

**Waste Assessment of:**

**Company A**

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## Executive Summary

Company A constructs, stains, and finishes cabinets and other wood products.

In the summer of 2008, Partners in Pollution Prevention intern Kristin Bruffett visited Company A's location in Nebraska in order to evaluate the location's waste management practices. Company A has already established a strong commitment to environmental stewardship. Some current practices the facility has already implemented include recycling plastic, cardboard, and paper; decreasing compressed air pressure; and using UV-curable finishes.

During her assessment, Kristin Bruffett identified the following opportunities:

- **Reduce filter waste.** Company A should continue to reduce chromium in their stains. A TCLP should be performed to determine if filters are still classified as a characteristic hazardous waste. Waste volume savings could also be realized by installing high efficiency prefilters prior to staining batches of chromium-containing stains.
- **Train painters with Virtual Paint, offered by WasteCap Nebraska.** Virtual Paint is a technology-based training program that simulates paint flow from a HVLP spray gun. Students participating in this program earn a 5-year certification. Benefits include better transfer efficiencies and no wasted wood and paint for training. Also, the training unit is mobile, so lost work hours are reduced because training can occur on-site.
- **Compact and bale plastic wrap.** Plastic stretch wrap is currently recycled by Company A. It is very bulky, and therefore takes up more space in the recyclables trailer than it would if it were baled. Baling could save 8 loads per year and supply additional revenue to the recycling program.
- **Use a spreadsheet to estimate recycled materials.** Company A's current recycler does not quantify the amount of recyclables handled. There is a company policy to measure progress towards environmental goals, so quantifying recyclables is an important part of that process. For this reason, the intern developed a spreadsheet that does the following, given the number of containers or bales:
  - Calculates the weight and volume of a recycled material
  - Calculates energy, oil, and tree savings from recycling
  - Calculates greenhouse gas emission reductions from recycling

Implementing these suggestions can save a potential \$8,900/yr, reduce the amount of hazardous waste generated, improve staining transfer efficiencies, enhance Company A's environmental image, and make it easier to track progress of environmental goals. Additional benefits that were difficult for the intern to quantify may also be realized.

## **Background and Waste Assessment**

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### **Business and Project Description**

Company A is a facility in Nebraska constructs, stains, and finishes cabinets and other wood products.

In the summer of 2008, Partners in Pollution Prevention intern Kristin Bruffett visited the Company A location in Nebraska in order to evaluate the location's waste management practices. This assessment will focus on general waste management and recycling. One goal is to quantify wastes produced and recycled.

### **Current Practices**

Company A has established a commitment to pollution prevention and sustainability. Company A is also committed to ensuring that foreign lumber is sustainably forested.

- Company A currently recycles:
  - Cardboard boxes
  - Plastic wrap
  - Universal Wastes
  - Electronic Equipment
  - Office paper
  - Aluminum cans
  - Plastic bottles
- Metal drums are re-used as containers for hazardous waste
- All automated staining processes use water-based paints which are UV-cured
- All coating operations use high volume, low pressure (HVLP) spray guns
- A recent compressed air audit resulted in a decrease in pressure to 90 psi, reducing the number of compressors running full time from 3 to 2, with one running as needed. Inappropriate uses and audible leaks are currently being addressed.

The following section will identify major wastes at the Company A.

## Waste Assessment

Below are the major wastes produced at Company A, along with the disposal method, amount produced per year. Calculations can be found in Appendix A.

**Table 1: Major Wastes of Company A Cabinets**

Type of waste	Disposal method	Amount/Year
Wood Waste	Chipped & shipped	2900 tons
Stain Booth Filters	Haz Waste	26 tons
Topcoat filters	Haz Waste	81 tons
Paint-related	Haz Waste	25 tons
Evaporator Sludge	Haz Waste	1100 tons
Plastic Wrap	Recycled	31 tons
Office Paper	Recycled	53 tons
Cardboard	Recycled	260 tons
Plastic Bottles	Recycled	Not quantified
Aluminum Cans	Recycled	Not quantified

## P2 Opportunities

As discussed in the Current Practices section, Company A has already implemented very strong pollution prevention and waste minimization practices. Some additional opportunities have been identified beyond those currently in practice. The following sections will present the general recommendations first, followed by the more specific ones.

### General P2 Opportunities

The following recommendation is often implemented by companies and organizations that have successful, continuous environmental improvement programs that have clear waste minimization, procedure improvement, and employee input objectives.

- **Input from employees should be considered, encouraged, and valued.** Since the employees must deal with the waste, they may have insight into how a specific pollution prevention opportunity may be implemented. Many companies offer incentives to employees who suggest innovations to minimize or reduce waste generation. An example of one such program is provided in Appendix B.

### Specific Opportunities

The following is detailed information about specific pollution prevention opportunities related to Company A in Auburn, NE. Each listing will include the suggested action, current practice, implementation cost, and summary of benefits, as applicable.

- **Reduce filter waste.** Currently, Company A's stain booth filters are classified as hazardous waste due to the chromium content of certain stains. Of the large number of stains at Company A, 8 contain chromium-3 dye complexes.

In recent years, there has been an effort in the painting and staining industry to remove as much chromium from dyes as possible. For this reason, some stains may have less chromium now than they had in the past. It is recommended that Company A has a TCLP for RCRA metals performed on filter wastes. This test will cost about \$200, and may determine that the filters do not contain enough chromium to be classified as hazardous.

A determination that paint booth filters are non hazardous could save Company A considerable waste disposal costs. If filter disposal costs are 10% of total hazardous disposal costs (currently \$45,600/year), landfilling filters at a rate of \$24/ton instead could save up to \$3900/year.

If the TCLP shows that the filters are still hazardous, Company A should continue to work with their stain supplier to reduce as much chromium as possible from their stains and have follow-up TCLP tests at regular intervals.

Another option to reduce hazardous waste could be to change production schedules such that dark, chromium-containing stains are all done during the same day. An inexpensive, high-efficiency prefilter could be installed prior to staining that day, so all the overspray would get caught on the prefilter instead of the pocket filter. The prefilters could be allowed to dry overnight or over a weekend, and then disposed of. This would segregate the non-hazardous filter waste from the hazardous waste, and should save money in disposal costs. The prefilters will also be easier to install and remove than the bulkier pocket filters.

- **Train painters using WasteCap Nebraska Finishing Technologies Certification.** This program uses Virtual Paint, a technology-based program that simulates paint flow from a HVLP spray gun. In addition to accurately modeling spray patterns, it also has the ability to show the thickness of the paint, clearly demonstrating problem areas. Benefits of using this system for training include better transfer efficiencies, and no waste paint or wood for training. All trainees who complete the course receive a 5-year certification.

WasteCap's Virtual Paint is a mobile unit, so training comes to the employees who need it. This could reduce work hours lost for training, since painters could receive training and immediately return to work. A brochure outlining the Virtual Paint Certification Program is attached in Appendix C.

- **Compact and bale plastic wrap for recycling.** The current recycler, Recycler A, picks up a semitrailer of recyclables every 2-3 weeks, depending on how quickly the trailer fills. It is estimated that the volume of each load is about half plastic wrap, mostly stretch wrap from raw material pallets. If the trailer is emptied every 3 weeks, and half of the load is plastic wrap, Company A recycles about 63,000 pounds of plastic wrap per year.

Company A already bales their cardboard. Since the same baler used for cardboard baling could also be used for plastic baling, it would be fairly simple to start baling waste stretch wrap. As shown below in Figure 1, the stretch wrap boxes take up a considerable amount of room in the recycling trailer.



**Figure 1: Interior of Recyclables Trailer**

Assuming that semi-compacted LDPE plastic film has an average density of 72.32 pounds per cubic yard, each container weighs about 87 pounds. The current baling machine makes bales that are 48" x 30" x 60". A plastic bale of this size will weigh about 730 lbs, so it will take about 8 full boxes of stretch wrap to make one bale (Detailed calculations in Appendix D-1). While this may cause a storage issue pre-baling, the trailer for recyclables is on-site most of the time, unbaled plastic boxes could be temporarily stored there.

Baling can reduce the volume of plastic by nearly 70 percent, saving an estimated 8 loads per year. This would also save about 54 gallons of fuel. Each gallon of diesel fuel burned creates approximately 22 lbs of CO<sub>2</sub>, so this could save 1200 lb of CO<sub>2</sub> emissions (see Appendix D-3 for calculations). If fuel prices continue to rise, Recycler A may add a fuel charge for pick-up, making it more advantageous for Company A to decrease recyclable volume wherever possible.

If Company A continues to recycle about 63,000 lbs of plastic each year, they can make about 86 plastic bales per year. Assuming it takes an employee about 1 hour to prepare and store a bale, baling plastic will cost about \$1290 per year in labor. However, many recyclers reimburse businesses that compact and bale their plastic prior to pickup. A common rate is about 10 cents per pound. Below in Table 3 is a cost analysis for 10 and 5 cent reimbursement rates. While this doesn't count electricity and baling wire costs, baling plastic will still most likely be able to pay for itself. More detailed calculations are in Appendix D-2.

**Table 3: Plastic Baling Revenues, Annual**

Rate	Reimbursement	Labor (\$15/hr)	Net Revenue
10 ¢/lb	\$6295	-\$1290	\$5005
5 ¢/lb	\$3147	-\$1290	\$1857

Instituting the practice of baling plastic wrap will expand Company A's already strong recycling program.

- **Use a spreadsheet to estimate recycled materials.** Even though Company A recycles a large amount of materials, Recycler A does not quantify the amount of recyclables handled. Recycler A reimburses for baled cardboard, and its recycled value on the market fluctuates greatly, it is difficult to calculate the amount of cardboard recycled from the amount reimbursed. Since Recycler A is the closest and most convenient choice for Company A, finding another recycler that does quantify recyclable and solid waste amounts is not a viable option, especially with rising transportation costs.

Since Company A has the desire to know the quantity of material they are recycling, Kristin Bruffett created a spreadsheet that can help estimate the quantity of each material recycled. Company A's containers are already standardized, making this estimation method more effective and accurate.

The operator who is loading the trailer can note the number of each type of container loaded onto the trailer, and then he or a supervisor can put the numbers into the spreadsheet for a quick estimate of recycled materials.

The first sheet (sample shown below), calculates the total weight and volume given the number of office paper, OCC, and plastic wrap containers. It also calculates the total volume and weight of recycled materials. Unit volumes were determined from measuring containers at Company A. Densities were estimated using averages from various sources, discussed in Appendix E-1.

Quantity	Description	Density (LB/CU.YD)	Unit Vol (CU.YD)	Total Wt. (LB)	Total Vol. (CU.YD)
1.0	Office Paper	363.50	1.29	467.46	1.29
1.0	Compacted Cardboard	900.00	1.85	1666.80	1.85
1.0	Plastic Film, Semi-compacted	72.32	1.20	87.07	1.20
			<b>Total</b>	<b>2221.33</b>	<b>4.34</b>

**Figure 2: Recycling Calculator Sheet 1**

The second sheet, shown below in Figure 3, uses the total weight calculated on the first sheet and estimates the number of trees saved (for paper and OCC), barrels of oil saved, energy saved in kWh, and greenhouse gas reduction in pounds of carbon equivalent (CE). Sources for these numbers are listed in Appendix E-2.

Quantity (LBS)	Description	Trees Saved	Oil Saved (barrels)	Energy Reduced (kWh)	GHG Reduced (LB CE)
467.5	Office Paper	5.61	2.10	934.92	479.15
1666.8	Compacted Cardboard	10.00	0.92	241.69	1561.96
87.1	Stretch Wrap	-	0.71	251.38	44.15
	<b>Total</b>	<b>15.61</b>	<b>3.73</b>	<b>1427.99</b>	<b>2085.25</b>

**Figure 3: Recycling Calculator Sheet 2**

- Tree Savings – paper is made from trees, so the recycling of paper products will reduce the amount of trees cut down every year.
- Oil Savings -It also saves transportation and equipment use, conserving oil. Also, many plastics are made from petroleum, so recycling plastic also saves oil.
- Energy Savings - Making new products from old materials saves energy when compared to making it from virgin material.
- GHG Reduction – extraction and creation of virgin materials is often very energy intensive and may require transport from overseas. Recycling reduces both, along with other activities throughout a product’s life-cycle which produce greenhouse gases.

Like any estimation, this tool is only as good as its assumptions. Improvements could include weighing a number of containers to determine if the initial density estimates were accurate. If not, numbers can be very easily changed. This calculator is flexible in case containers or materials change. For example, if Company A decided to compact their stretch wrap, they could simply change the density and volume columns on Sheet 1 to 729.2 and 1.852, respectively.

Company A’s environmental impact is being measured as part of their company sustainability goal. 2007 was to be the baseline year to measure their goals against, and this calculator will help to see what progress and impact is being made in their recycling program. A copy of the spreadsheet is attached to this report on a CD-ROM in Appendix E-3.

### **Summary**

Several P2 opportunities have been identified. Implementing these suggestions can aid Company A in attaining its environmental stewardship goals by reducing the amount of solid and hazardous waste generated and being better equipped to measure those wastes they do generate. Many large corporations have instituted programs for “greening” their supply chain, requiring their suppliers meet certain environmental requirements. Company A’s continued P2 efforts can help retain current clients or even attract new ones that have strict environmental requirements.

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Note: due to formatting difficulties, appendices are available in hard copy only.