



## Section IV

## The Waste Assessment<sup>17</sup>

The Project Team will need information provided by a thorough analysis of exactly what is happening with all types of waste throughout the facility. Additionally, information concerning procurement policies and any impact they may currently have on source reduction will be necessary in order to begin planning the Waste Reduction Project. (See H2E's [Environmental Purchasing](#) chapter.) [Link](#)

A Waste Assessment is a systematic way of identifying waste reduction opportunities. The Assessment can be as simple as a walk-through of the facility, or it can be as detailed as a complete review of all purchasing, materials use and disposal practices. A thorough Waste Assessment helps you meet the broader objectives of identifying and documenting those actions that will have the greatest impact and cost savings by:

- ▶ Establishing a better understanding of current purchasing,
- ▶ Understanding waste generation, recycling and waste disposal practices,
- ▶ Identifying opportunities for prioritizing your efforts, and
- ▶ Establishing a baseline from which to measure the success of the waste reduction program.

The baseline Waste Assessment will be the point against which future waste volumes and costs will be compared. Accurate establishment of this baseline is essential to accurate tracking and reporting the contributions that your waste minimization efforts ultimately make toward the facility's ability to support high quality

2. *Facility Walk-Through* – A facility walk-through is a relatively quick way to assess

patient care at the lowest possible cost. This documentation is essential to obtaining continued management support for your program.

Although the complexity and comprehensiveness of assessments vary, they generally include the following steps:

- ▶ Review of facility operations and records of waste generated,
- ▶ Identification of potential waste reduction options,
- ▶ Identification of locations where recycling, regulated medical waste, hazardous chemical waste and solid wastes are generated
- ▶ Where recycling and waste collection containers should be placed,
- ▶ Assessment of the operational and economic feasibility of the most promising waste reduction options.



### Waste Assessment Methods

There are three generally accepted methodologies for conducting a Waste Assessment: *Records Examination*; *Facility Walk-Through*; and the *Waste Sort*. The most successful waste assessments use all three.

1. *Records Examination Method* – Records examination can provide insight into your organization's waste generation and removal patterns. The types of records your organization may want to examine include: purchasing and operating logs; supply and repair invoices; equipment service contracts; and waste hauling and recycling records.
- your facility's waste generating practices. It involves touring your facility and its

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<sup>17</sup> This chapter has been compiled with extensive use of the American Society for Healthcare Environmental Services guide *An Ounce of Prevention; Waste Reduction Strategies for Healthcare Facilities*. Pp 29-49. 1993.

grounds; observing the activities of each department; and interviewing employees about waste producing activities and equipment.

3. *Waste Sort* – If your organization needs more detailed data than a records examination or a walk-through can provide, a waste sort may be a desirable option. A waste sort involves the physical collection, sorting, and weighing of a representative sample of your organization’s waste. The goal of the waste sort is to identify each waste component and calculate, as precisely as possible, its percentage of your

organization’s waste. Each organization can determine whether its waste sort focuses on the entire organization’s waste stream or targets a functional area.

The Waste Manager, the Project Team, or an outside consultant can conduct this Assessment. Each facility will need to decide how the Assessment is to occur and facilitate its completion.

Table 4.1: “*Waste Assessment Methods*” summarizes the strengths and weaknesses of each method.

Table 4-1 *Waste Assessment Methods*<sup>18</sup>

Method	Strengths	Limitations
Records Examination (Hauler Records)	<ul style="list-style-type: none"> <li>◆ May provide accurate data on the weight or volume of waste generated at the facility.</li> <li>◆ Can require less time and effort than facility walk-throughs or waste sorts.</li> </ul>	<ul style="list-style-type: none"> <li>◆ If accurate waste hauling records do not exist, might not provide adequate data.</li> <li>◆ Not likely to provide information about specific waste components.</li> <li>◆ Can be difficult to use if businesses share a dumpster.</li> </ul>
Records Examination (Purchasing Records)	<ul style="list-style-type: none"> <li>◆ Can provide data on the waste generation of specific materials or products.</li> <li>◆ Tracks potential waste from the point of origin.</li> <li>◆ Can require less time and effort than facility walk-throughs or waste sorts.</li> <li>◆ Can be more accurate than waste sorts for tracking small items, low-volume waste materials, and occasional seasonal waste.</li> <li>◆ Can help identify the most expensive components of a company’s waste.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Not likely to provide the full picture on waste generation.</li> <li>◆ If company purchasing is not centralized, can be incomplete or require substantial effort to collect and analyze.</li> </ul>
Facility Walk-Through	<ul style="list-style-type: none"> <li>◆ Can require less time and effort than waste sorts.</li> <li>◆ Allows firsthand examination of facility operations.</li> <li>◆ Can provide qualitative information about major waste components and waste-generating processes.</li> <li>◆ Allows interviews with workplace personnel, which can reveal waste prevention, recycling, composting, and purchasing opportunities that would not be found through records examinations or waste sorts..</li> </ul>	<ul style="list-style-type: none"> <li>◆ Might not identify all wastes generated.</li> <li>◆ Might not represent the waste in the facility if only conducted once.</li> <li>◆ Does not provide precise information about the quantity of waste generated..</li> </ul>

<sup>18</sup> US Environmental Protection Agency. *Business Guide for Reducing Solid Waste* (EPA/530 K 92 004)

Method	Strengths	Limitations
Waste Sort (Specific Function)	<ul style="list-style-type: none"> <li>◆ Provides quantitative information about specific types of waste and functional areas; appropriate if targeting specific types of waste.</li> <li>◆ Requires less time and effort than comprehensive waste sorts.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Does not provide data on waste generated facility-wide.</li> <li>◆ Might omit major components of the facility's waste.</li> <li>◆ Might not represent the waste in the specific area if only conducted once.</li> <li>◆ Requires use of personal protective gear.</li> </ul>
Waste Sort (Facility-Wide)	<ul style="list-style-type: none"> <li>◆ Provides generation estimates for the entire facility</li> <li>◆ Provides quantitative information on each waste component.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Requires significant time and effort to conduct</li> <li>◆ Might not be representative if only conducted once</li> <li>◆ Does not provide qualitative information on how or why wastes are generated.</li> <li>◆ Requires use of personal protective gear.</li> </ul>

### Where to Start ?

H2E has provided a number of assessment tools for you to use:

- ▶ [Department Assessment \(Appendix D.1\)](#) [link](#)
- ▶ [Summary Assessment](#) [link](#) ( [Appendix D.2](#) [link](#) ).
- ▶ [Records Review Worksheets \(Appendix E\)](#) [link](#)
- ▶ [Waste By Department Chart \(Appendix D.3\)](#) [link](#)
- ▶ [Receptacle Placement Form \(Appendix D.4\)](#) [link](#)

The Waste Reduction Team first should decide which portions of the assessment will be performed. At a minimum the records examination and facility walk through should be done. The records examination will help illuminate the true costs of waste; its generation, management and disposal. The facility walk-through will provide general information on where the largest quantities of waste are generated and what those waste types are.

The multi-disciplinary Waste Reduction team provides the means to do a thorough walk-through. The walk-through assessment can be assigned to various team members, e.g. by department, to facilitate the task. Another team member or members can perform the records review portion of the assessment.

The [Waste Assessment Action Plan](#) [link](#) (Appendix C) provides step-by-step guidance for performing your assessment. More detail for performing the [Records Review](#) [link](#) is provided on page 25 and [Appendix E](#). [link](#)

How to Conduct a Waste Sort is located in [Appendix F](#). [link](#)

More tips for performing the assessment are given in Figure 4-2.

Figure 4-2 *Do's and Don'ts of Conducting a Successful Waste Audit*<sup>19</sup> 

DO	DON'T
* Think it through	* Don't let your enthusiasm carry you away... focus it and it will be contagious
* Create a planned approach that is logical and can be easily explained	* Know your own biases - don't assume you know the outcome before you look carefully at the problem
* Be flexible - you will be working with lots of people for whom this is not the highest priority	* Don't be pushy - seek out cooperation - make it convenient for those who have to help you
* LISTEN to everyone - do not ignore anyone -	* Don't expect this to happen over night - set

<sup>19</sup> American Society for Healthcare Environmental Services. *An Ounce of Prevention*. p45. 1993.

often the best suggestions come from the most unexpected sources

\* Have a careful and consistent method to document your findings

realistic timelines, even just to get the waste assessment done

\* Don't ignore the housekeeping staff or trash handlers - they can provide the most intimate knowledge of what is thrown out - seeking their input early on will help get their support for later implementation

### *Containers and Labeling*

An accurate audit of both the types and locations of the various waste receptacles throughout the facility is essential to success of a waste minimization program that utilizes the concept of waste segregation. As part of the audit, it is important to discuss the specific container needs with the department manager, supervisors or other staff members to ensure that employees do, in fact, have the necessary resources located in the correct places. [Appendix D.4 Receptacle Placement link](#) will assist with this task.

It is also important to involve the environmental services staff who have the responsibility for routinely cleaning the area in these discussions. These employees will serve as the primary liaison to the department and can help to identify any necessary changes in container type or location based on volume of waste generated. The housekeeping staff can also help to identify opportunities for minimization and monitor waste segregation practices to ensure that the maximum volume of waste is recycled

### **Records Review**

Obtain actual copies of the invoices. If you are uncertain about who manages waste in your facility, the person that signs the invoices can be identified by contacting Accounts Payable. Calculate the true cost for your facility's waste removal by reviewing the invoices. Use the worksheets in [Appendix E link](#) to summarize waste management costs. Fill in total waste management costs using the [Summary Assessment sheet \(Appendix D.2\). link](#)

### *The Trash Dock*

The end point in the hospital is the trash dock and container. The following questions must be considered:

- ▶ Is the trash emptied into the container by environmental services staff?
- ▶ Are trash closes or holding areas on different floors?
- ▶ How frequently is trash/recyclables collected from different areas?
- ▶ Are waste and recycling containers color coded for easy identification?
- ▶ What is the contamination rate of recyclables?
- ▶ When does collection happen? Does it include weekends?
- ▶ What path does trash take from the generating point to the dock? What is the vertical lift (elevator) capacity/access?

### **Analysis of the Data .**

Once you have completed the Waste Assessment, enter the data into the summary chart in [Appendix D.2. link](#) This information will serve as your baseline data and now can be used to list, analyze and choose appropriate waste reduction measures for your facility.



## Setting Goals and Priorities

While the general objective of any waste reduction program is to reduce the amount and/or toxicity of the waste being generated, the first task the team will have is to work with management to establish and record specific goals and priorities for the program. It is important to first focus on reduction opportunities prior to considering waste management options such as recycling.

The following caveats should be considered when setting goals and progressing with the program:

- ▶ Set aggressive but attainable goals. H2E goals call for a 33% waste reduction by 2005 and 50% reduction by 2010. These goals are aggressive but attainable.
- ▶ Well defined mechanisms for measuring accomplishments (against your initial survey or other benchmarks). This can be accomplished with quarterly or semi-annual review of waste volumes pulled by your waste hauler. Instituting waste monitoring, follow up and tracking of contamination can also be measured.
- ▶ Consider both the operational and economic feasibility of the options under consideration [Appendix G](#) [link](#)
- ▶ Make sure your hauler contracts work for your program. [Appendix H](#) [link](#) Also see “[Working With Your Hauler](#)” [link](#) p38.



## Option Identification and Evaluation

The first step in this process is to compile and screen the options. H2E’s [Best Management Practices](#) [link](#) and [Appendix I](#) [link](#) contain source reduction options for medical and solid waste. It’s important to *also* consider that waste reduction starts at the front door. If waste doesn’t come into your institution, your facility will spend less time and money handling it. The [Environmentally Preferable Purchasing](#) chapter of H2E provides ideas and tools to eliminate waste entering your facility.

Brainstorming sessions among team members, managers and employees can

provide additional options.. After all the options have been identified the team should screen them based on criteria such as:

- ▶ reduction of waste removal costs
- ▶ purchase costs,
- ▶ low start-up costs,
- ▶ ease of implementation
- ▶ or those that are likely to boost employee morale.

If the [Best Management Practices](#) [link](#) screening criteria doesn’t fit your situation, [Appendix G.2 & G.3](#) [link](#) worksheets in can be used to screen the potential options against criteria the team feels are important. .

### *Reducing Regulated Medical Waste*

The first waste stream to focus reduction efforts is regulated medical waste. It is the most costly of healthcare waste streams. A remarkable reduction in costs can be seen with an intensive regulated medical waste reduction initiative. Improved regulated medical waste education and segregation program with focus on the operating room where generally 60% of a facility’s wastes are generated<sup>20</sup> will yield good results. Beth Israel Medical Center in New York has seen annual cost savings of \$600,000 with their program. Section VII, [More About Regulated Medical Waste](#) [link](#) is based on Beth Israel’s success. However, as regulated medical waste is appropriately segregated an increase in solid waste may be seen.

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<sup>20</sup>French, H. *Blueprint for Reducing, Reusing, Recycling*. AORN Journal. 60 (1); 94-99. 1994.

<sup>21</sup> “Close the Loop” refers to recycling and purchasing the same item. E.g. when new paper is made from paper sent for recycling.

<sup>22</sup> US EPA. Sector Notebook. *Plastic Resin and Manmade Fiber Release and Transfer Profile* 1997. [www.epa.gov](http://www.epa.gov). viewed 2/2001.

<sup>23</sup> US EPA. Sector Notebook. *Stone, Clay, Glass and Concrete Products Industry Release and Transfer Profile* 1995. [www.epa.gov](http://www.epa.gov). viewed 2/2001.

<sup>24</sup> Tickner, J. et al. *The Use of Di-2-Ethylhexyl-Phthalate in PVC Medical Devices: Exposure, Toxicity and Alternatives..* University of Massachusetts, Lowell. p9. 1999.

<sup>25</sup>Ibid.

### *Reducing Solid Waste*

Use [Waste Management Hierarchy](#) [link](#) page 8 and [Waste Reduction Strategies](#) [link](#) page 10 as you set goals and priorities. Also refer to the [Environmental Preferable Purchasing](#) and the [Best Management Practices](#) [link](#) sections for more ways to reduce the volume and toxicity of the solid waste stream. E.g. purchasing “Process Chlorine Free (PCF)” and paper with a high percentage of Post-Consumer Recycled (PCR) content reduces the paper industry’s contribution of toxic effluents and sludges to the water and air. Purchasing high PCR paper also provides the market for the paper your facility recycles and “closes the loop”<sup>21</sup> for paper recycling.

The largest waste stream in most facilities is paper and cardboard ( [Figure 2.3](#) on page 8). [link](#) Using the results of the facility walk through the Waste Reduction Team will know where most of the paper and cardboard are generated and the costs of disposal. Next steps could be implementation of paper reduction programs such as mandatory double sided copying, review of paper use in those area where the largest amounts are generated and reducing packaging waste from suppliers. Recall that the Legacy Visiting Nurses Association in Portland, OR assessed paper flows through their organization and determined they were able to reduce copy numbers 50% saving \$128,000 annually.<sup>10</sup>

### *Product Packaging Reduction*

Talk to your suppliers regarding their use of packaging materials. First you will need to understand why certain packaging is used and what barriers there may be to change. E.g. there may be packaging regulations or different practices between different hospitals. The supplier also may think the customer wants certain types of packaging. Frequently though, the supplier will be willing to work with the hospital on reducing packaging as doing so saves the supplier money as well.

### *Office Paper*

When purchasing office paper it is important to purchase high recycled content (Post

Consumer Recycled PCR). PCR should be at least 30% or greater. Doing so “closes the loop”<sup>21</sup> and ensures continued markets for your facilities’ recyclables.

Office paper should also be Process Chlorine Free (PCF). When chlorine is used in the pulp and bleaching processes of paper manufacture dioxins are generated. Purchasing paper that is manufactured without chlorine reduces dioxin generation. [Contract & Product Specifications and Environmentally Preferable Purchasing Policies](#) [link](#) provides language for contracts and product specifications for vendors.

### *Plastic*

The second largest waste stream in healthcare is plastic ([Figure 2.3](#)) [link](#).

The plastic resin industry released close to 400,000,000 pounds of toxic chemicals in 1995.<sup>22</sup> Comparatively, the glass, clay and concrete industry released 26,000,000 pounds<sup>23</sup>. Additionally most plastic recycling does not “close the loop”<sup>24</sup> as does recycling paper, glass or aluminum.

Poly-vinyl chloride (PVC) represents more than 25% of all plastic used in medical devices<sup>25</sup>. PVC is found in numerous medical products including intravenous (IV) bags and tubing, shower curtains and patient identification bands<sup>26</sup>. PVC is also used in other items such as shower curtains, plastic trays, plastic wrap, bed pans, thermal blankets and gloves<sup>27</sup>.

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<sup>24</sup> American Plastics Council. *State of Plastics Recycling*. Nov. 2000.

[www.americanplasticscouncil.org](http://www.americanplasticscouncil.org).

<sup>25</sup>Tickener, J. et al. *The Use of Di-2-Ethylhexyl-Phthalate in PVC Medical Devices: Exposure, Toxicity and Alternatives*. University of Massachusetts, Lowell. p9. 1999.

<sup>26</sup> Vinyl Institute. *Medical*.

[www.vinylinfo.org/infiniteuses/medical/medical.html](http://www.vinylinfo.org/infiniteuses/medical/medical.html). 2001.

<sup>27</sup>Tickener, J. et al. *The Use of Di-2-Ethylhexyl-Phthalate in PVC Medical Devices: Exposure, Toxicity and Alternatives*. University of Massachusetts, Lowell. p9. 1999.

PVC is the only major commercial plastic that contains chlorine<sup>28</sup>, almost 50%. The PVC molecule being comprised of carbon, chlorine and hydrogen is an “organochlorine”. The American Public Health Association passed a resolution calling for the elimination of organochlorine chemicals<sup>30</sup>.

The production of PVC produces dioxins<sup>31</sup>. Polyvinyl chloride is a significant contributor to acid gas and may form dioxins formation when incinerated<sup>32</sup>.

To make PVC flexible, the plasticizer diethylhexyl phthalate (DEHP) is added. DEHP is an endocrine disrupting chemical. Human health effects associated with endocrine disruptors include alternation in pituitary & thyroid gland function, abnormal sexual development, reduced male fertility, and immune suppression and neurobehavioral effects<sup>33</sup>. DEHP is considered a hazardous (chemical) waste when disposed of under the Resource Conservation and Recovery Act. DEHP leaches out of PVC devices, including blood and transfusion bags<sup>34</sup>.

Given the concerns associated with PVC and plastics in general, another area for waste and toxicity reduction would be the reduction,

substitution and elimination of these products. See the [Environmentally Preferable Purchasing](#) [link](#) tool for substitutions.

### *Reducing Hazardous Chemical Waste*

Hazardous chemical waste reduction is another media that can be reduced to see significant cost savings. Not only is hazardous chemical waste expensive to dispose of, but the management of hazardous materials incurs many liability and compliance costs. To learn more about hazardous chemical waste reduction, see the [Chemical Minimization Chapter](#) of H2E. [link](#)

### **Making Decisions**

Once a short list of waste reduction options has been identified, the team should begin the process of deciding which options are the most appropriate for your program, given your facilities goals and priorities. [Appendix I](#) [link](#) provides a set of decision-making criteria to help lead the team through the evaluation process. This appendix contains a formula for calculating an option’s payback period, which is one way of measuring the long-term economic feasibility of a proposed investment.

After completing the evaluation of these options, review the long-term feasibility of the program as a whole. Successful programs can be designed around complementary options that take advantage of their different strengths. Before removing any items from consideration consider whether certain waste reduction efforts may over time save enough money to pay for other waste reduction activities that meet other goals such as improving environmental awareness, employee morale, or community and customer relations.

Some options might not require extensive analysis. For example, if your facility already has a copy machine with two-sided copying capability, then a policy mandating double-sided copying can be implemented easily. On the other hand, complex options will require a more careful analysis. For such options the team will want to contact suppliers, product

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<sup>28</sup>McGinn, A. *Why Poison Ourselves? A Precautionary Approach to Synthetic Chemicals*. Worldwatch Paper 153:49. 2000.

<sup>30</sup>American Public Health Association. *Resolution 9304: Recognizing and addressing the environmental and occupational health problems posed by chlorinated organic chemicals*. Am J Public Health 84: 514-15. 1994.

<sup>31</sup>US EPA. *Draft Dioxin Reassessment*. EPA/600/P-00/001. March/May 2000.

<sup>32</sup>Yasuhara, A. et al. *Formation of Dioxins during the Combustion of Newspapers in the Presence of Sodium Chloride and Poly Vinyl Chloride*. Environ Sci Technol 35 (7): 1373-78. 2001.

<sup>33</sup>US EPA Office of Research and Development. *Special Report on Environmental Endocrine Disruption: AN Effects Assessment and Analysis*. 1997. P7. [www.epa.gov/ORD/WebPubs/endocrine/endocrine.pdf](http://www.epa.gov/ORD/WebPubs/endocrine/endocrine.pdf). 2001

<sup>34</sup>Tickener, J. et al. *The Use of Di-2-Ethylhexyl-Phthalate in PVC Medical Devices: Exposure, Toxicity and Alternatives*. University of Massachusetts, Lowell, MA. P13-20. 1999.

refurbishers, packaging designers, and any other individual who can help determine the feasibility of the option.

Remember to take into operational effects of source reduction options. For example even in the case of a straight forward option like using double-sided copying, savings will be incurred due to:

- ▶ reduced paper purchasing,
- ▶ reduced space necessary for paper storage,
- ▶ reduced employee time associated with handling paper and filling paper trays and,
- ▶ reduced packaging and disposal costs.