Big Lakes Regional Household Hazardous Waste Case Study

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Introduction

Household hazardous waste (HHW) represents a wide variety of wastes, which are produced as a result of normal household activities. Among the most common of these wastes are:

- Pesticides, paints, and varnishes
- Paint thinners and other solvents
- Motor oil, antifreeze, and other automobile fluids
- Household cleaners, polishes, and waxes
- Wood preservatives, photo and hobby chemicals
- Swimming pool chemicals
- Batteries
- Fluorescent bulbs, electronics, and pharmaceuticals

Each of these products may pose a threat to sanitation workers or public health and the environment when improperly handled or disposed. HHW discarded with other trash may contaminate the air or groundwater, react or explode in waste compactors, or injure personnel handling these wastes. Improper disposal to sanitary or storm water sewers may damage septic systems, sewage treatment plants, drinking water supplies, corrode plumbing, or cause treatment plant sludge to become hazardous.

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The Kansas HHW program began with the establishment of the HHW grant project in 1989, which was funded by fees on water use and fertilizer and pesticide sales through the State Water Plan. The HHW program was designed to protect Kansas groundwater by reducing, recycling, diverting, and replacing the use of household hazardous products. Riley County Kansas was given the first Household Hazardous Waste permit, which was issued by the Kansas Department of Health and the Environment in 1990. Riley County held their very first one-day collection event on April 21, 1990. On October 4 of that same year, they opened a permanent collection facility. Since then, the number of permitted facilities have grown to 45 with 42 additional satellite locations throughout the state. Safe HHW disposal options are available for 93 Kansas counties and over 95% of the state's population. Community access ranges from a permanent year-round collection facility to annual mobile collection events.

The Riley County Household Hazardous Waste facility became the host county for a four- county regional collection program in 1992 and is now identified as the Big Lakes Regional Household Hazardous Waste Program. Today, it has grown to include 11 counties. In addition to Riley County, the facility also handles HHW from Clay, Geary, Dickinson, Marshall, Morris, Marion, Nemaha, Pottawatomie, Wabaunsee and Washington counties.

Project Description

One waste received by the HHW facility that is particularly problematic are fluorescent lamps. Fluorescent lamps require a large amount of storage space. Additionally, they are made of glass and are lightweight. Each lamp must be packaged in boxes, marked, palletized, and shrink wrapped prior to shipping. Since they contain mercury, extra care must be taken in handling to avoid incidental breakage and the release of harmful mercury vapors. In the 2015, statewide HHW report published by Kansas Department of Health and the Environment, fluorescent lamps represented 12,295 pounds or 7.6% of the amount of waste handled by the states HHW collection program. HHW managers are required to do initial 24-hour hazardous waste handling training and an annual 8-hour refresher course. During one of these training sessions, Big Lakes' new HHW manager, Steve Oliver, learned about Air Cycle's Bulb Eater® technology from another county HHW manager. He reached out to Air Cycle to learn more about the technology, which crushes fluorescent lamps in a manner that eliminates dust and mercury vapor emissions. Since the spent lamps are crushed into standard 55-gallon drums, the crushed lamp residue requires less storage space at his facility and is easier and safer to transport.

Kansas Department of Health and the Environment established a HHW grant program in 1989 and legislation enacted in 1995 expanded the program and created a new source for grant funding. Funding was available for both the launch of new HHW programs, as well as for improvements to existing facilities. Local match requirement was 40% funding to participate in the program, so Big Lakes officials saw an opportunity to help defray the cost of the equipment and applied for and received a grant to purchase the **Bulb Eater® 3L**.

The Problem

Since lamps are lightweight, they take a disproportionate amount of space in the HHW facility storage area, as well as in the truck transporting it to the recycling facility. As mentioned previously, fluorescent lamps represented 7.6% of the weight handled by the states HHW collection program. If volume were considered, this figure would be much larger, relative to the other products collected. As part of the grant, Big Lakes officials

prepared a detailed approach to attempt to capture the cost and space savings resulting from the use of the Bulb Eater® technology. When Steve Oliver took over the HHW program, the facility had a large number of fluorescent lamps that had accumulated over a nearly 12-month period. He estimated that approximately 9,700 lamps of all shapes and sizes were being stored. This allowed Mr. Oliver to do a comprehensive time and cost analysis in support of the grant application.

The photograph below identifies the amount of space consumed and portion of spent lamps on-site prior to the start of the crushing program.

BEFORE

The Solution

The Riley County personnel purchased the **Bulb Eater® 3L** model, which as configured, allowed them to process straight lamps of any diameter or length, circular and u-bends, and compact fluorescent lamps. It took Big Lakes HHW personnel a total of 14.5 hours over the course of four days to complete the task of crushing the one-year spent lamp backlog. The completed project generated nine full drums and one partial drum (156 pounds). Big Lakes officials also tracked the amount and types of lamps placed in each drum and the resulting weight. As mentioned previously, the Big Lakes HHW facility services 11 total counties and five of the 11 counties generated lamps that were crushed over the four-day period. The individual county's wastes were also counted and detailed in the study.

Highlights from the report include:

- Heaviest drum – 568 pounds
- Lightest drum – 275 pounds (100% compact fluorescents)
- Most lamps contained in a drum – 1,825 compact fluorescents
- 4’ and 8’ linear average drum weight – 525 pounds

In addition to tracking lamp counts and their resultant weights, filter change and labor costs were also tracked. After filling six drums of waste, the machine’s sensors notified personnel that a filter change was required. The filter then was replaced and was also accounted for in their analysis.

Two people went through the mandatory online training and were assigned to the project. Approximate labor costs to process the waste were estimated to be $1,870.50 for the 14.5 hours the equipment was used. While the cost to operate the Bulb Eater® was factored into the overall cost and to generate the cost savings data, it is important to note that the cost to collect, package and transport the bulbs from the collections sites was not calculated. Since the bulbs were collected from 5 different counties, they were collected, labeled and transported to the Big Lakes’ facility. They were then handled at least a second time when Big Lakes HHW had to palletize and shrink wrap the lamps prior to loading the bulbs on the recycling transportation vehicle. The county plans to use the Bulb Eater® at future collection events, thereby eliminating the need to label multiple boxes and double handling at the Big Lakes HHW facility. While the exact handling costs of their current practice is difficult to determine, and were not calculated as part of the cost analysis, labor savings are expected in the future due to the use of the Bulb Eater® in the field.

The photograph below shows the same storage room, after the crushing was completed.

AFTER

Impact

Over four days, 9,268 total lamps were processed. When factoring the labor required to package, label, palletize the lamps to prepare them for shipment, and the recycling cost savings of transporting intact lamps versus crushed lamps, county officials estimated their savings to be $4,265.00.

The Big Lakes program also generated High Intensity Discharge lamps in the program. Because these contain a bead of liquid mercury that would contaminate the crushed lamps, they cannot be processed in the Bulb Eater®. However, these can be managed separately and picked up at the same time the crushed lamps are generated. Big Lakes identified additional savings by sending this waste with the crushed lamp pick up, which is also reflected in the savings noted above.

Finally, and important to note, the county charges a recycling fee to bring Universal Waste to their facility. They have been able to reduce this user fee by 50% using the Bulb Eater® technology. The county plans to use the Bulb Eater® at all future recycling events, which will enable them to eliminate the need for boxing and storing intact lamps.

Air Cycle Corporation is a sustainable solutions and technologies company. We believe that people want innovative tools and services that are easy to use, improve results, save money, and are environmentally protective. Air Cycle is committed to developing those tools and services in order to help people and protect our environment, and create opportunity for our team and partners.

For more information, please visit Air Cycle.com, call 800-909-9709, or email info@aircycle.com.