

# CONTROLLING THE COST OF HOUSEHOLD HAZARDOUS WASTE COLLECTION AND DISPOSAL

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In the recent past, household hazardous waste has become an issue to more and more communities. In an effort to control the pollution generated within a household, various methods have been set forth in collecting and disposing of these wastes. Unfortunately, all too often the hazardous waste collection days are poorly attended, and the costs become prohibitive when measured against the amount of pollution prevented. This paper is intended to highlight the means of maximizing the amount of pollution prevented while minimizing the associated costs.

Successful household hazardous waste collection programs require specific effort in the following four (4) areas:

- (a) Public awareness.
- (b) Collection.
- (c) Decommissioning.
- (d) Disposal.

All four (4) are extremely important; however, they are often handled on an individual basis which causes an increase in cost. To see how these four (4) major sections interact, they have all been addressed in this paper.

## **PUBLIC AWARENESS**

More often than not, the public awareness campaign for household hazardous waste prevention are based on the idea that a good citizen would not pollute. We have found that another effective approach is to highlight

that many of the old wastes hidden in the basements and garages are dangerous to your family and when removing this hazard from your home be certain that it is disposed of in an environmentally sound manner.

There is also a need for an educational approach which makes a certain amount of sense. All wastes which are hazardous or toxic need not necessarily be handled by a hazardous waste treatment facility. The Water Pollution Control Federation has begun to address this concept by providing a chart which separates the wastes into four (4) basic categories:

- (a) Wastes that can be poured down the drain with plenty of water in sewerred areas.
- (b) Material that cannot be poured down the drain but safely disposed of in a sanitary landfill.
- (c) Wastes should be collected at a community wide collection day or given to a licensed hazardous waste contractor.
- (d) Items that can be recycled.

This level of knowledge is sometimes difficult to set forward; however, one of the goals of the household hazardous waste program is to educate the public so that they can identify and handle these wastes appropriately and safely, but not overwhelm the community collection days with wastes which can be safely disposed by other means.

## **COLLECTION**

Collection is one of the largest cost items of the household hazardous waste process. There are four (4) basic procedures currently in use:

- (a) Area wide collection days (amnesty days).
- (b) Fixed site drop off centers.
- (c) Mobile drop off centers.
- (d) Waste collection in connection with the refuse collection.

Area wide collection days are the most common. These days can be handled in one of two ways: (a) the individual containers can be broken down and the wastes commingled within 55-gal drums at the collection site; or (b) the waste can be roughly segregated, taken to a fixed site and then decommissioned. Our experience teaches that this second approach is a much more cost effective manner. The collection itself can be handled by fewer people (on the order of two or three) and then the waste can be decommissioned by these same people over the days following the event.

Our experience also teaches that it is appropriate to try to schedule these household hazardous waste collection days in conjunction with a normal recycling facility or operation. The types of people that likely frequent recycling centers are the types of people who are concerned about the health and environment and therefore are more likely to properly handle hazardous waste.

City Environmental, Inc. currently serves several municipalities and regional waste authorities in providing household hazardous waste collection, decommissioning and disposal services. Our typical household hazardous waste day consists of spending four (4) hours on a Saturday and collecting waste from 200–1000 individuals. Many of these individuals come with trunk loads of waste initially but then on subsequent trips deposit smaller amounts. City Environmental, Inc. uses spill contained pallets. On each four (4) drum pallet, two (2) drums would be placed with appropriate absorbent. The waste is segregated by hazard type and packed in the drum with the appropriate lab pack paperwork. We have also had success with DOT approved totes for collection of oil or ethylene glycol. A summary of the costs associated with area wide collection days is provided in Table 1.

All of these wastes are taken to a fixed site household hazardous waste facility. This facility serves as a drop-off location to collect household hazardous wastes during the working day throughout the week, and serves as a place to segregate and bulk household hazardous waste and store these wastes until an economical volume is collected for disposal to a licensed facility. This option allows greater convenience to the citizens at very little additional costs to the operation. By utilizing the personnel responsible for decommissioning for collection, the mobilization and collected labor can be eliminated. Thus, the cost per participant can be estimated

at less than \$40/participant. This compares favorably to the \$75 to \$130/participant quoted by Gregory B. Lie.

A mobile unit has the advantages both of the area wide day scenario and the fixed site scenario. City Environmental, Inc. has built these mobile facilities, which have separate compartments for storing segregated wastes. These units are parked on an on-going basis at municipal facilities. In our case, the units were parked at a water supply operation, where trained professionals can schedule and screen wastes.

The municipality is then given the opportunity to oversee the public awareness aspects and man the physical collection of the wastes. Once the mobile unit is filled with waste, a second unit is dropped at the location and the first unit is returned to our fixed site for decommissioning. Municipalities have found that this is a very cost effective way of limiting the cost of household hazardous waste collection because the least technical aspects are handled by their staff, i.e., manning a collection station and loading the trucks while the more technically complex aspects are handled by trained professionals decommissioning the lab packs, manifesting and transporting the waste to a licensed facility.

Table 2 presents the relative costs associated with operating mobile collection facilities. One can see that these are a substantially less expensive option on a cost per participant basis.

The last form of collection which I believe will be more and more common is curbside household hazardous waste collection, where wastes which are considered hazardous can be placed within a special container and are handled by either the refuse collection individuals or by a separate vehicle that travels door-to-door prior to the refuse vehicle. This technique will be somewhat more expensive than the mobile facility; however, it should allow much higher participation in hazardous waste collection.

City Environmental, Inc. has proposed this solution to several of their existing clients, but have yet to perform this particular collection method.

## DECOMMISSIONING

The single most important aspect to limiting the cost of household hazardous waste collection is decommissioning lab packed waste prior to disposal. This requires additional manpower cost, but substantially reduces the disposal costs. Our experience teaches that waste paint is the single largest waste type collected at these days. Of course, latex paint is much less of a hazard than oil-based paint. Thus, latex paint is either com-

**TABLE 1 COSTS ASSOCIATED WITH OPERATING AREA WIDE COLLECTION DAYS FOR THE COLLECTION OF HOUSEHOLD HAZARDOUS WASTE**

DATE	NUMBER OF PARTICIPANTS	COSTS	TOTAL	COST/PARTICIPANT	
04/20/91	200	Fixed Costs -	\$5,377.20	\$10,848.22	\$54.24
		Mobilization -	\$595.00		
		Decommissioning Labor -	\$787.50		
		Disposal -	\$4,088.52		
05/04/91	20	Fixed Costs -	\$5,377.20	\$7,097.76	\$354.89
		Mobilization -	\$735.00		
		Decommissioning Labor -	\$742.50		
		Disposal -	\$243.06		
5/11/91	50	Fixed Costs -	\$5,377.20	\$7,029.70	\$140.59
		Mobilization -	\$595.00		
		Decommissioning Labor -	\$607.50		
		Disposal -	\$450.00		
06/01/91	7	Fixed Costs -	\$5,377.20	\$6,652.20	\$950.31
		Mobilization -	\$595.00		
		Decommissioning Labor -	\$630.00		
		Disposal -	\$50.00		
06/29/91	403	Fixed Costs -	\$5,377.20	\$12,273.98	\$30.46
		Mobilization -	\$722.50		
		Decommissioning Labor -	\$911.25		
		Disposal -	\$5,263.03		
07/06/91	13	Fixed Costs -	\$5,377.20	\$7,304.70	\$561.90
		Mobilization -	\$595.00		
		Decommissioning Labor -	\$782.50		
		Disposal -	\$550.00		
07/20/91	231	Fixed Costs -	\$5,377.20	\$9,323.86	\$40.36
		Mobilization -	\$595.00		
		Decommissioning Labor -	\$720.00		
		Disposal -	\$2,631.66		
08/10/91	34	Fixed Costs -	\$5,377.20	\$7,069.70	\$207.93
		Mobilization -	\$595.00		
		Decommissioning Labor -	\$472.50		
		Disposal -	\$625.00		
10/19/91	110	Fixed Costs -	\$5,377.20	\$8,479.70	\$77.09
		Mobilization -	\$552.50		
		Decommissioning Labor -	\$900.00		
		Disposal -	\$1,650.00		
11/02/91	22	Fixed Costs -	\$5,377.20	\$7,272.83	\$330.58
		Mobilization -	\$552.50		
		Decommissioning Labor -	\$793.13		
		Disposal -	\$550.00		
10/12/91	900	Mobilization -	\$1,921.63	\$39,210.13	\$43.57
		Decommissioning Labor -	\$4,275.00		
		Disposal -	\$31,176.00		
		Hammermill -	\$1,837.50		
TOTALS	1,990			\$122,562.78	\$61.59

**TABLE 2 COST ASSOCIATED WITH OPERATING MOBILE DROP-OFF CENTERS FOR THE COLLECTION OF HOUSEHOLD HAZARDOUS WASTE**

<u>April</u>	<u>Actual Cost</u>	<u>COST/Participant</u>
# Participants - December 1 through February 28 - 221		
# Participants - March - 143		
Trailer Rental	\$ 1,092.00	\$52.23
Decommissioning Labor	\$ 1,006.62	
Transportation	\$ 720.00	
Disposal	\$ 2,610.48	
Mobile Collection Labor	\$ 1,408.42	
Mobile Collection Supplies	\$ 193.20	
Mobile Collection Equipment	\$ 595.00	
<b>TOTAL</b>	<b>\$ 7,625.72</b>	
# Participants - 146		
<u>May &amp; June</u>		
Trailer Rental (two months)	\$ 2,184.00	\$29.44
Decommissioning Labor	\$ 2,246.90	
Transportation	\$ 931.00	
Disposal	\$ 3,993.31	
Mobile Collection Labor	\$ 2,816.84	
Mobile Collection Supplies	\$ 386.40	
Mobile Collection Equipment	\$ 1,190.00	
<b>TOTAL</b>	<b>\$13,748.45</b>	
# Participants - 251, 216 consecutively		
<u>July</u>		
Trailer Rental	\$ 1,092.00	\$18.61
Decommissioning Labor	\$ 0.00	
Transportation	\$ 455.00	
Disposal	\$ 425.00	
Mobile Collection Labor	\$ 1,408.42	
Mobile Collection Supplies	\$ 193.20	
Mobile Collection Equipment	\$ 595.00	
<b>TOTAL</b>	<b>\$ 4,168.62</b>	
# Participants - 224		
<u>August</u>		
Trailer Rental	\$ 1,092.00	\$50.69
Decommissioning Labor	\$ 2,145.00	
Transportation	\$ 815.00	
Disposal	\$ 3,534.64	
Mobile Collection Labor	\$ 1,408.42	
Mobile Collection Supplies	\$ 193.20	
Mobile Collection Equipment	\$ 595.00	
<b>TOTAL</b>	<b>\$ 9,783.26</b>	
# Participants - 193		
<u>September</u>		
Trailer Rental	\$ 1,092.00	\$42.95
Decommissioning Labor	\$ 1,183.86	
Transportation	\$ 165.00	
Disposal	\$ 2,278.18	
Mobile Collection Labor	\$ 1,408.42	
Mobile Collection Supplies	\$ 193.20	
Mobile Collection Equipment	\$ 595.00	
<b>TOTAL</b>	<b>\$ 6,915.66</b>	
# Participants - 161		
<u>October</u>		
Trailer Rental	\$ 1,092.00	
Decommissioning Labor	\$ 150.00	
Transportation	\$ 390.00	
Disposal	\$ 986.70	
Mobile Collection Labor	\$ 1,408.42	
Mobile Collection Supplies	\$ 193.20	
Mobile Collection Equipment	\$ 595.00	
<b>TOTAL</b>	<b>\$ 4,815.32</b>	
# Participants - not available		

mingled to generate a recyclable water-based paint or at a separate City Environmental, Inc. facility it is stabilized and disposed of in a sanitary landfill. The empty paint containers are shredded in a hammermill, mixed with lime and landfilled.

The contents of oil-based paint containers are consolidated into 55-gal drums and transported to a City Environmental, Inc. solvent recovery facility where the solvents are recovered and the solvent, paint solids and resins are recycled in three (3) different manners. Waste kerosene, gasoline, fuel oil, diesel fuel and motor oil

**TABLE 3 COSTS ASSOCIATED WITH A DECOMMISSIONING AND DISPOSAL FOR A SINGLE MAJOR COLLECTION DAY**

<u>Latex</u>			
Hammermill	25 hr.	x	\$ 65.00/hour = \$ 1,625.00
Additional Labor	25 hr.	x	\$ 22.50/hour = \$ 562.50
Disposal	20 yd.	x	\$ 65.00/yard = \$ 1,300.00
Transportation	2 trips	x	\$ 65.00/trip = \$ 130.00
<u>Oil</u>			
800 gallons x \$0.40/gallon			= \$ 320.00
<u>Flammable Liquids</u>			
Labor	333 hr.	x	\$ 22.50/hour = \$ 7,492.50
Disposal (debris)	50 yd.	x	\$ 55.00/yard = \$ 2,750.00
Transportation	2 trips	x	\$ 65.00/trip = \$ 130.00
Disposal	73 drm.	x	\$200.00/drum = \$14,600.00
Transportation	1 trip	x	\$500.00/trip = \$ 500.00
Supplies	73 drm.	x	\$ 25.00/drum = \$ 1,825.00
<u>Herbicides &amp; Pesticides</u>			
12 drm. x \$ 25.00/drum			= \$ 300.00
36 drm. x \$400.00/drum			= \$14,400.00
36 plastic drums x \$25.00/drum			= \$ 900.00
<u>Aerosols</u>			
18 drm. x \$ 25.00/drum			= \$ 450.00
Disposal	18 drm.	x	\$ 425.00/drum = \$ 7,650.00
Transportation	1 trip	x	\$1,800.00/trip = \$ 1,800.00
<u>Acids &amp; Caustics</u>			
Nitric Acid	5 drm.	x	\$250.00/drum = \$ 1,250.00
Sulfuric Acid	5 drm.	x	\$ 25.00/drum = \$ 125.00
Transportation	1 trip	x	\$300.00/trip = \$ 300.00
<u>Labor</u>			
Supervisors	80 hr.	x	\$ 40.00/hour = \$ 3,200.00
Chemists	40 hr.	x	\$100.00/hour = \$ 4,000.00
	5 hr.	x	\$250.00/hour = \$ 1,250.00
Absorbent	200 bags	x	\$ 6.50/bag = \$ 1,300.00
Miscellaneous Chemicals			= \$ 1,000.00
<b>TOTAL:</b>			<b>\$69,160.00</b>
No. of Participants			983
Cost/Participant			\$ 70.36

are all recycled in various City Environmental, Inc. recycling facilities.

**DISPOSAL**

The ability to quickly and cheaply dispose of these household wastes is determined by the ability of the people decommissioning the lab packs to maintain records so that the acceptance of the wastes can be approved at a licensed treatment facility. Table 3 provides a list of approximate costs for the actual disposal of the wastes both utilizing City Environmental's facilities and other licensed facilities for a given household hazardous waste collection day. Certain of these disposal costs remain quite high (such as aerosol cans), which will cause us to evaluate additional treatment technologies.

## RECOMMENDATIONS

Household hazardous waste handling will change in the near future. If municipalities and the environmental industry can provide a service in a cost effective manner, these wastes should continue to be handled appropriately. City Environmental, Inc. believes that the least cost method for a municipality for the disposal of household hazardous waste is to: (a) provide a mobile facility which is loaded and managed by a municipality; (b) have a decommissioning center which decommissions the lab packs, creates bulk loads for price discounts and segregates those wastes which require handling as hazardous wastes from those wastes which can be recycled and/or handled as a nonhazardous waste; and (c) identify as many wastes as possible which can be safely recycled.

In conclusion, household hazardous wastes are the concern of many of the public. In those areas which do not offer community wide collection, these wastes are kept in basements or garages until such times as the jars break or the cans rust and this does not solve the problem. As household hazardous waste programs have become more routine, there have been many methods identified for reducing the wastes. In southwest Michigan, many communities have found that by paying additional monies for the manpower required for collection and decommissioning, the total cost of the program decreases as the cost of disposal decreases. Ultimately, the success of any of these programs is based on the convenience that it provides to the households. While mobile facilities solve many of these concerns, ultimately the success of the program will be determined by the ability to provide collection on a door-to-door basis with or without association with the refuse collection.