables

**Sigrun Leonhardt**, REMEDY Program Coordinator, Albert Schweitzer Institute for the Humanities

**Frank Eaton**, Director of Purchasing/Risk Manager, New Hampshire College, Coordinator of Donation Depot

Moderator: **Judith Gorbach, Ed.M, MPH**, Massachusetts Public Health Association

### **Incinerator Update**

**Brian Fitzgerald**, Engineering Services Supervisor, Air Pollution Control Division, Vermont Agency of Natural Resources

**Judy Shope**, Recycling Policy Coordinator, Bureau of Waste Prevention, Massachusetts Department of Environmental Protection

**John Courcier**, Senior Environmental Engineer, Air Permits Section, United States Environmental Protection Agency - New England

Moderator: **James E. Kearney, CIH CSP**, Bristol-Myers Squibb

### **Changing Work Practices to Eliminate Root Causes of Waste**

**Robert Pojasek, Ph.D.**, President, Pojasek & Associates

Moderator: **Beth Rosenberg, Sc.D.**, Massachusetts Public Health Association

