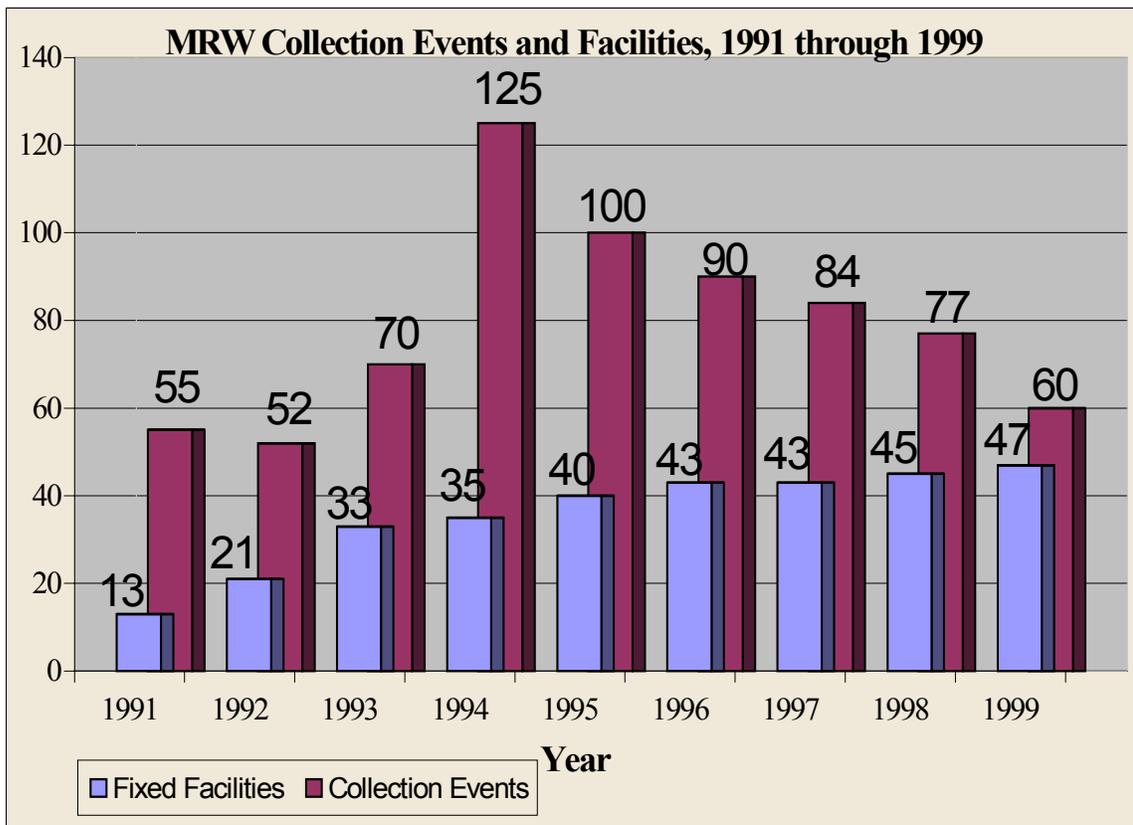


Moderate Risk Waste Collection System Report



Publication # 00-07-041

Moderate Risk Waste Collection System Report

Prepared by:

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Washington State Department of Ecology
Solid Waste and Financial Assistance Program**

December 2000
Publication No. 00-07-041



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Acknowledgement

This publication would not have been possible without the hard work and dedication of **Ms. Elizabeth Ellis**. She spent many hundreds of hours with the 1998 and 1999 Moderate Risk Waste (MRW) annual report data submitted to Dept. of Ecology by the local programs. Ms. Ellis worked as an environmental intern during parts of 10 months in 1999 and 2000 to collect and compile the information, perform data verification, and create most of the extensive analysis that you see in this document. Because of her efforts Washington State now has a clearer picture of where we have been and where we may need to be going with the MRW collection system.

David Nightingale
Washington State Department of Ecology
Olympia, WA
December, 2000

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Introduction

This is the first detailed analysis of the Moderate Risk Waste Collection system published by the Washington State Department of Ecology since the Problem Waste Study in 1990. In 1990 Ecology staff, and a statewide panel of interested parties worked with a group of consultants to examine the emerging collection system which was published in the Problem Waste Study. The state has come a long way in the development of its Moderate Risk Waste (MRW) management system since 1990.

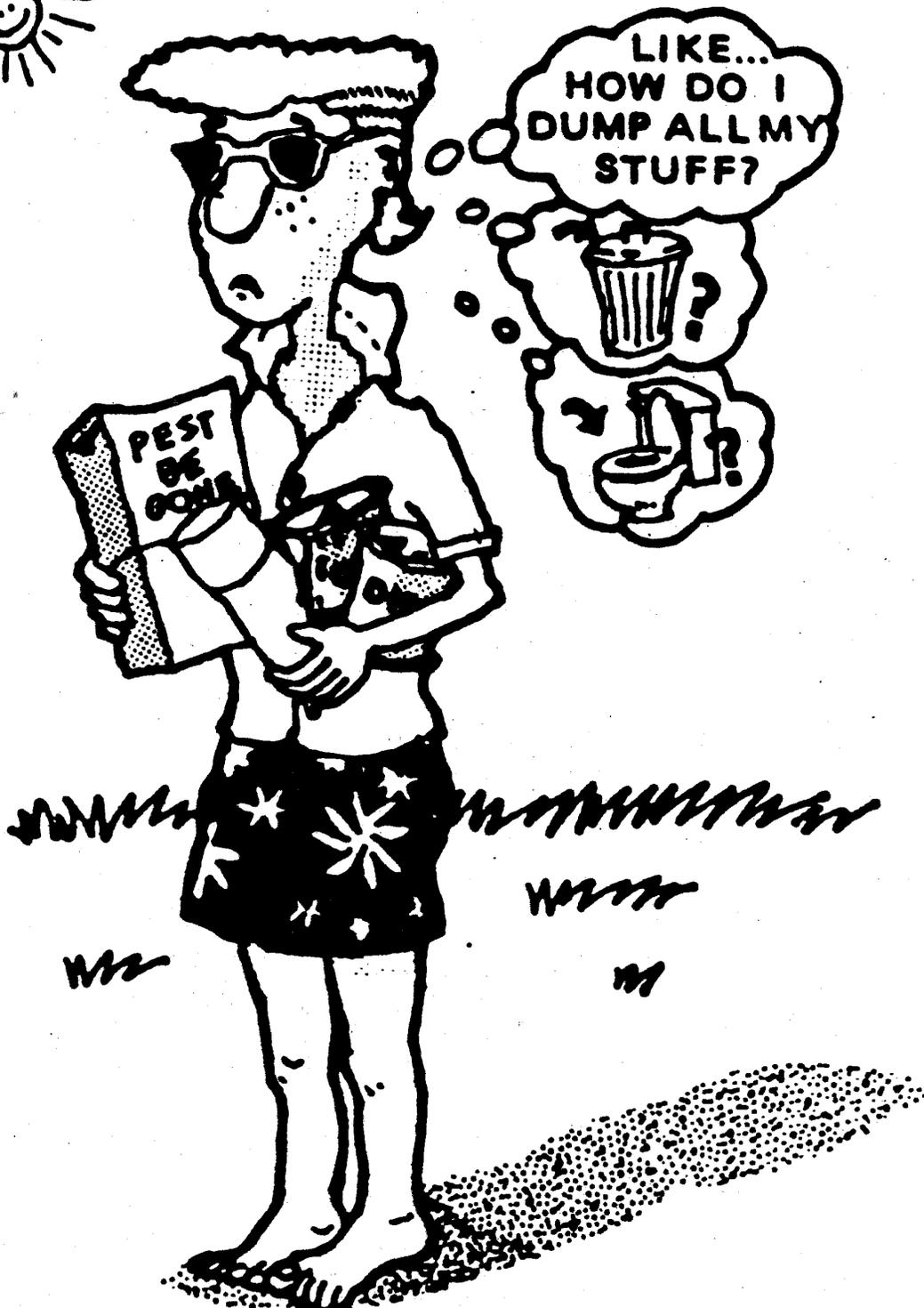
The MRW collection system functions through a partnership between state and local government efforts. Local programs operate under locally adopted and Ecology approved local hazardous waste plans. In addition, the Dept. of Ecology has provided matching grant funding for implementing the various recommended elements of the local hazardous waste plans through the Coordinate Prevention Grants (CPG) program. In the calendar years 2000 and 2001 funding has been approved for various MRW programs as shown in Table A

Table A CPG Funding for MRW Programs during 2000 and 2001

MRW Program Element	Total CPG funds for 2000 and 2001 (biennial budget), all values in thousands of dollars	Distribution of MRW CPG Funding, %
Local Hazardous Waste Planning (Updates)	\$ 144.4	1.9 %
Household Hazardous Waste Implementation	\$ 690.1	9.1 %
Household Hazardous Waste Collection	\$5,641.1	74.3 %
Conditionally Exempt SQG Programs (no disposal costs allowed)	\$ 969.0	12.8 %
MRW Capital Projects	\$ 149.8	2.0 %
Total state MRW funding for the biennium 2000 / 2001	\$7,594.4	

The average locally funded grant match is 37%. The total CPG grant funding for the biennium is \$15.8 million with MRW funding amounting to approximately \$7.6 million, or about 48% of the total.

This funding reflects the waste management hierarchy of waste reduction first. In Washington State, waste reduction includes solid waste toxicity and volume reduction. MRW programs achieve the toxicity reduction function in the larger solid waste system through MRW collection and waste generation avoidance. This report focuses on the most easily measured part of toxicity reduction, the MRW that is generated and subsequently collected and managed at public collection facilities.





NON-HAZARDOUS WASTE	
Generator	_____
Address	_____
City, State	_____
Contents	_____



The History of Moderate Risk Waste Management in Washington

The term moderate risk waste (MRW) was created by revisions to Washington State's 1986 Hazardous Waste Management Act (RCW 70.105). Simply put, MRW is Household Hazardous waste (HHW) plus Conditionally Exempt Small Quantity Generator (CESQG) waste. In 1988, Initiative 97 created the Model Toxics Control Act in Washington State (MTCA). The MTCA provided funding for moderate risk waste programs, required planning for the development of MRW programs, required implementation of MRW programs by each local jurisdiction, and required Ecology to assist local governments with MRW programs.

In Washington, local moderate risk waste plans were submitted from all governments by 1991. Local moderate risk waste plan implementation includes at a minimum the following programs: CESQG Technical & Disposal Assistance, MRW Public Education, MRW Enforcement and HHW Collection.

Local MRW collection started in the early 1980's primarily as HHW-only collection events or round-ups, once or twice a year. In the late 1980's permanent collection facilities started to replace the events because of a need for year-round collection, to serve larger number of customers without long lines, to control costs, and to reuse and recycle larger quantities of moderate risk waste.

MRW collection diverts hazardous materials from the municipal waste streams and provides numerous benefits. MRW collection provides an opportunity for waste reduction education, allows for the recovery of materials as resources, reduces toxicity of solid waste landfills and wastewater systems, helps the public to avoid improper disposal practices, and protects waste processing equipment and handlers from exposure to hazardous materials.

The information received from local programs through the MRW annual reports provides Ecology with data on the MRW infrastructure, collection trends, costs, waste types received by events and facilities, and the final disposition of MRW. This year's report focuses on two years of data, 1998 and 1999. In the 1998 data set, Skamania County was unable to provide data due to a fire that consumed their records and transfer station. In the 1999 data set, Adams County did not provide MRW collection data.

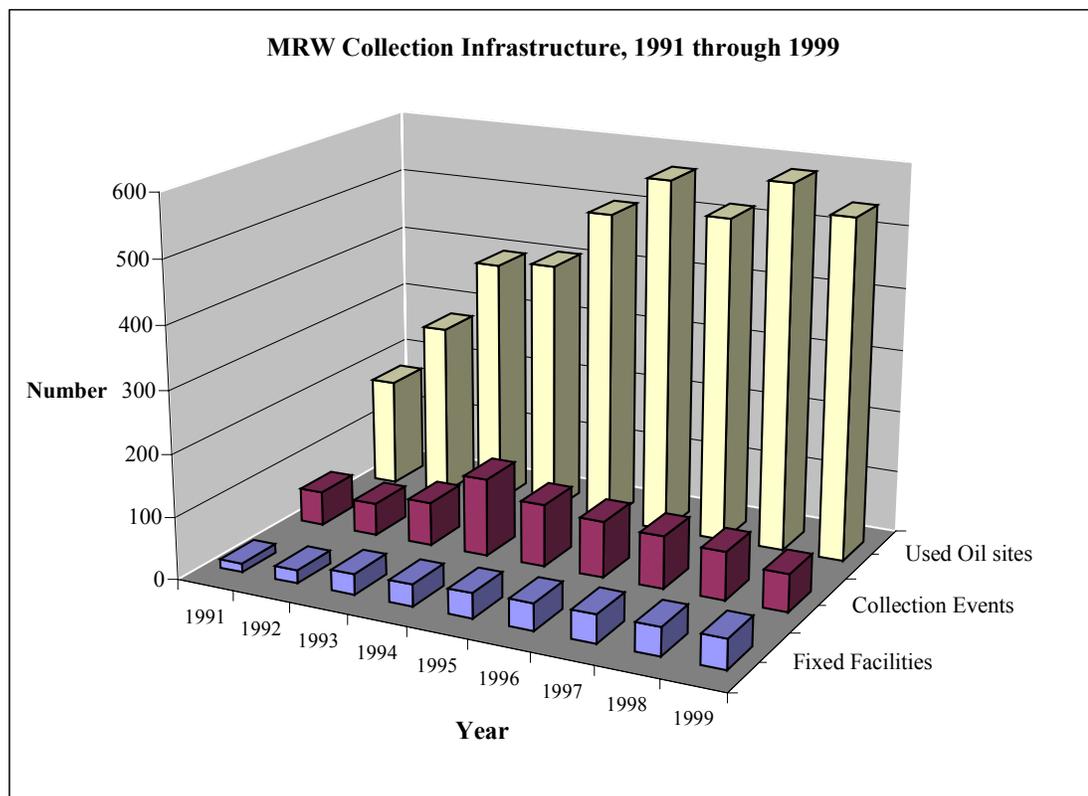


The last Seattle-King County HHW Round-Up at Shoreline, June 3, 1989.

Trends in Collection

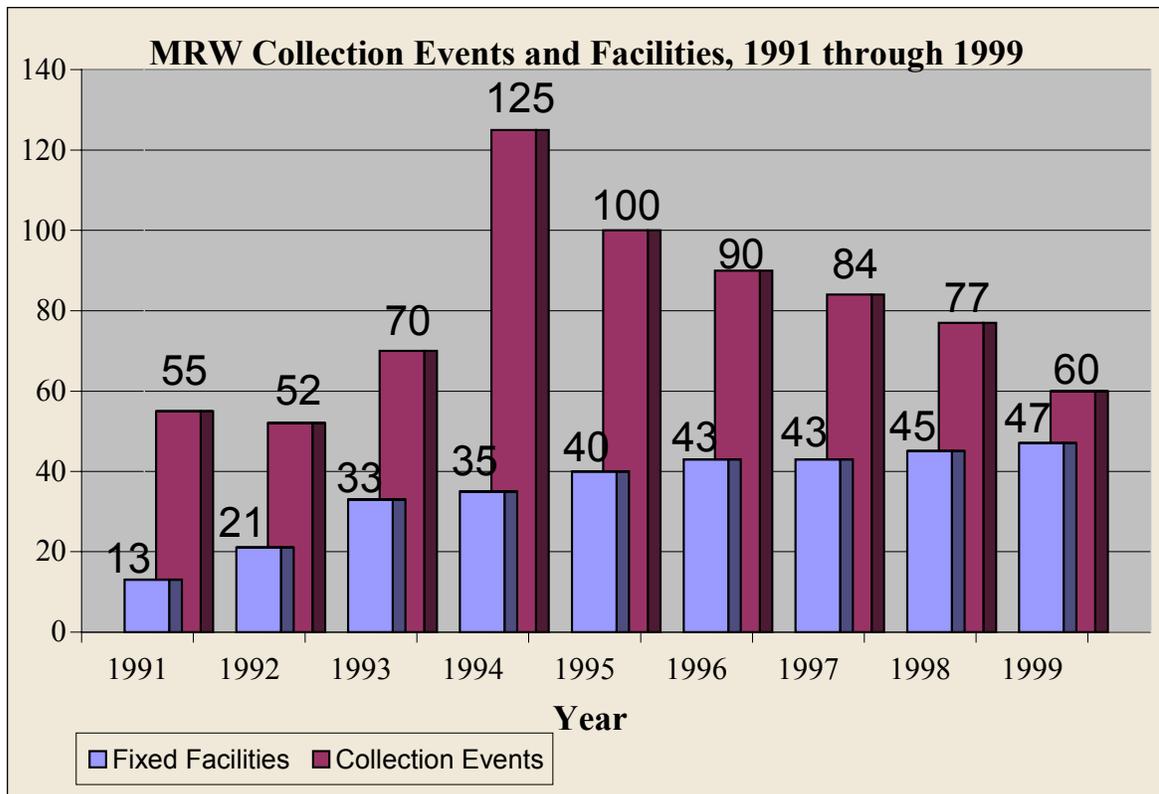
Public MRW collection is categorized into three modes: collection events/mobile systems, fixed collection facilities, and used oil collection sites. Only HHW is collected at used oil collection sites. HHW and CESQG wastes can be collected at the collection events/mobile systems and the fixed collection facilities. MRW collection fixed facility construction reached its peak between 1991 and 1995 with 26 facilities built during that time. Construction has slowed, and as of 1999 Washington currently has 47 facilities. The number of MRW collection events reached a high of 125 for the state of Washington in 1994, and has been declining ever since then, in 1999 less than half that amount. This downward trend is due to the development of fixed facilities that have supplanted the need for continuation of as many or any collection events in some counties. The number of public and private used oil sites for the state of Washington rose steadily between 1991 and 1996, averaging around 555 for the remaining years (Fig. 1).

Fig. 1
Moderate risk waste infrastructure in Washington state: Change from 1991 through 1999.



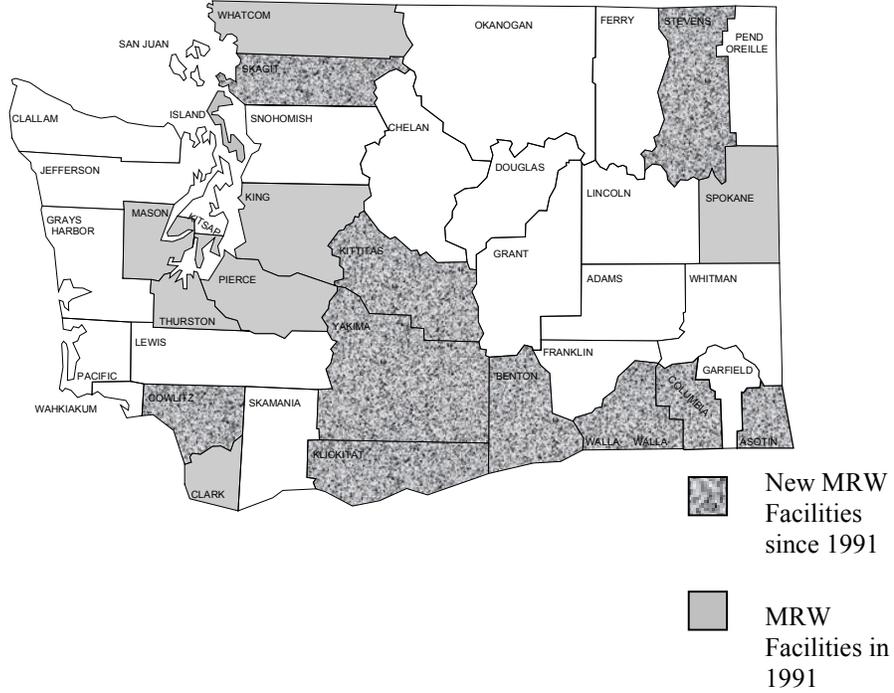
Because the number of used oil sites in the MRW collection infrastructure are very large in comparison to collection events and facilities, Figure 2 was created to show only the collection events/mobile systems and fixed facilities. Figure 2 shows more clearly the declining trends in collection events since 1994 and the increasing trend in fixed facilities since 1991.

Figure 2
MRW Collection Events and Facilities



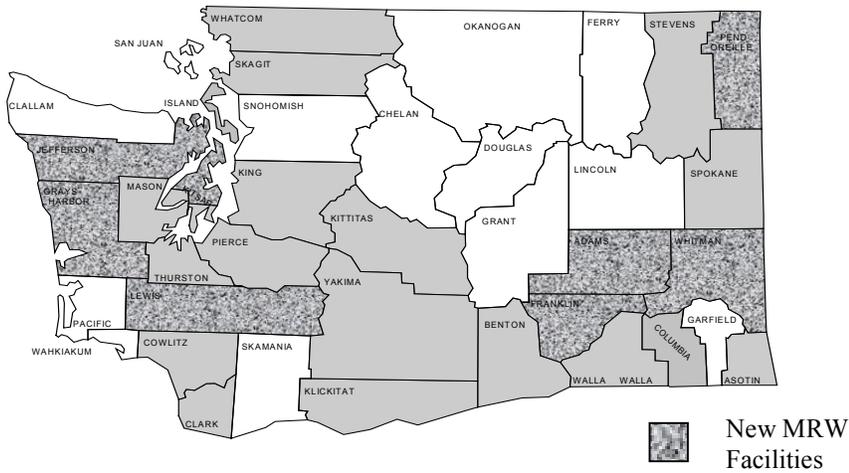
The next three figures show maps of Washington State, illustrating the progression of fixed facility construction by county. Following the City of Bellingham’s lead in 1982 or 1983, metropolitan areas created most of the early facilities, with 13 facilities built by 1991. Mason and Island Counties were pioneering small to medium sized counties (Fig 3). The more rural counties also began building permanent MRW collection facilities with 22 more facilities added between 1991 and 1994 (Fig 3). By 1997, 43 facilities had been built, and only one metropolitan county, Snohomish, did not have a fixed facility. However, that same year, they began planning for construction (Fig 4). As of 2000, there are 47 facilities, with seven projected facilities. These 47 existing facilities currently provide an average statewide service level of one facility for every 120,000 Washington State citizens (Fig 5).

Fig. 3 35 MRW Facilities in 1994,
22 new since 1991



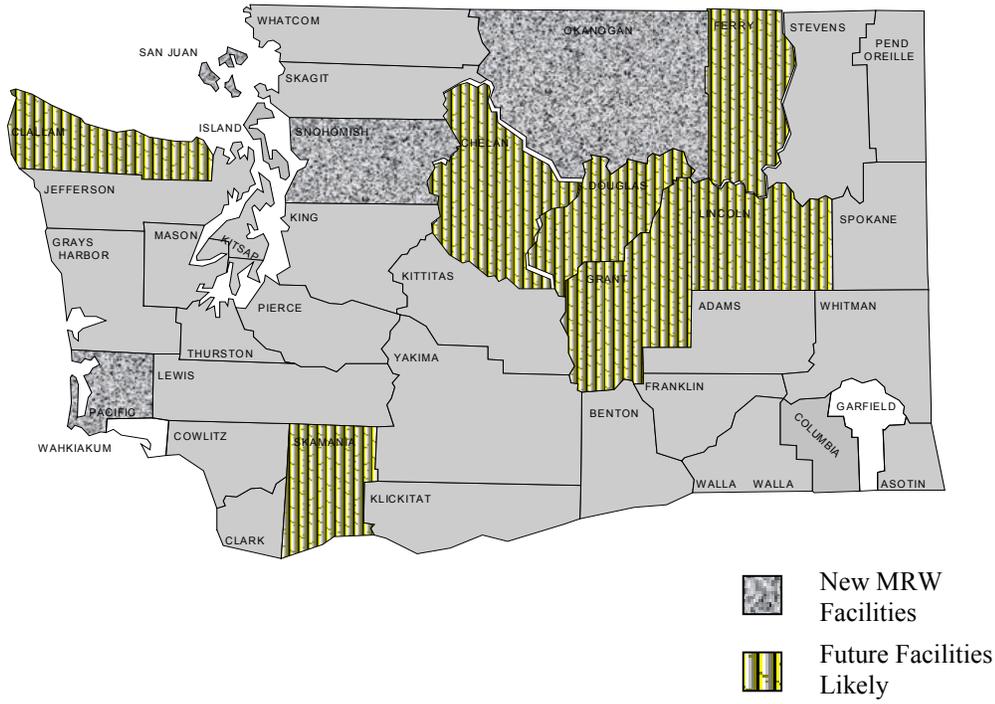
97MRWFF

Fig. 4 43 MRW Facilities in 1997,
8 new since 1994



97MRWFF

Fig. 5 47 MRW Facilities as of 2000,
4 new since 1997

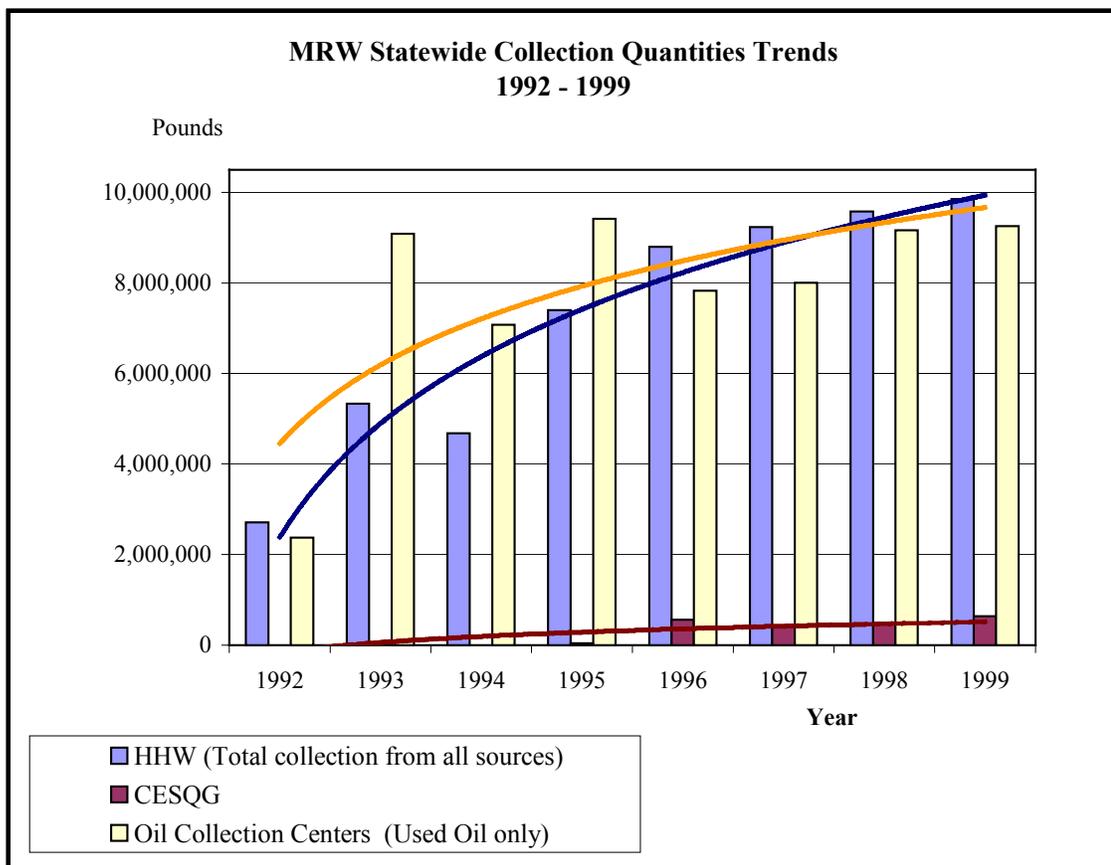


Amounts of MRW Collected, Service Levels, and Projections

In 1998 Washington's public MRW collection system collected approximately 9.6 million pounds of HHW¹, over 9.2 million pounds of used oil, and approximately 497,000 pounds of CESQG waste, for a total of 19 million pounds of MRW. The amount of HHW by only four percent compared to 1997. This small increase in collection was due to Snohomish County building a facility and curtailing most county collection events in 1998. Statewide, both used oil and CESQG waste collection quantities increased compared to 1997. CESQG collection levels increased by 25 percent and used oil collection levels increased by 20 percent over the 1997 levels.

In 1999 Washington's public MRW collection system collected approximately 9.9 million pounds of HHW; nearly 9.3 million pounds of used oil, and 637,400 pounds of CESQG waste, for a total of nearly 19.8 million pounds of MRW. This represents an increase of over 522,000 pounds since 1998. HHW collection is still increasing; CESQG collection levels have also increased by 28% compared to 1998. Overall, MRW collections in Washington State increased by 2.7% between collection years 1998 and 1999, from 19,227,312 lbs. to 19,750,452 lbs., respectively. Figure 6 shows MRW collection from 1992 to 1999.

Figure 6



Trendlines have been placed in Figure 6 to graphically show the growth or decline of the three moderate risk waste types.

¹ Household hazardous waste collected from used oil collection sites, such as antifreeze, has been included in the HHW collection numbers for 1998 and 1999. Used oil collection values are only the used oil from used oil collection sites.

Typical estimates of HHW generation per capita per year are 20 lbs per person. At this rate of generation, Washington State's 5.76 million people would have generated 115.2 million pounds of HHW in 1999. The 19.2 million pounds of HHW collected would amount to a 17% recovery rate. The average 20 pounds per capita generation rate was developed by a number of waste stream studies in Washington and elsewhere primarily in the mid-1980s and early-1990s. There is some evidence that the rate of HHW generation may be falling. For instance, Clark County has seen the proportion of MRW in its waste stream fall in successive waste stream sorting events. It may be time to reexamine the 20 pounds per capita assumption for generation of HHW. The recovery rate of HHW removed from the waste stream would be affected if the generation rate has changed.

Statewide Level of Service

The US Census Bureau reported that as of July 1998, there were an estimated 2,211,000 households² in Washington state. There were 125,076 participants in HHW collection programs during 1998, and 145,041 participants in 1999. Because some participants bring HHW from multiple households, the number of households served can be conservatively estimated by adding ten percent to the participant values or an estimated 137,584 households served in 1998 and 159,545 in 1999. This represents 5.66 percent of all households in Washington in 1998, a slight decrease of 0.59 percent from the estimated 6.25 percent served in 1996. For 1999, an estimated 7.22 percent of all households were served in Washington State, an increase of 1.56 percent compared to 1998. However, this does not include the additional households served by the used oil collection sites, which, with one exception, do not count the number of participants.

The HHW participants reported by the public MRW collection system does not include households which use used oil collection sites, except for Spokane. Statewide in 1998 the MRW collection system accounted for approximately 1.6 million gallons of used oil. About 80% of this was collected at used oil collection sites and the remaining 20% at collection events / mobile systems or at collection facilities.

If households which change their own vehicle oil have two vehicles and generate four gallons of used oil per year per vehicle, the total households served by the collection of 1.6 million gallons would be about 200,000. If 20% of these household participants were already reported above, by events and facilities, the remaining 80%, 160,000 households, would not have been counted as participants unless they made separate trips to drop off HHW. If Spokane served 10,000 used oil collection site customers, which would have been reflected in their 1998 HHW facility participation totals, representing 31% of their total reported 32,281 participants for that year, there would still be 150,000 additional uncounted participants served statewide by used oil collection sites.

Adding these additional 150,000 HHW participants to the statewide total would more than double the level of service to households reported by HHW collection events and facilities in 1998. The total estimated participants for 1998 would therefore increase from 137,584 households to 287,584 households, a 109% increase. This would increase the total rate of participation in 1998 from 5.66% to 11.8%. Applying the same oil site increase ratio to the 1999 data, the 7.22% 1999 participation rate would increase to 15.1%.

The used oil collection sites account for a significant level of statewide MRW participation, probably more than half of the total HHW participation, as well as a large volume of MRW diverted from improper disposal.

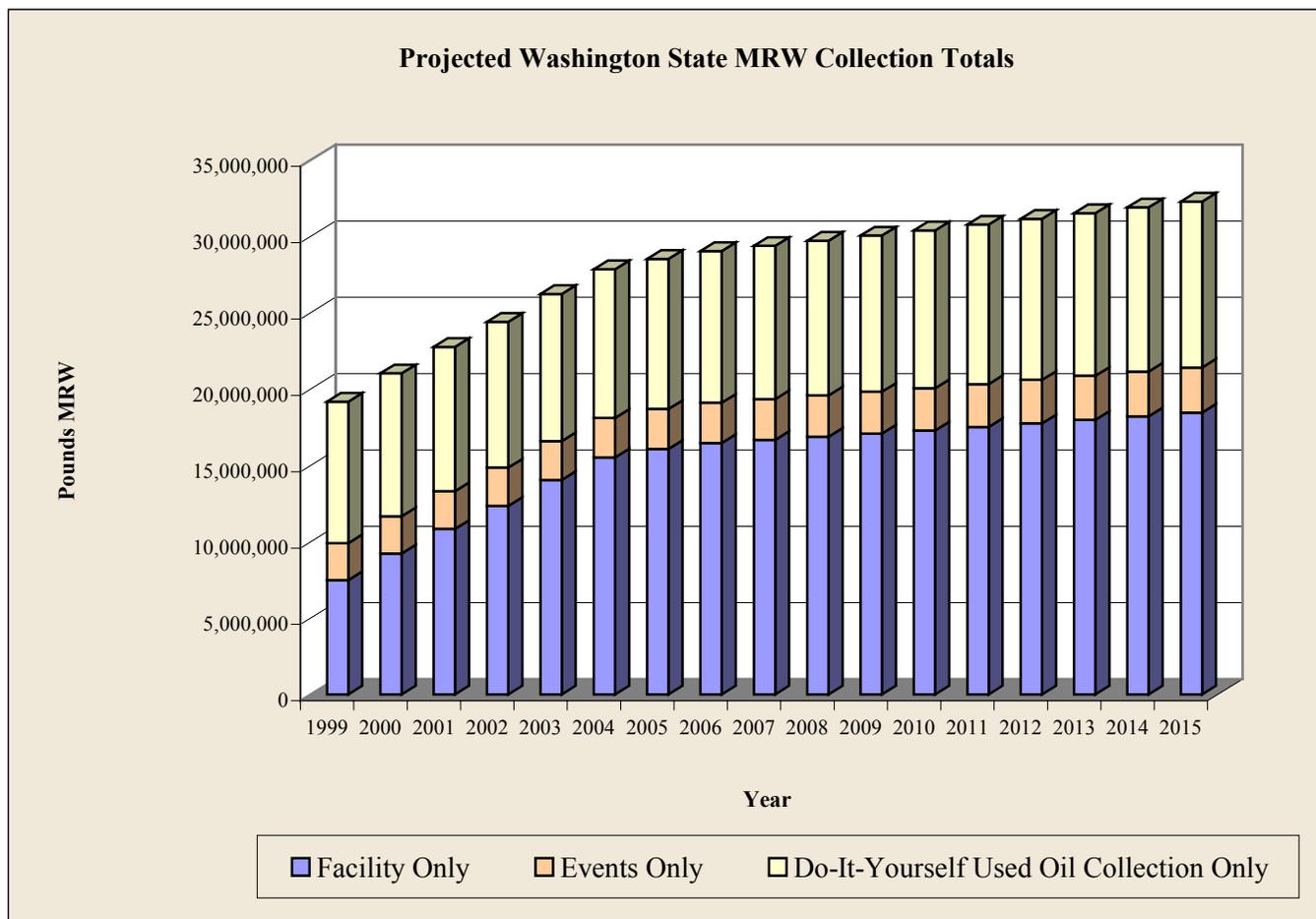
² This number will be updated in the year 2000 by the Office of Financial Management and in the year 2001 by the U.S. Census Bureau

Projection of MRW collections

The Washington State Office of Financial Management releases annual population forecasts for Washington State. Using the change in state population from year to year and other factors, it is possible to calculate probable changes in the collection of moderate risk waste in the coming years.

The population of Washington State is projected to increase from the year 2000 at 5,820,995 to 7,049,917 in 2015 – an increase of 21%. It can be expected that the collection of MRW will increase as well. Figure 7 shows stacked bars with three MRW segments in each bar. The middle segment of each bar reflects projections of collection event quantities based on statewide population growth from year 2000 to year 2015.

Figure 7 Projected MRW Collection: 1999 through 2015, Washington State



For collection facilities, a national study shows that average participation, and quantities of HHW, more than double in the second year of operation (Nightingale and McLain, 1997). The study found year-to-year average participation increases are dramatic in the early years at collection facilities but

gradually level off to an average of a four percent participation increase in year-eight of facility operations. (See Appendix F for a summary of these year-to-year averages.) These year-to-year average annual increases were used to project future collection rates for each county that had a fixed facility operating for eight years or less for the year 2000 and beyond. In the year where a facility had more than eight years of operating history, projected annual increases were based on the statewide average population increases for all remaining years. The results of these collection facility projections are shown in Figure 7 on the bottom section of each years bar.

Because Snohomish County has recently built one of the newest facilities and has a large collection quantity, it contributed more to the facility collection growth projections than Tacoma or Spokane, which have had facilities operating for many years.

For used oil collection, males in the 20 to 45 year-old age range dominate the data. Consequently, the used oil projections in Figure 7 use the growth rate of this statewide population subgroup to estimate future growth in used oil collection. This is reflected in Figure 7 on the top section of each yearly bar.

The combined projections in Figure 7 show that the MRW collection system is approaching a more stable phase. There are no remaining large counties without a permanent HHW collection facility. If there was a significant increase in the number of facilities or used oil sites, these projections may underestimate actual results. In addition, it is unclear to what extent local programs will be accepting increasing quantities of CESQG, electronics, and other types of MRW wastes not typically accepted today. Because most CESQGs pay for disposal services at public and private collection facilities, this possible increase may be less likely to have a significant increase in local operations costs. However, if significant increases in CESQG quantities were realized, the estimates in Figure 7 would be low.

Assuming a relatively stable collection system for the foreseeable future, Figure 7 shows the total projected MRW quantities through 2015. In 1999, the last year of data, approximately 20 million pounds of MRW was collected. By 2015, the total estimate for MRW collection is about 32.2 million pounds of MRW, an projected increase of approximately 69 percent over the 1999 quantities of MRW.

County and Statewide Per Capita Collection Analysis

Metropolitan vs. Non-Metropolitan Areas

This analysis examined the differences in collection found in metropolitan and non-metropolitan areas. The U.S. Census Bureau defines a metropolitan area as 1) a city of 50,000 or more population, or 2) a Census Bureau defined urbanized area of at least 50,000 in population, provided that the component county/counties of the metropolitan statistical area have a total population of at least 100,000. In this analysis, the second definition that focuses on county populations was used to separate the metropolitan versus non-metropolitan counties. Table 1 is the list of the ten metropolitan statistical areas, or MSAs, located in Washington State. If a county contains a metropolitan statistical area, or at least 50% of the population within a MSA reside in a county, that county is considered the “Central county” in relationship to the MSA.

Table 1.

Metropolitan Statistical Areas and their Central Counties

CENTRAL MSA COUNTY	NAME OF AREA (CMSA is a Combined MSA; typically more than one county)
KITSAP	Seattle-Tacoma-Bremerton CMSA
WHATCOM	Bellingham MSA
SNOHOMISH	Seattle-Tacoma-Bremerton CMSA
THURSTON	Seattle-Tacoma-Bremerton CMSA
BENTON	Richland-Kennewick-Pasco MSA
KING	Seattle-Tacoma-Bremerton CMSA
SPOKANE	Spokane MSA
PIERCE	Seattle-Tacoma-Bremerton CMSA
CLARK	Portland-Salem OR-WA CMSA
YAKIMA	Yakima MSA

Table 2
Comparison of metropolitan and non-metropolitan analysis, per capita MRW collection and participation, 1998 and 1999.

DATA TYPE	METROPOLITAN COUNTIES		NON METROPOLITAN COUNTIES		WASHINGTON STATE	
	1998	1999	1998	1999	1998	1999
Facility/Event HHW	1.50 lb.	1.69 lbs.	1.57 lbs.	1.50 lbs.	1.52 lbs.	1.66 lbs.
Used oil sites: HHW*	.05 lb.	.05 lb.	.68 lb.	.09 lb.	.17 lb.	.06 lb.
Sub-Total HHW	1.55 lb.	1.74 lb.	2.25 lbs.	1.59 lbs.	1.68 lbs.	1.71 lbs.
Used Oil Sites: oil	1.55 lb.	1.60 lbs.	1.71 lbs.	1.62 lbs.	1.58 lbs.	1.61 lbs.
Total CESQG	.09 lb.	.11 lb.	.06 lb.	.10 lb.	.09 lb.	.11 lb.
Total MRW	3.19 lb.	3.46 lb.	4.03 lbs.	3.32 lbs.	3.35 lbs.	3.43 lbs.
Proportion of statewide participation in HHW collections	84%	86%	16%	14%	125,076	145,041
Pounds HHW per Participant	66.0	51.0	85.0	82.0	69.0	66.0

*Oil filters, antifreeze

Table 2 shows a comparison of Washington state, metropolitan and non-metropolitan areas average per capita collection. The “Facility/Event HHW” row excludes used oil collection site data, which is shown under the label, “Used Oil Sites.” The CESQG collection per capita is much less than HHW or used oil, with Yakima County’s efforts accounting for most of the metropolitan CESQG per capita average. For 1998, non-metropolitan counties’ collection of used oil, total HHW, and total MRW, exceeded both metro counties and state average per capita rates.

For specific data on per capita collection numbers by county, see Appendix E. Table E.1a present all counties in alphabetical order, with the 1998 used oil and household hazardous waste per capita collection and population numbers. For comparison, the 1997 numbers are presented as well. The same is repeated for the year 1999, with comparison data from 1998, in Table E.1b.

For 1998, Table 2 shows the average collection of household hazardous waste for Washington State was 1.68 pounds per person. For used oil, the 1998 state per capita rate for used oil collection was 1.58 pounds. For CESQG, the average was 0.09 pounds per person. For 1999, the state per capita was 1.71 for household hazardous waste, 0.11 pounds for CESQG, and 1.61 pounds for used oil.

The average 1998 used oil collected per capita at used oil collection sites in non-metropolitan areas was 1.71 pounds and 1.55 pounds in metropolitan areas. In 1999, metro areas increased in used oil collection rates to 1.6 pounds per capita and non-metropolitan collection decreased to 1.62 per capita. The state per capita increased in 1999 to 1.61 pounds per capita.

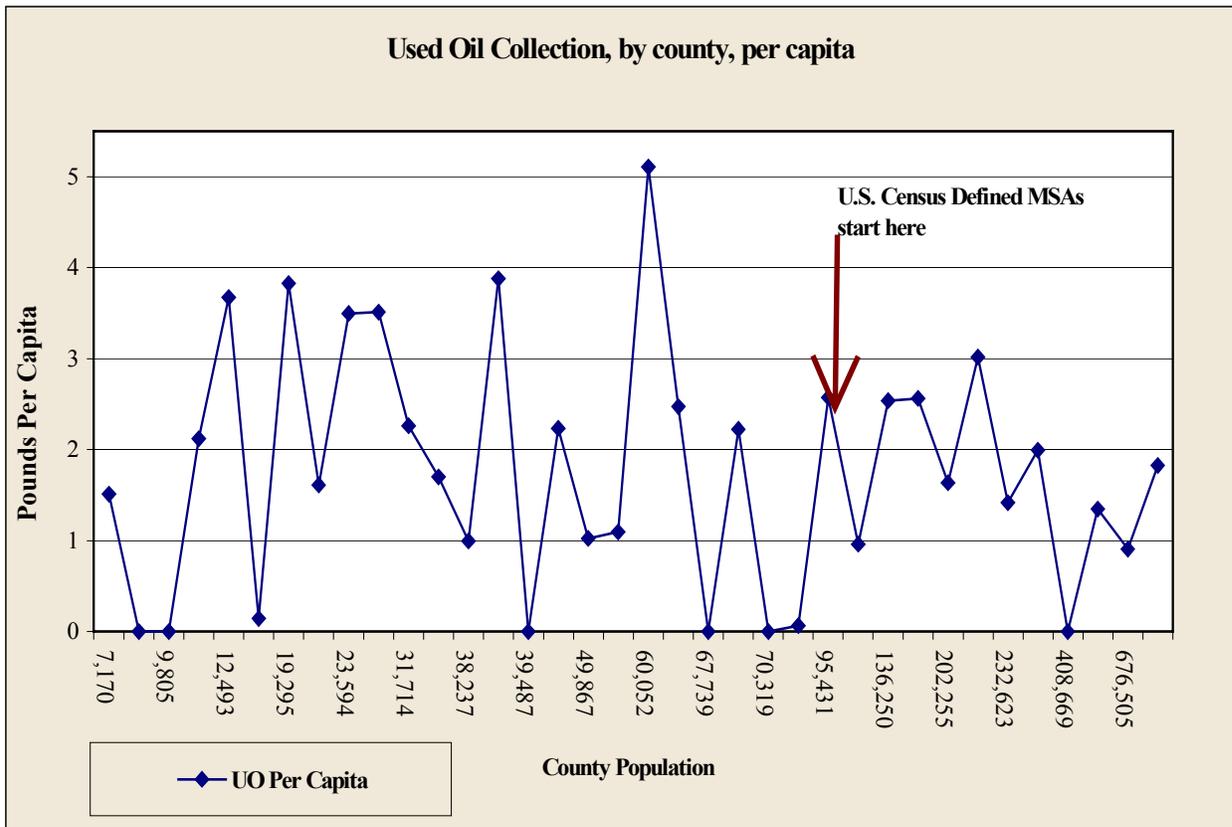
For HHW collection from HHW facilities and events, during 1998, the state per capita was 1.52 pounds. In non-metropolitan areas, the average HHW collected per capita was 1.57 pounds for 1998. In metropolitan areas, the average amount of HHW collected was 1.50 pounds per capita for 1998. During 1999, metropolitan areas increased the HHW collection by facilities and events to 1.69 pounds per capita, while non-metropolitan

decreased collections to 1.50 pounds per capita. Overall, the State of Washington HHW per capita for 1999 increased to 1.66 pounds for facilities and event collection.

In 1999, non-metropolitan areas slipped behind metropolitan areas in total moderate risk waste collection, dropping from 4.03 pounds per capita in 1998 to 3.32 pounds per capita in 1999. Metropolitan areas increased from 3.19 pounds per capita in 1998 to 3.46 pounds per capita MRW in 1999. In Table 2, the number of HHW participants increased by about 20,000, from 125 thousand to 145 thousand, between 1998 and 1999. The metropolitan areas increased their statewide share of these participants from 84% to 86% from 1998 to 1999.

In Figures 8a, 8b, 9a, and 9b, the reader can differentiate between metropolitan and non-metropolitan counties by noting that Central MSA (metropolitan) counties are located to the right of the arrow.

Figure 8a
1998 Oil collection per capita in Washington State



In 1998, used oil collection sites in metropolitan and non-metropolitan areas showed variability in pounds per capita; see Figure 8a for 1998 and Figure 8b for 1999. Chelan County, with a population of about 60,000, collected over 300,000 pounds of used oil: over 5 pounds per person. In metropolitan areas, the average per capita amount of used oil collected was 1.55 pounds, with Yakima County collecting 3.02 pounds per person. A number of counties collected twice or more of the state average per capita amount of used oil (approximately 3.0 lbs. used oil), and some counties made this list in both 1998 and 1999. The used oil per capita collection by these high counties in 1998 and 1999 are listed in Table 3.

**Table 3
High Used Oil Collection Counties**

Used oil, 1998			Used oil, 1999		
County	Region	Pounds Per Capita	County	Region	Pounds Per Capita
Asotin	Eastern	3.50	Asotin	Eastern	4.15
Chelan	Central	5.11	Cowlitz	Southwest	3.06
Jefferson	Southwest	3.51	Jefferson	Southwest	3.00
Klickitat	Central	3.82	Klickitat	Central	3.72
San Juan	Northwest	3.61	San Juan	Northwest	6.05
Stevens	Eastern	3.88	Skamania	Southwest	4.25
Yakima	Central	3.02	Stevens	Eastern	4.03

**Figure 8b
1999 Oil collection per capita in Washington State**

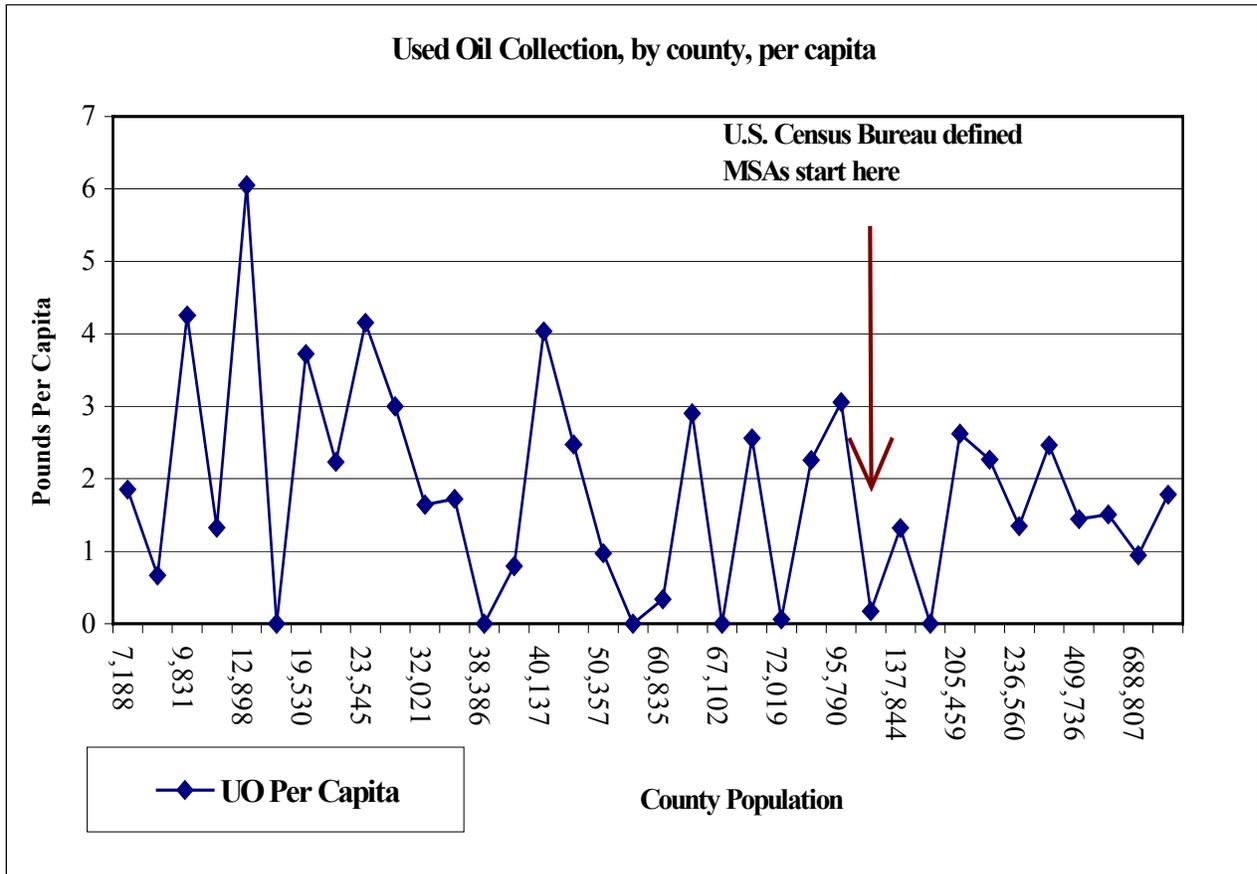


Figure 9a which shows the variability between counties of different populations in 1998 for the collection of HHW. See Figure 9b for the 1999 HHW collection variability between counties.

Figure 9a.
1998 Household Hazardous Waste collection per capita in Washington State

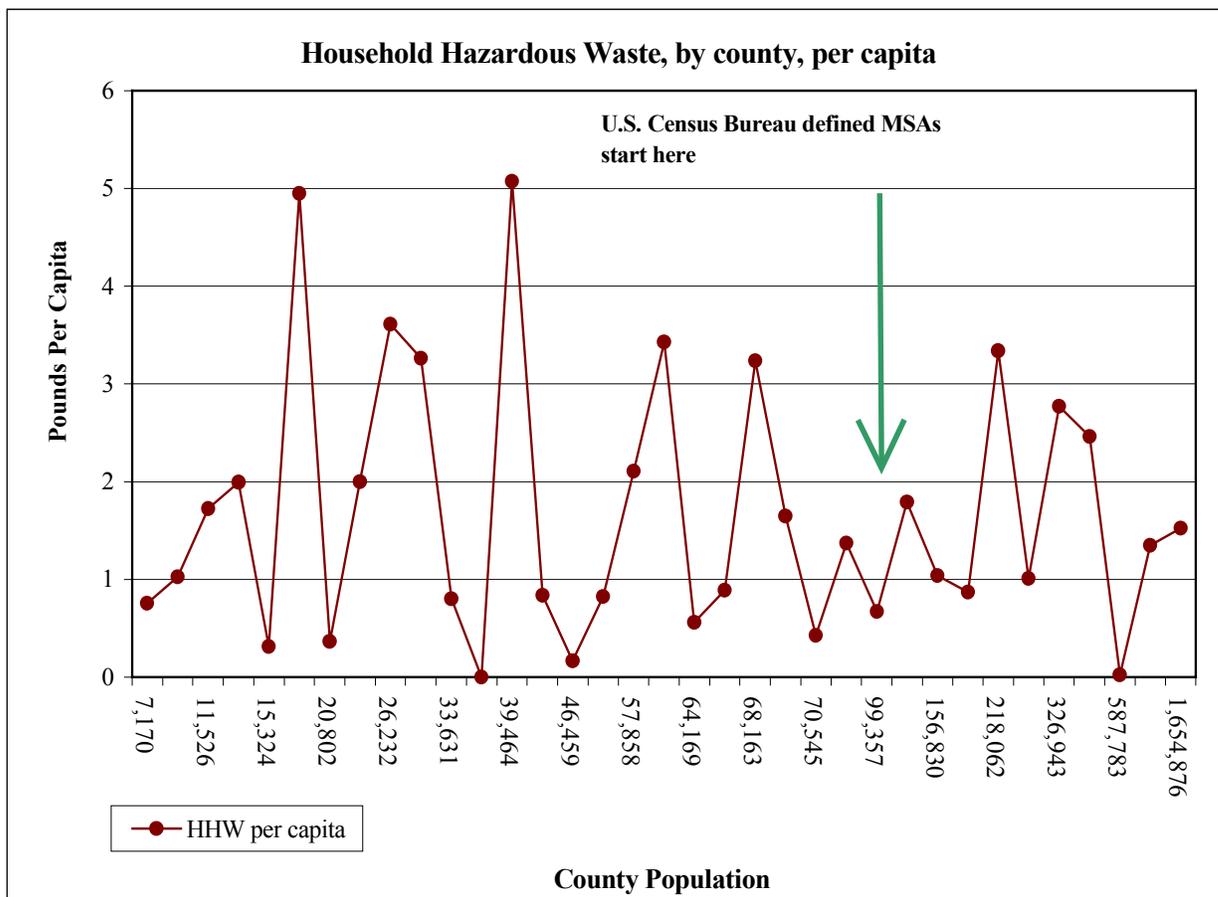


Table 4 lists counties that collected over 3.0 pounds per capita HHW during 1998 and 1999, approximately twice the state average or more. Some of these counties also made the list for collection of used oil at over three pounds per capita, during 1998, 1999, or both years. Klickitat, Jefferson, San Juan, Stevens, Yakima, and Kittitas counties have all made both categories (HHW and used oil) during one or more years. Except for Yakima with a population of 220,000, these are all non-metropolitan counties with populations between 19,000 and 32,000 persons.

Figure 9b.
1999 Household Hazardous Waste collection per capita in Washington State

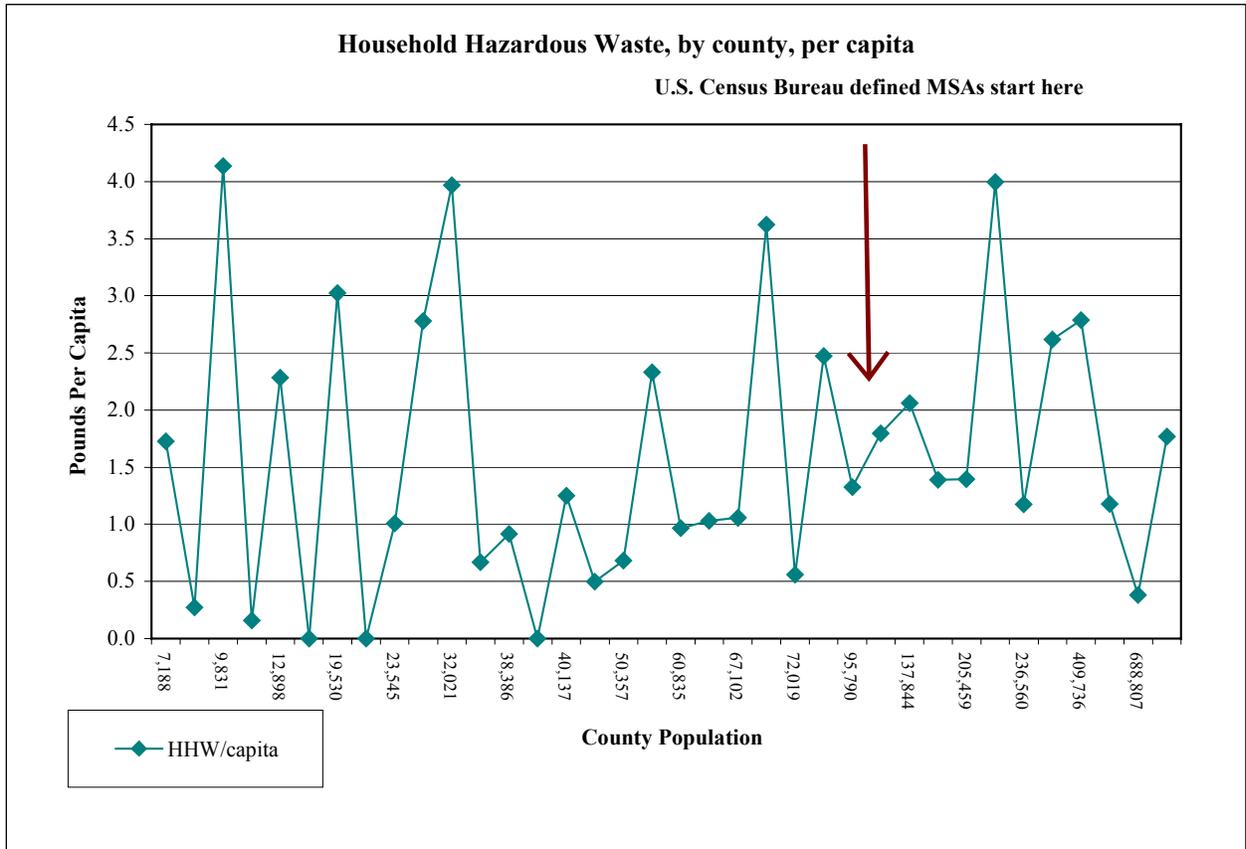


Table 4
High HHW Collection Counties

HHW, 1998			HHW, 1999		
County	Region	Pounds Per Capita	County	Region	Pounds Per Capita
Chelan	Central	3.43	Lewis	Southwest	3.62
Jefferson	Southwest	3.61	Kittitas	Central	3.97
Lewis	Southwest	3.23	Klickitat	Central	3.02
Kittitas	Central	3.26	Skamania	Southwest	4.14
Klickitat	Central	4.95	Yakima	Central	4.00
Stevens	Eastern	5.07			
Yakima	Central	3.34			

MRW Collection by Ecology Region

There are four Department of Ecology regions in the state: Eastern (ERO), Southwest (SWRO), Northwest (NWRO) and Central (CRO). By combining the county populations in each region, the collection of each waste method and category per capita was examined. Figure 10a shows the regional per capita breakdown by MRW collection method in 1998. Figure 10b shows this same analysis for 1999. In both figures the influence of the Yakima County program can be seen in the relatively high rates per capita for HHW and CESQG waste collection in the Central Region, CRO.

Fig. 10a
1998 Moderate risk waste collected as pounds per capita, by region

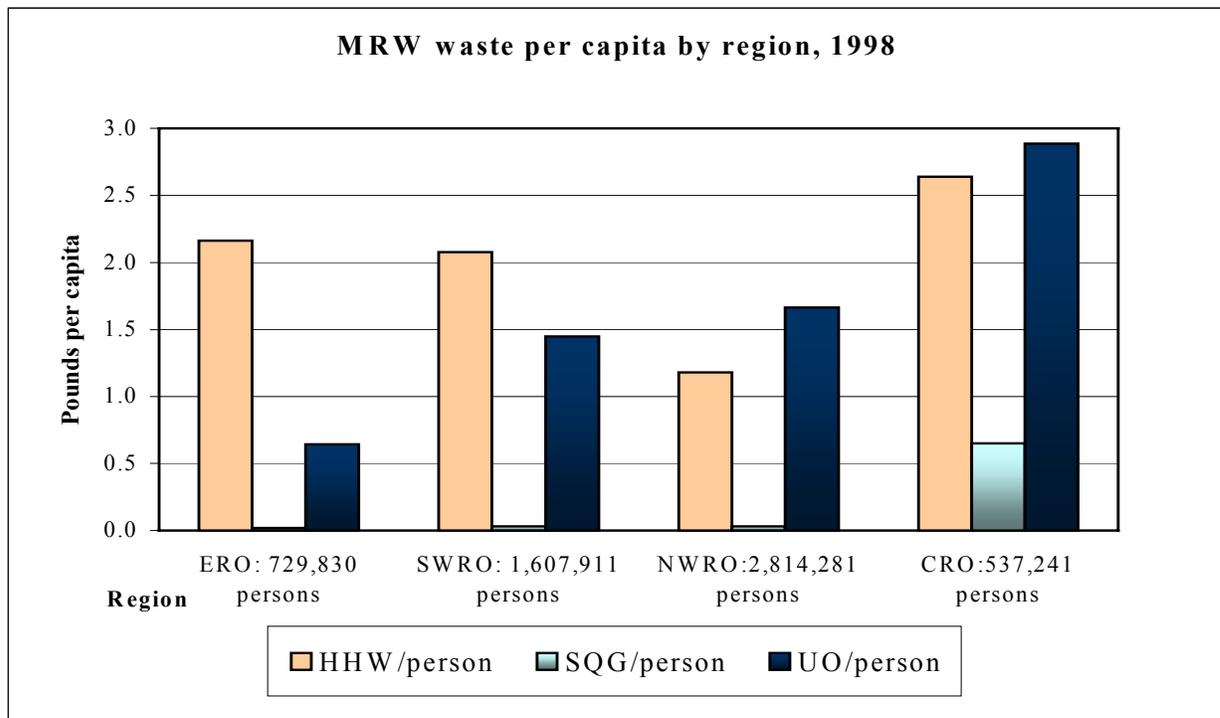
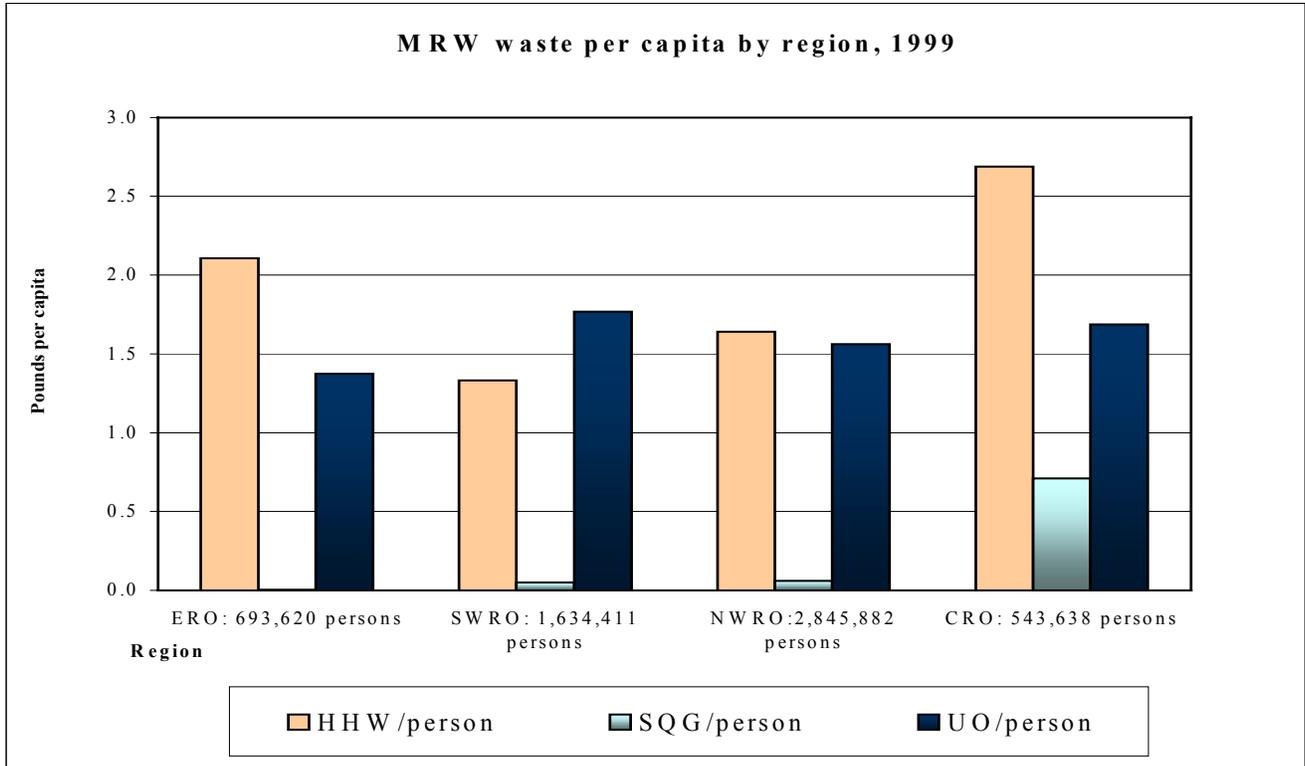


Fig. 10b
1999 Moderate risk waste collected as pounds per capita, by region



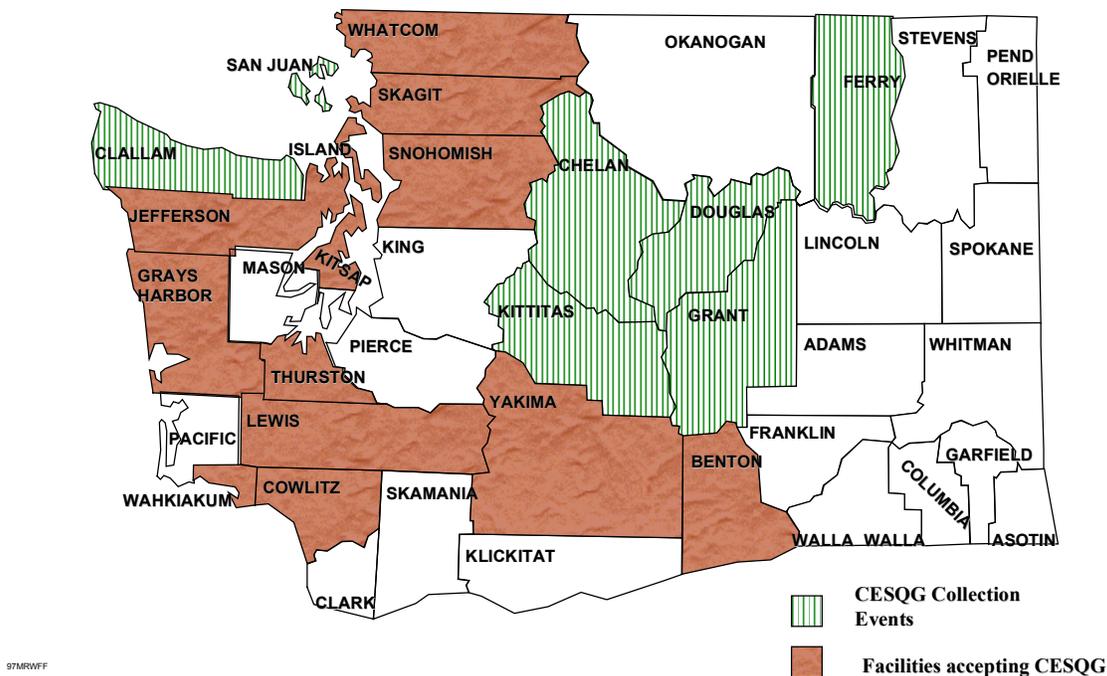
In 1998 and 1999, the Northwest region collected the highest amounts of HHW and used oil when pounds of waste are examined. Used oil collected in the Northwest region amounted to 4.67 million pounds collected for 1998, and 4.44 million pounds collected for 1999. HHW collected in the Northwest region amounted to 3.32 million pounds in 1998 and 4.67 million pounds in 1999. On a per capita basis, Figures 10a and 10b show that the Eastern region came in second during 1998 and 1999 for HHW collection, averaging 2.15 pounds per capita during that time period.

The Central region contains the smallest population with 543,000 persons. However, this region has collected the highest per capita amounts of MRW in both 1998 and 1999. In 1998, the Central region collected 1.42 million pounds of HHW for a per capita rate of 2.64 pounds, plus 1.55 million pounds of used oil for a per capita rate of 2.89 pounds, and seventy percent of all CESQG collected in Washington State for a per capita rate of 0.65 pounds. The Central region collects the highest CESQG waste due in large part to Yakima County's relatively well developed publicly operated CESQG outreach and collection system. The Yakima facility is located in the Central Region, with ongoing CESQG events. During 1999, the Central region maintained the high rates of collection, although both HHW and used oil collection amounts dropped slightly from 1998 levels (see Figures 10a and 10b). Chelan, Kittitas and Klickitat Counties have also contributed to the regions high collection rates as noted in Tables 3 and 4.

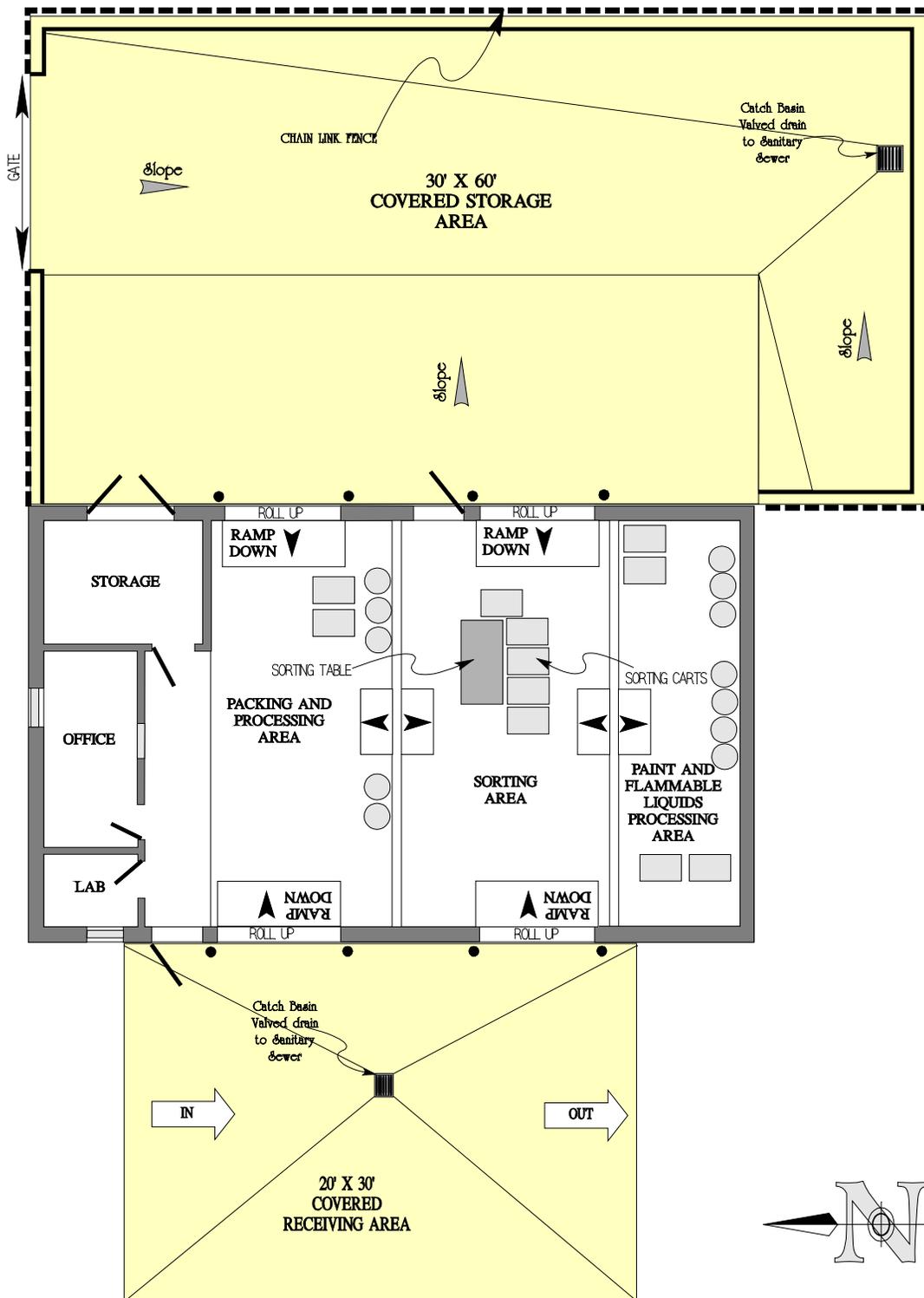
Availability of Public-Sector CESQG Collection Programs

In the Northwest region, King and Pierce counties rely primarily on the private sector for CESQG collection due to readily available services in these counties, and those CESQG collection numbers have not been reported to the Department of Ecology. Other counties also rely on the private sector to manage CESQG waste. In 1998 and in 1999, the number of public facilities that accept CESQG has not changed: twelve counties, twelve facilities. Also, the number of events that collect CESQG, generally held in counties without facilities that accept CESQG or in counties without facilities, is only nine (some counties may hold more than one collection event). This number also has not changed for two years. The total numbers of counties reporting CESQG waste collection from the general business CESQG population at publicly run facilities or events are twenty. Figure 11 shows the counties reporting CESQG waste collection at public programs.

**Figure 11.
1999 Washington State Public CESQG Collection Programs**



Because it has been estimated that the amount of CESQG wastes generated exceeds the amount of HHW generated, there it may be prudent to examine of the adequacy of the current CESQG collection system. Yakima does not charge an extra fee for CESQG collection because it is funded by those businesses through the existing county solid waste tipping fee. The costs in the early years of the Yakima program were high, averaged \$160 to \$340 per business, similar to the early years cost per HHW participant. In recent years, Yakima’s CESQG program has had an average cost of \$55 to \$70 per customer. Average costs for CESQG waste management are typically priced higher in the private-sector collection programs.



General Layout of Tacoma's HHW Collection Facility

HHW Collection Facilities Versus Events

Facility and Event Costs: Household Hazardous Waste

The next analysis of HHW looks at disposal and local costs for both facilities and event collections. It is important to note that not all counties provided complete information and incomplete cost data was excluded from this analysis. The primary focus was a cost comparison of HHW gathered through collection events versus facilities. To normalize the data, only used oil associated with household hazardous waste collection were counted in the cost analysis. This is because with used oil collection sites there are minimal operating costs, but large and highly variable quantities of used oil collected.

It should also be noted that *HHW collected from used oil sites (antifreeze and used oil filters) is not included*. Only household hazardous waste associated with facility collection and collection events/mobile collection is included, because separate cost data is not available for HHW (oil filters, antifreeze) collected at used oil collection sites. The term “revised population” is used in some tables to emphasize that the statistics are calculated only using the populations from counties that reported useable data in that year.

In 1998, seventeen counties provided useable facility cost information and 12 provided useable event information for household waste collection. For the counties with both HHW collection facilities and events, they were classified predominantly as an event or facility county based upon the quantity of HHW collection and participation rates, for each mode of collection. The results of this categorization are shown in Table 5a for 1998 and Table 5b for 1999. King County’s collection program was divided into the City of Seattle (facility) and King County (event collection) for this analysis.

In comparing Table 5a with Table 5b, an ongoing trend is seen towards HHW collection by facilities from HHW collection by events. Eight counties relied on collection events in 1999 compared with 12 collection event counties in 1998. The remaining eight collection event counties, except for King County, are all non-metropolitan. They each collect less than 80,000 pounds HHW per year, except for the King County WasteMobile at over 2.1 million pounds HHW per year.

In addition to the trend towards reliance on fixed facilities instead of only collection events, there is also a trend for collection activities based from fixed facilities to serve populations distant from the facility. These hybrid collection systems have the advantage of selective, more efficient waste processing as well as providing flexible and timely services to outlying areas. The City of Tacoma / Pierce County and Cowlitz County collection systems provide good examples of these new hybrid collection systems in an urban and rural setting, respectively.

Table 5a
1998 Counties providing complete, useable costs data: Facility and Event HHW collection

Facility Counties N=17	Lbs. HHW	Event Counties N=12	Lbs. HHW
Asotin	47,176	Chelan	205,859
Benton	253,877	Clallam	35,882
City of Seattle	766,578	Cowlitz	4,857
Clark	905,732	Douglas	26,979
Grays Harbor	60,152	Ferry	5,410
Island	115,662	Grant	30,118
Kitsap	234,792	King County	1,752,113
Klickitat	95,468	Kittitas	60,363
Lewis	220,482	Mason	40,335
Pierce	912,447	Pacific	7,529
Skagit	66,568	San Juan	24,290
Spokane	1,004,623	Snohomish	12,939
Stevens	200,158	Total lbs. HHW	2,332,467
Thurston	176,080		
Whatcom	162,434		
Whitman	33,040		
Yakima	727,947		
Total lbs. HHW	5,938,215		

Table 5b
1999 Counties providing complete, useable cost data: Facility and Event HHW collection

Facility Counties N=23	Lbs. HHW	Event Counties N=8	Lbs. HHW
Asotin	23,752	Chelan	58,876
Benton	172,131	Clallam	66,613
Clark	861,505	Douglas	22,859
Cowlitz	126,975	Ferry	12,410
Franklin	22,275	Grant	40,154
Grays Harbor	70,961	King County	2,175,686
Island	181,723	Kittitas	78,223
Jefferson	74,366	San Juan	29,457
Seattle	766,543	Total HHW	2,484,278
Kitsap	277,499		
Klickitat	56,046		
Lewis	248,651		
Lincoln	2,648		
Mason	34,366		
Pierce	238,599		
Skagit	181,906		
Snohomish	701,418		
Spokane	1,142,881		
Stevens	50,175		
Walla Walla	124,433		
Whatcom	222,771		
Whitman	32,455		
Yakima	882,220		
Total HHW	6,496,299		

Table 5c
Facilities and Events: Percent of total HHW collected, 1998 and 1999.

1998 Facilities		1999 Facilities	
Percent of State Population:	% of Total HHW collected, 1998:	Percent of State Population	% of Total HHW collected, 1999
58%	70%	70%	66%
1998 Events		1999 Events	
Percent of State Population:	% of Total HHW collected, 1998:	Percent of State Population	% of Total HHW collected, 1999
38%	27%	25%	25%

Table 5c also demonstrates the increasing dominance of facilities in the HHW collection system. The percentage of Washington State’s population served primarily by a facility has increased from 58% in 1998 to 70% in 1999, a 12% shift in one year.

The costs, participants, and amount of HHW collected for each category of counties (“events” versus “facilities”) are shown in Table 6. Facility counties that submitted complete and useable cost information collected 5.9 million pounds of HHW, costing over 3.8 million dollars in 1998. Event counties that submitted complete and useable cost information collected 2.3 million pounds of HHW with a total cost of 1.9 million dollars in 1998.

The submitted cost data was examined three ways: cost per pound, cost per participant and cost per capita. A ratio of events to facility collection costs was then completed to find the difference between event/facility collection cost per pound, and event/facility cost per capita. Table 6 provides the results for 1998 and 1999.

Table 6
HHW Collection at Facilities and Events
Comparison of Costs, Participants, and HHW collected, 1998 and 1999*

1999	FACILITIES				
Total costs	Total Participants (Ppts)	Total lbs. HHW	Cost per ppt.	Cost per lb.	Cost per capita
\$4,255,859.55	103,288	6,496,299	\$41.20	\$0.66	\$1.05
1998					
\$3,859,636.35	99,144	5,983,215	\$38.93	\$0.65	\$1.16
1999	EVENTS				
Total Costs	Total Participants (Ppts)	Total lbs. HHW	Cost per ppt.	Cost per lb.	Cost per capita
\$1,965,894.90	30,554	2,484,278	\$64.34	\$0.79	\$1.39
1998					
\$1,921,864.11	25,316	2,332,467	\$75.91	\$0.82	\$0.89
RATIOS: EVENTS TO FACILITIES					
1998	Event to Facility Costs	1999	Event to Facility Costs		
Cost per ppt.	195%	Cost per ppt.	156%		
Cost per lb.	128%	Cost per lb.	121%		
Cost per capita	76%	Cost per capita	132%		

*All values based upon complete and useable cost data submitted with 1998 and 1999 annual MRW forms.

Facilities experienced an 8.6% increase in the amount of HHW collected, accompanied by a 10.3% increase in associated costs, and a 4.2 % increase in participants. In contrast, event collection experienced only a 6.5% increase in the amount of HHW collected during the same time period. Collection events did see a rise in participation, by about 5,000 participants (20%). Although the increase in associated costs was lower for collection events (2.3%).

Looking at facility to event ratios, costs of event collections are higher than those of facility collection in all three categories, during 1999, see Table 6. The largest differences are seen in cost per participant, with cost for event collection 95% higher than facility collection in 1998 and 56% higher than facility collection in 1999. This increased to 32% in 1999. The cost per pound of HHW also remains higher for collection events than that for facility collection. In 1999, it was 21% more expensive per pound to handle HHW at an event versus through a facility-based system.

Regional Breakdown of Collection Efforts

HHW collection efforts were delineated by region again defined by facility counties and event counties. The following results on collection efforts and costs are shown in Table 7a. Population numbers were revised for each region to reflect only the counties who provided complete information.

**Table 7a
1998 Regional breakdown: Facilities and Events Collection***

Region	HHW Collection, Pounds		Revised Population	<i>Pounds HHW per capita</i>		<i>Cost per capita</i>	
	<i>Facilities</i>	<i>Events</i>		<i>Facilities</i>	<i>Events</i>	<i>Facilities</i>	<i>Events</i>
ERO:	1,284,997	35,528	588,929	2.51	0.46	\$1.69	\$0.71
SWRO	2,274,893	214,396	1,571,874	1.70	0.93	\$0.78	\$1.15
NWRO	1,346,034	1,789,342	2,814,281	1.23	1.04	\$1.41	\$0.85
CRO	1,077,292	293,201	499,004	2.88	2.34	\$1.05	\$1.07
Total	5,983,215	2,332,467	5,474,088	1.80	1.08	\$1.16	\$0.87

*All values based upon complete and useable cost data submitted with 1998 annual MRW report forms.

During 1998, collection of household hazardous waste by both facility and event collection methods appeared highest in the Central region, on a per capita basis. Looking at pounds collected only, the Southwest region accounted for nearly fifty percent of the 5.98 million pounds HHW all four-region facilities collected, and cost per capita is also lowest in this region. Interestingly, the Southwest has the highest cost per capita for collection events, showing a high reliance on facility collection during 1999.

In 1998, the Northwest region event/mobile collection of HHW accounted for over fifty percent of the 2.33 million pounds HHW collected statewide by the events/mobile collection method. This region also has a high cost per capita for facility collection and a comparatively lower cost per capita for collection events. Because the King County Wastemobile collects such large quantities of HHW per year, it significantly skews the data for the Northwest region and the statewide averages for collection events.

The cost per capita values in Tables 7b and 7b are best viewed as indicators of the level of effort and resources on a regional basis devoted to the HHW collection program. These values do not necessarily indicate the overall effectiveness of the local programs in removing HHW from the waste stream.

Table 7b
1999 Regional breakdown: Facilities and Events Collection*

Region	HHW Collection, Pounds		Revised Population	<i>Pounds HHW per capita</i>		<i>Cost per capita</i>	
	<i>Facilities</i>	<i>Events</i>		<i>Facilities</i>	<i>Events</i>	<i>Facilities</i>	<i>Events</i>
ERO:	1,398,619	52,564	705,561	2.23	0.66	\$1.01	\$0.72
SWRO	1,655,423	66,613	709,576	2.57	1.03	\$1.87	\$0.88
NWRO	2,331,860	2,205,143	3,534,689	0.97	1.93	\$0.80	\$1.49
CRO	1,110,397	159,958	505,206	2.94	1.26	\$1.32	\$1.20
Total	6,496,299	2,484,278	5,455,032	1.61	1.76	\$1.05	\$1.39

*All values based upon complete and useable cost data submitted with 1999 annual MRW report forms.

During 1999, the Central region continued with the highest pounds per capita facility collection rate, and the Northwest region remained the top region for pounds per capita for event collections. The Northwest region shows the lowest facility collection rate. This is probably due to the relatively low facility density in Seattle-King County compared with other service areas. Also, Snohomish County's recent transition to a facility-based system is expected to provide a large addition to the regional HHW collection quantities in the next few years.

The cost per capita for collection events in the Southwest region has dropped dramatically since 1998 not due to low collection rates, but due to a lack of events. Only one county sent in useable cost information on event collections in this region, affecting the cost data for the Southwest Region. The Northwest and Central regions have seen significant increases during 1999 associated with the cost per capita rate for collection events (Table 7b). Facility cost per capita has gone down in the Northwest and Eastern regions, bringing the state average down to \$1.05 per capita.

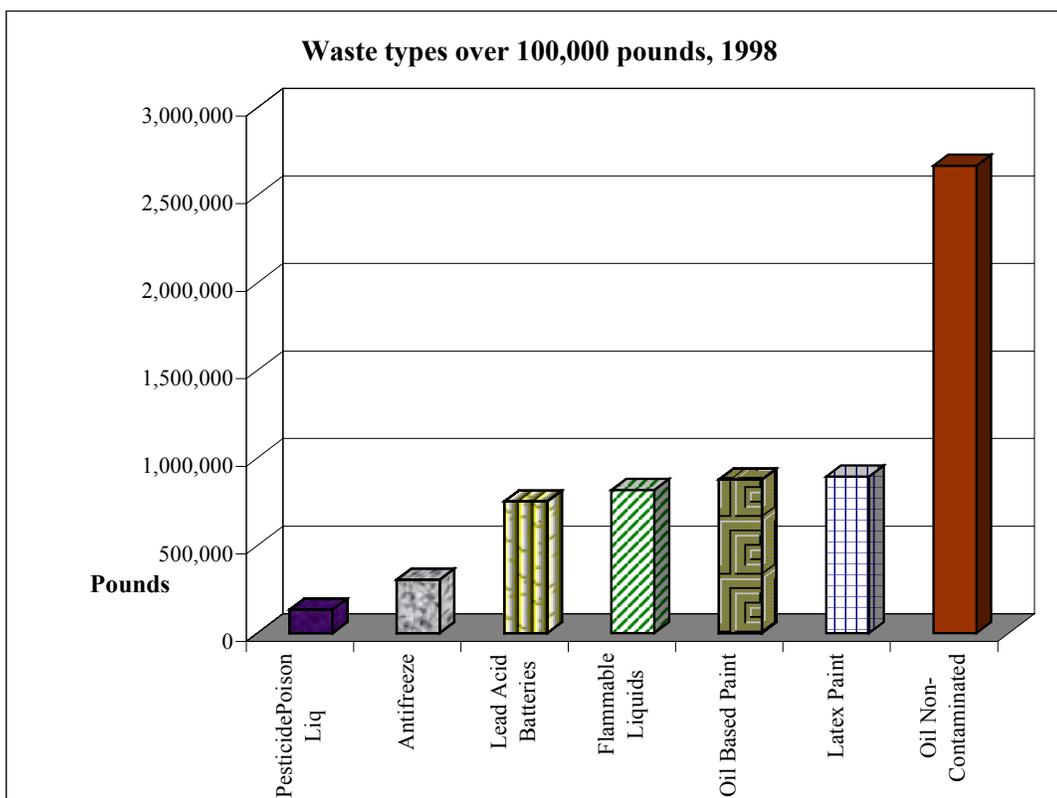


The “Red Comet, *Safety Spray* Automatic Fire Extinguisher containing CM-7 Fluid”, an antique fire extinguisher “bomb” filled with carbon tetrachloride (potential human carcinogen) delivered to Pacific County’s new HHW collection facility.

Collection by Fixed Facilities

There are many types of moderate risk waste collected at facilities; however, the vast majority of waste can be represented by types collected in quantities over 100,000 pounds. This section addresses information on quantities collected at fixed facilities for the years 1998 and 1999.

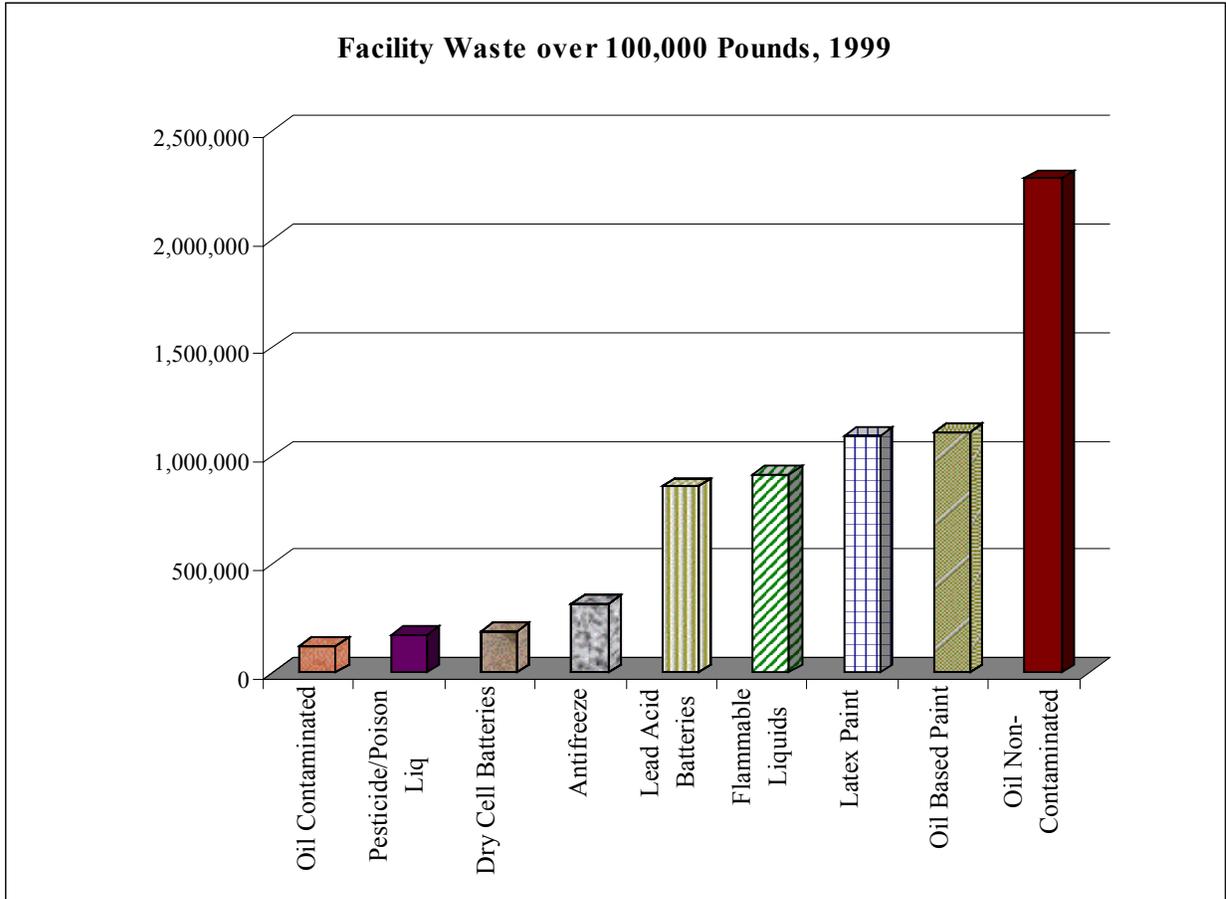
Fig. 12a
Fixed facility collections of waste streams over 10,000 lbs. in 1998



The largest quantity of any waste type brought into fixed facilities during 1998 was non-contaminated oil, at 39 percent (see Fig. 12a). This does not include oil collected from used oil collection sites, but only oil brought into facilities. Also commonly brought to fixed facilities were oil-based and latex-based paints, flammable liquids, and lead acid batteries. After these categories, the quantities start to drop dramatically³. Figure 12b shows the 1999 waste streams collected at facilities in aggregate quantities over 100,000 pounds.

³ For additional details on the disposition of MRW collected by waste type, please refer to Appendix D.

Fig. 12b
Fixed facility collections of waste streams over 100,000 lbs. in 1999



The total waste delivered to facilities increased by more than 0.5 million pounds from 1998 to 1999. Consequently, two additional waste types were collected in quantities greater than 100,000 pounds. The new waste types over the 100,000-pound threshold were contaminated oil and dry cell batteries.

Fixed facilities disposed of HHW and CESQG wastes in similar manners. For 1998, fixed facilities in Washington State preferred energy recovery as their primary method for disposal of household hazardous waste, followed closely by recycling and reusing materials (see fig 13a). These two disposal methods accounted for 72 percent of all household hazardous waste that entered into the facilities.

Fig. 13a
Household hazardous waste disposition methods by fixed facilities in Washington, 1998.

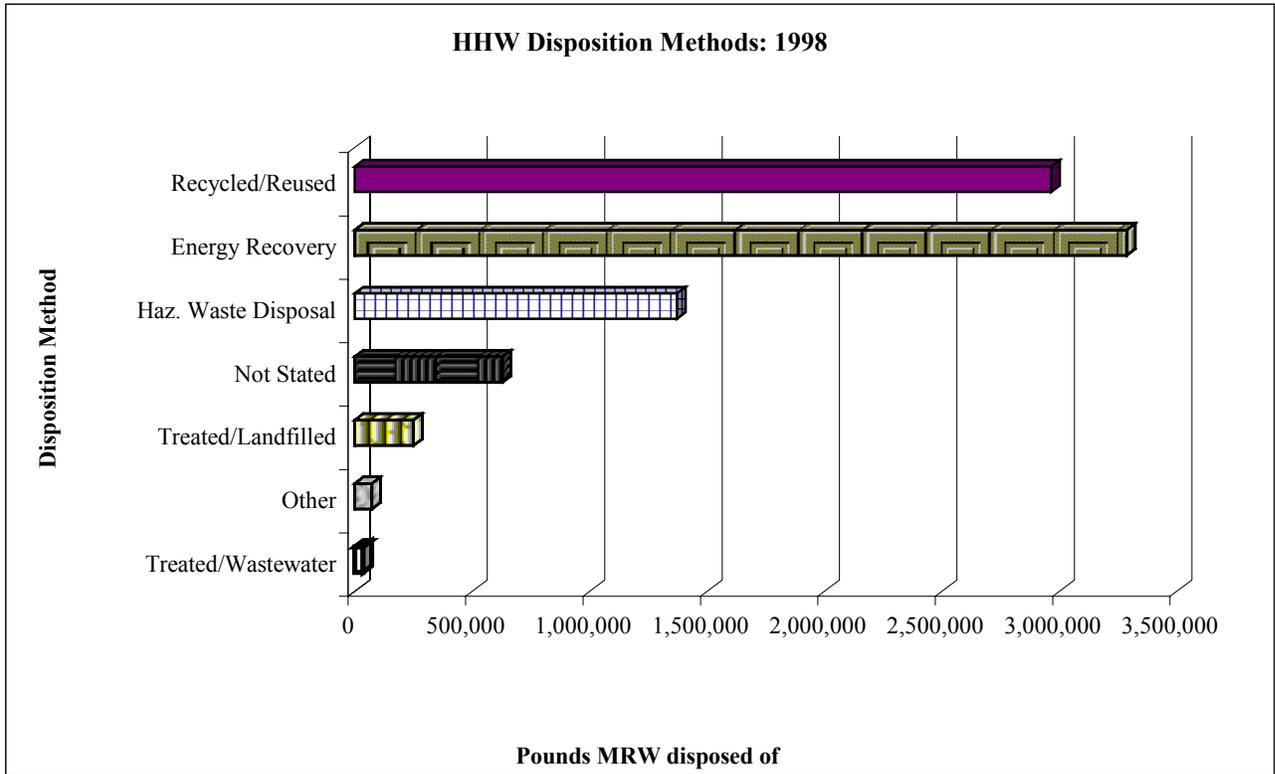
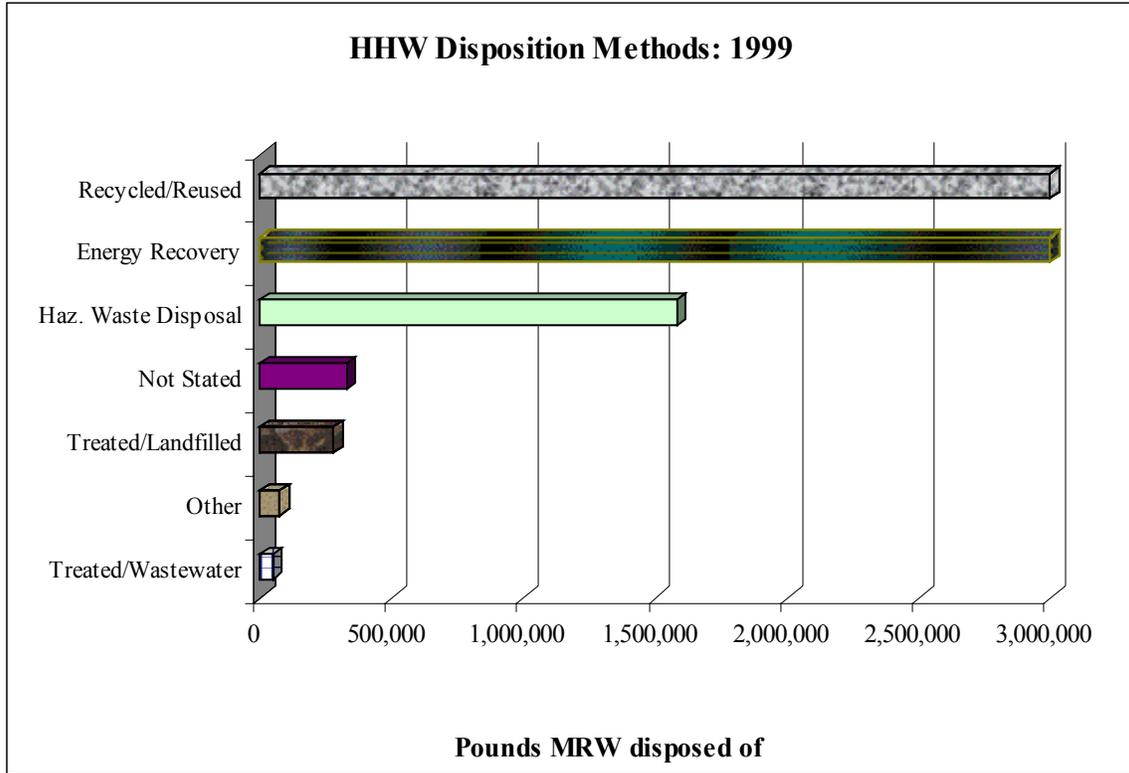


Figure 13b shows a similar HHW waste disposition proportion although recycling/reuse amounts are about equal to energy recovery.

Fig. 13b
Household hazardous waste disposition methods by fixed facilities in Washington, 1999.



CESQG disposal follows the same trend as HHW except a much smaller reliance on energy recovery with 70 percent of CESQG wastes being recycled/reused and seven percent were used for energy recovery (see fig 13c and 13d).

Figure 13c
CESQG disposition methods by facilities in Washington state, 1998

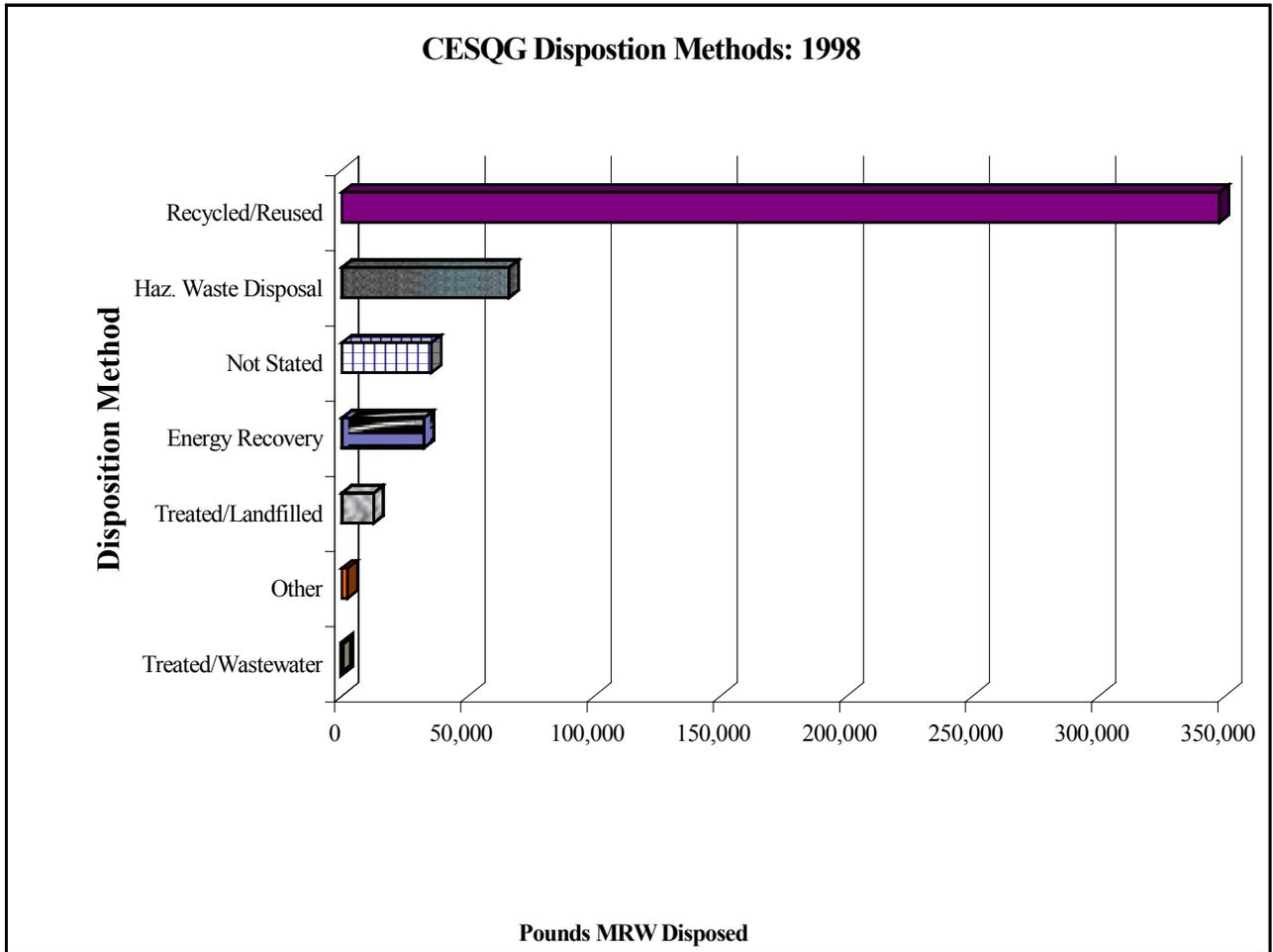
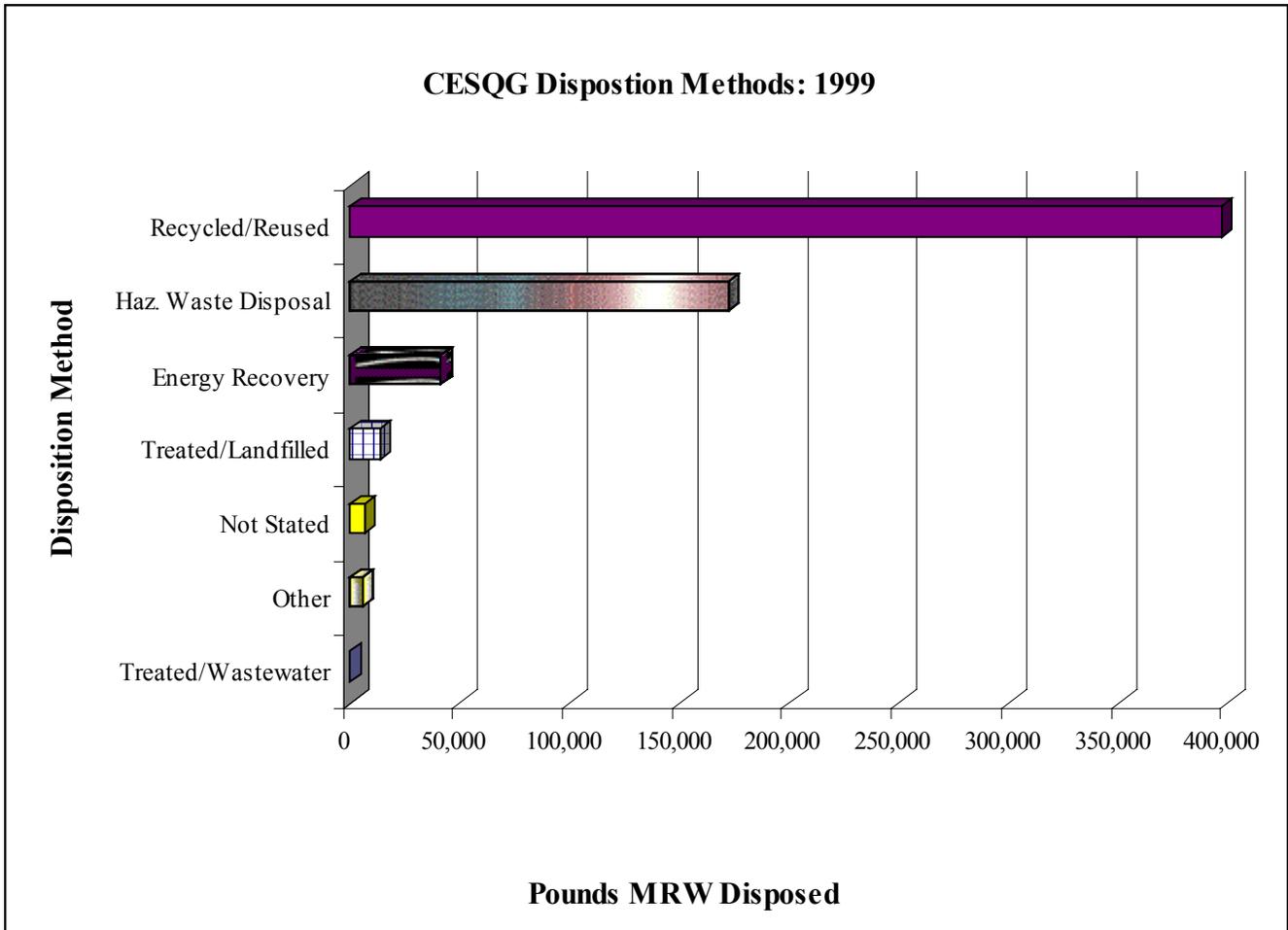


Figure 13d
CESQG disposition methods by facilities in Washington state, 1999.



In 1999, Washington State collected over 137,000 pounds more CESQG compared to the 1998 level. The majority of it was disposed of by recycling or re-utilization, sending to a hazardous waste landfill, or through energy recovery.

MRW Collection by Waste Category and Type

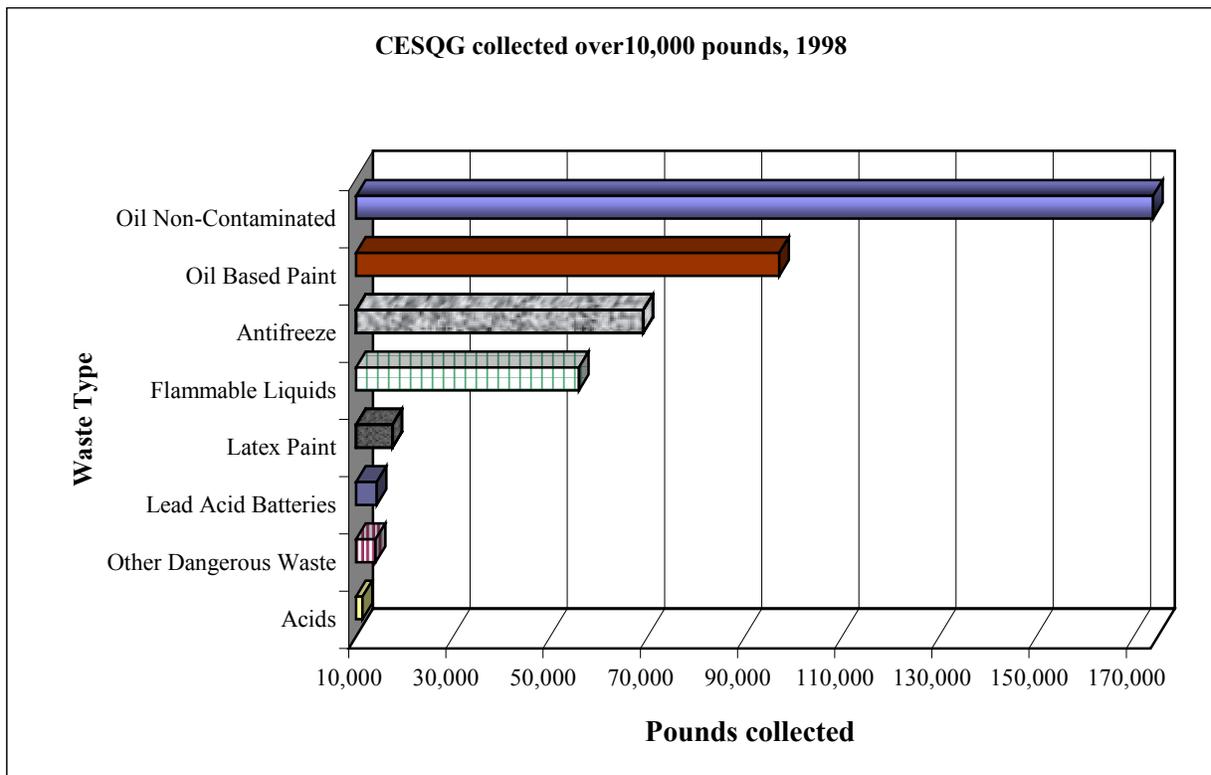
This section provides summary information on MRW waste types collected. More detailed information regarding the final disposition of wastes by type is contained in data tables of Appendices A and D.

Conditionally Exempt Small Quantity Waste Collection

A total of 497,000 pounds of CESQG was collected in Washington State during 1998 in the local MRW collection system. This is about .09 lb. per person in the state of Washington. Of this total amount, the Yakima facility collected 346,000 lb. or 70 percent. This amount increased to 637,000 pounds in 1999, also increasing the state per capita collection to .11 pounds per person. Of this total amount, the Yakima facility collected 374,000 pounds or 54 percent. This does not include a large amount of CESQG wastes managed by facilities and collection activities operated independently from the MRW collection system, largely by CESQG's and hazardous waste facilities.

In 1998, the largest CESQG waste type collected by the MRW collection system was non-contaminated oil, followed by oil-based paint, antifreeze and flammable liquids. Together, these four categories comprise 87% of all CESQG waste accepted in quantities over 10,000 pounds. See Figure 14a.

Figure 14a
1998 CESQG waste types collected in amounts over 10,000 pounds⁴.

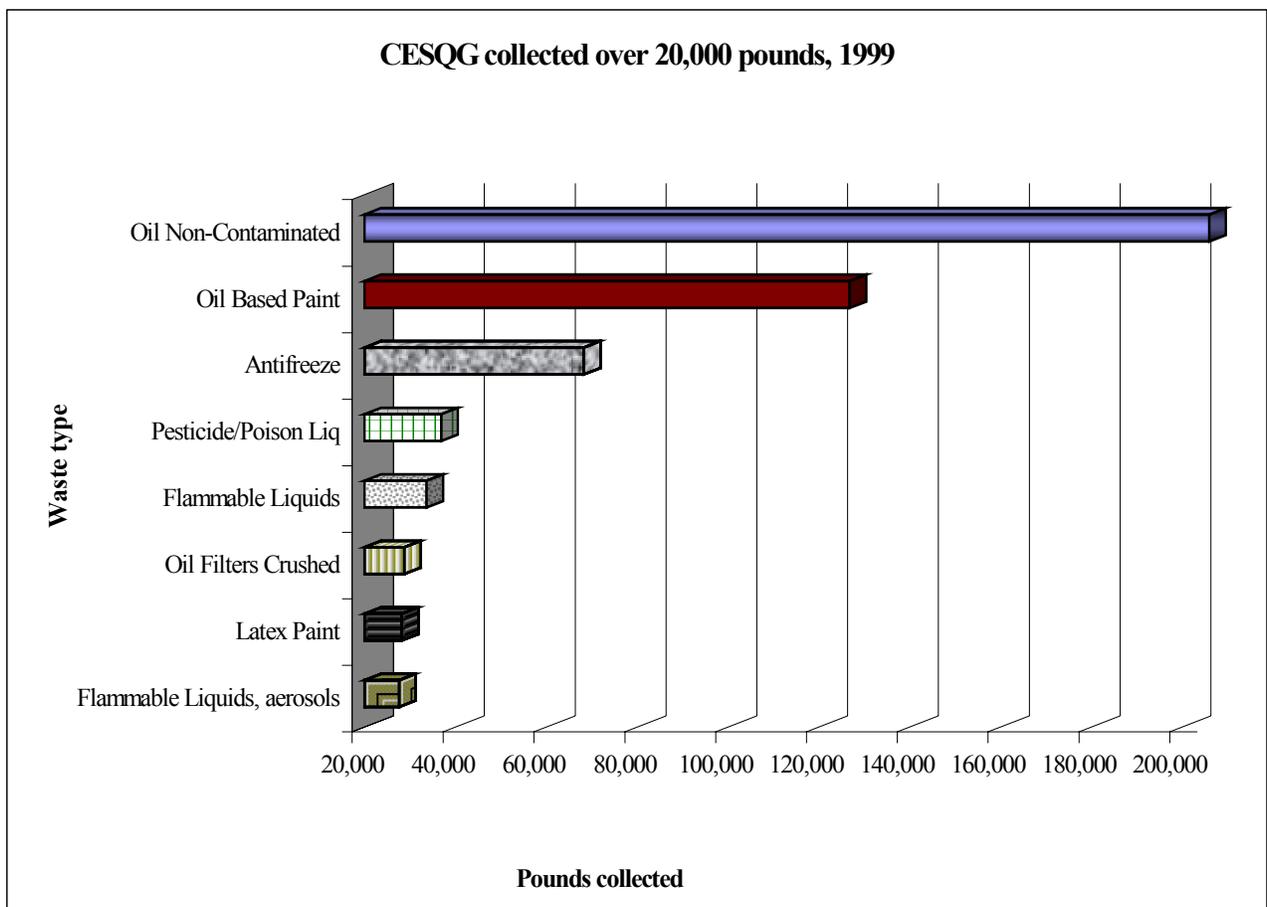


⁴ Excludes used oil collected at used oil collection sites.

In 1999, collection levels were higher than 1998 for many categories, particularly the top three: non-contaminated oil, oil-based paint, and antifreeze. Figure 14b shows the waste types and quantities over 20,000 pounds collected from CESQGs in 1999.

Other changes include flammable liquids displaced from the fourth to the fifth highest category by pesticides and poison liquids. New categories include crushed oil filters and flammable liquids (aerosols). Lead acid batteries, acids, and “other dangerous waste” are no longer on the list of CESQG waste types collected in amounts over 20,000 pounds. However, they may have been collected in amounts over 10,000 pounds.

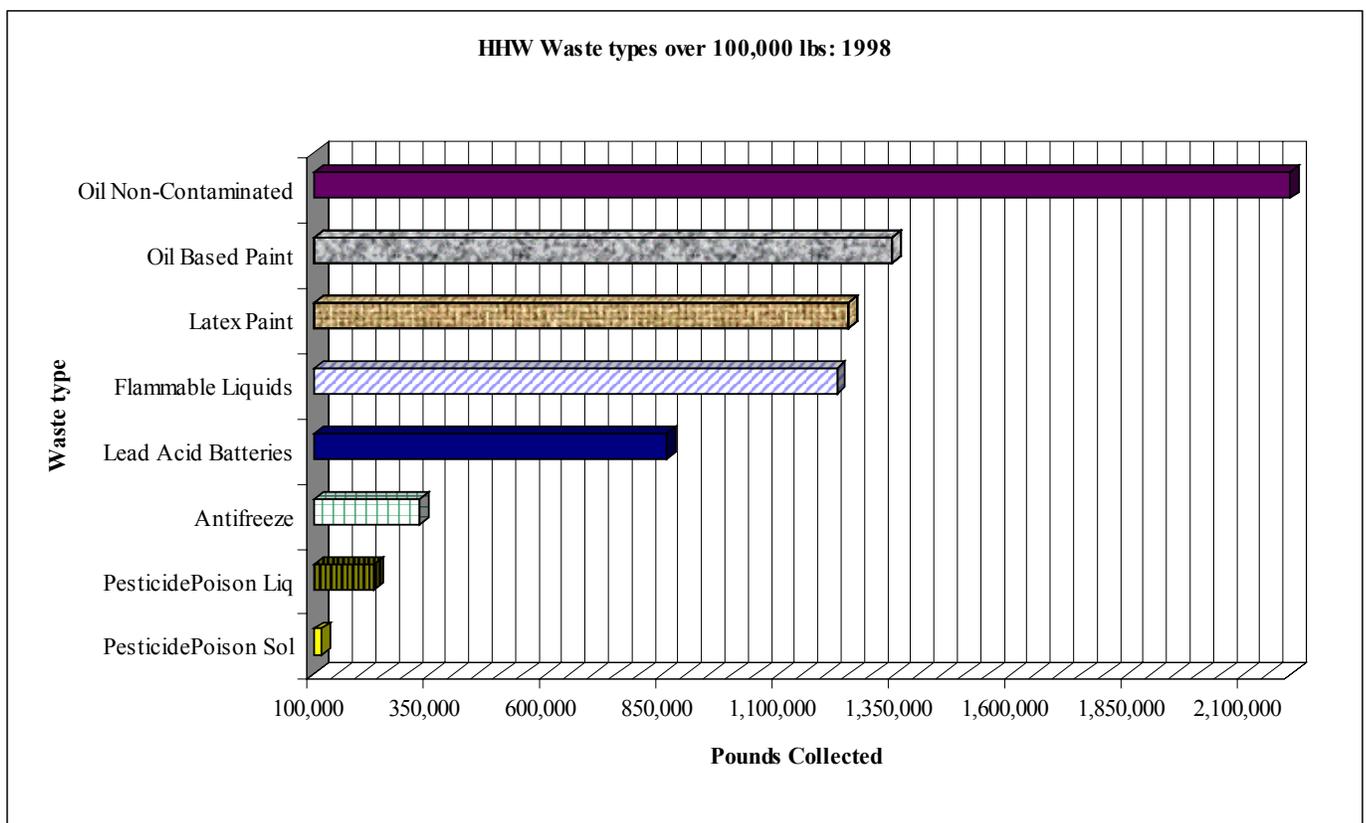
Figure 14b
1999 CESQG waste types collected in amounts over 20,000 pounds



Household Hazardous Waste

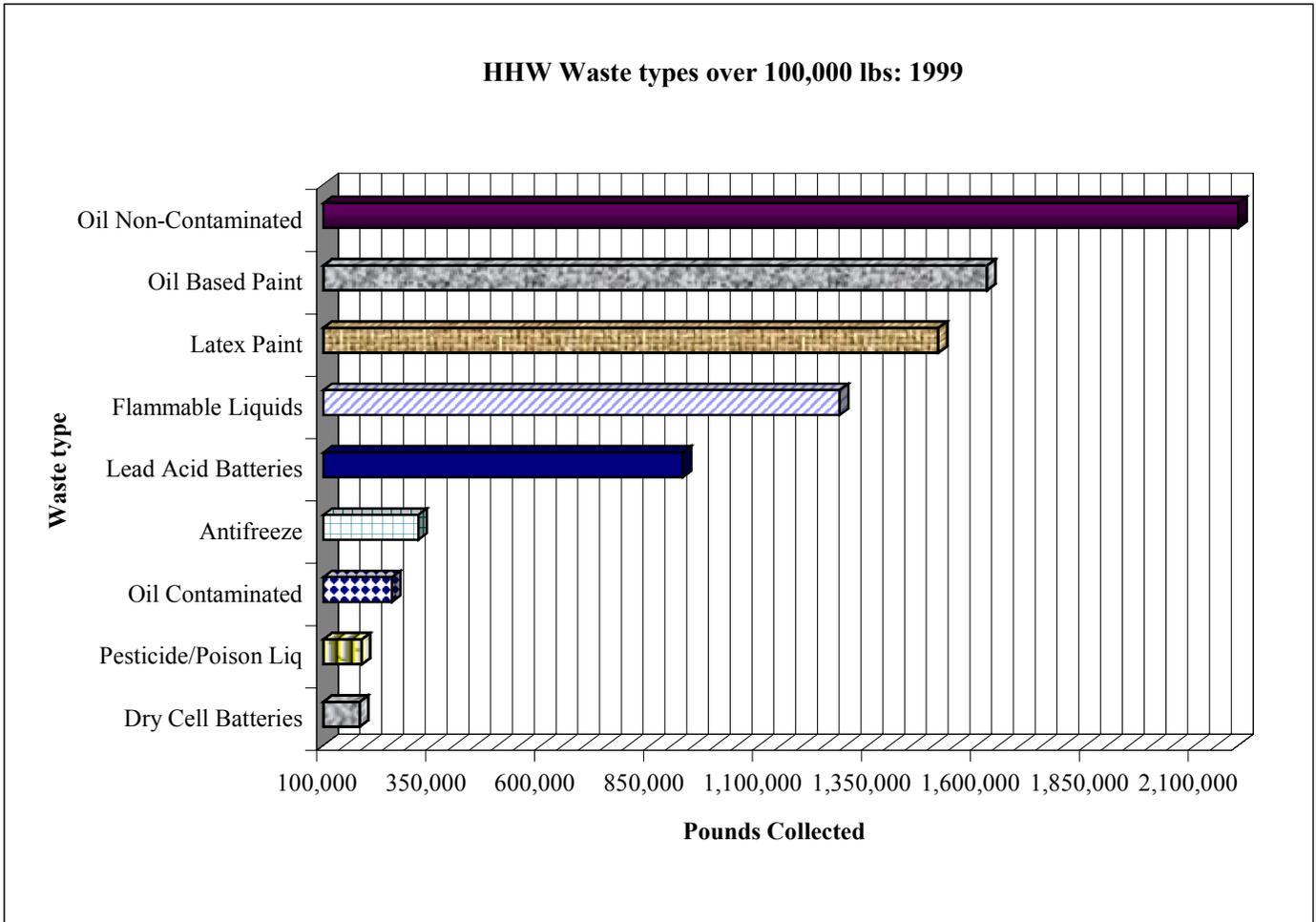
Waste types that dominated household hazardous waste collected during the years 1998 and 1999 ranged from 100,000 to 2.5 million pounds. In 1998 facilities and events collected 8.6 million pounds of these waste types and 9.5 million pounds in 1999. Four categories made up 80% of the entire amount for both years — flammable liquids, latex paint, oil-based paint, and non-contaminated oil (see Figures 15a and 15b). With the exception of latex paint, these are the same waste types collected in high quantities during the 1998 and 1999 CESQG collection efforts.

Figure 15a
1998 HHW types collected in amounts between 100,000 and 2,500,00 pounds⁵



⁵ Excludes used oil collected at used oil collection sites.

Figure 15b.
1999 HHW types collected in amounts between 100,000 and 2,500,00 pounds⁶



During 1999, the waste categories remains the same except for two changes: contaminated oil is added at nearly 350,000 pounds, and dry cell batteries replaces pesticides/poisons (solids) at just over 115,000 pounds. While the amount of non-contaminated oil collected appears similar, other categories have risen considerably during 1999, including collection of oil based and latex paints, and flammable liquids.

⁶ Excludes used oil collected at used oil collection sites.

**USED OIL
FILTERS**

**Used
Antifreeze
Only**

Used Oil Collection Sites

Used oil is a large part of moderate risk waste quantity collected in Washington State, at collection facilities, events, and used oil collection sites. In 1998, do-it-yourself (DIY) used oil collection sites captured 9.1 million pounds of used oil. Also collected were approximately 169,000 pounds of antifreeze and 788,000 pounds of oil filters. A majority of this waste was recycled, re-used, or sent for energy recovery. During 1999, the collection of used oil increased slightly, to 9.3 million pounds. It appears that the amount of oil filters collected dropped dramatically, to below 38,000 pounds.

This drop in the collection of oil filters might not actually reflect a decrease in collection, but reflect a lack of data on private used oil collection sites. There has been an effort to collect more accurate information on private DIY used oil collection sites not currently reporting to the Department. This effort has resulted in some new data on used oil collections for the years 1997-99.

Tables 8a and 8b show how much of each waste type was collected at used oil collection sites, how it was disposed of (if the disposition method was stated), and how many pounds of oil were collected per capita. This does not include used oil collection sites that are operated in concert with facilities unless the site is reported separately from the facility.

Table 8a
1998 DIY collection center information for Washington State

Waste Type & Disposal	Recycled	Energy Recovery	Haz. Disposal	Not stated	Total Pounds
Oil	2,787,141	3,881,881	60,769	2,862,572	9,160,553
Oil Filters	787,809			400	788,209
Antifreeze	163,440	600	304	4,800	169,144
Totals Waste	3,738,390	3,882,481	61,073	2,867,772	10,117,906
	1998 WA State Population:		5,689,263		
	Pounds of collected waste per person:		1.78	Used Oil only per person:	1.61

Table 8b
1999 DIY collection center information for Washington State

Waste Type & Disposal	Recycled	Energy Recovery	Haz. Disposal	OTHER	Total Pounds
Oil	5,365,072	3,808,472	740	83,473	9,257,757
Oil Filters	37,306			54	37,360
Antifreeze	270,744	2,960	440	13,072	287,216
Totals Waste	5,673,122	3,811,432	1,180	96,599	9,582,333
	1999 WA State Population:		5,756,361		
	Pounds of collected waste per person:		1.66	Used Oil only per person:	1.61



Cowlitz County Used Oil Collection Site

Effectiveness of Used Oil Collection

So how effective was our DIY used oil program? The American Petroleum Institute reported that Washington State residents purchased 13.6 million gallons of oil in 1997. Of the purchased oil, those people who change oil themselves (Do-It-Yourselfers) purchased an estimated 7.3 million gallons or 54 million pounds. Of the estimated 54 million pounds, only about 70% of this is recoverable. Oil will be lost through combustion, residual left on engine parts, and inadvertent spillage and leaks. According to these numbers, 70% of the recoverable Do-It-Yourselfers used oil would be 38 million pounds.

The amount of used oil recovered through used oil collections during the 1998-year was 9.2 million pounds, and another 2.5 million pounds was collected through household hazardous waste efforts, for a total of 11.6 million pounds or 1.6 million gallons. If the average DIY customer generated 3 gallon of used oil per year per car and each had 2 cars, the 1.6 million gallons of used oil collected would represent approximately 267,000 DIY households served in 1998 by used oil sites, HHW facilities, and events/mobiles systems. This amounts to recovery rate of about 31% of the estimated total recoverable amount. These numbers did not change significantly for the year 1999. Where did the rest of the oil go in the state of Washington? Should we be concerned?

To answer the questions above, data sources, human behavior changes, and service availability may need to be examined more closely. Some of the answers may include:

- 1) Illegal dumping of oil – one study showed that 20% of DIY households improperly disposes of used oil
- 2) Use of DIY oil for other purposes, such as heat or weed abatement, instead of returning it for collection
- 3) Private companies that pick up or accept used oil, but do not report it as DIY used oil to Ecology
- 4) Incorrectly or mistakenly reporting DIY used oil amounts on the MRW report forms
- 5) Other sources of DIY used oil collection for which Ecology is not aware

Thurston County Environmental Health recently surveyed 400 households. One of the survey questions asked, what was done with the oil from their last oil change. 51.5% of the respondents indicated that the last oil change was performed at a quick oil change business. The responses of the survey are shown in Table 9.

Table 9

What was done with the oil from that last oil change? (Thurston County, 1/2001)		
Responses	Number of Responses	Percent
Take vehicle in for quick oil change	206	51.50
Took auto parts store or gas station oil collection site	88	22.00
Took to oil collection site at the landfill or transfer station	69	17.25
Did not know	14	3.50
Still storing the oil	10	2.50
Put oil in the garbage	5	1.25
Used the oil in some way	4	1.00
Burned the oil	3	0.75
Refused to answer	1	0.25
Totals	400	100.00

About 90% of the 400 Thurston County households responded in the first three categories and are therefore reporting appropriate management of their used oil. It is unclear whether the self-reporting may be introducing bias into these results or perhaps Thurston County has a better than average education and behavior change program for do-it-yourself oil changing households. Each local program should examine their oil collection infrastructure and household management of used oil to assess their needs in this area.



Jeff Scott with the Cowlitz County HHW Mobile Collection Drop Box

Mercury Bearing Waste and Used Electronics Collection

In the 1999 MRW annual report, each local MRW program was asked about collection efforts in two areas: mercury-bearing waste, such as fluorescent lamps, and used electronics. MRW coordinators were asked whether they were currently collecting either type of waste, or investigating the possibility of collecting either waste type. The results of these questions are presented in this section in Table 10.

The need to focus on collection of these waste streams is important. Fluorescent and high intensity lamps contain small amounts of mercury, and are commonly used by Americans. An estimated amount of mercury discharged in the United States, into the atmosphere from the 550 million lamps currently in use amounts to 35 tons (Greskovich 1997).

Used electronics are also of concern to Ecology. Components in a number of electrical and electronic product components are known to contain one or more of the following substances: mercury, lead; cadmium; and embedded batteries.

The European Union estimates that in 1999 electronics, other electrical devices and appliances comprised four percent of their municipal solid waste stream. They anticipate that by the year 2010 this waste substream will double. There is a draft protocol which, if passed, would require all manufacturers to be responsible for their electronic products. In Japan their manufacturers are being required to recycle their appliances. As consumer electronics increases in popularity, appropriate recovery, recycling, and disposal of electronics and their components is a concern for Ecology and local solid waste managers.

Survey Results

Table 10
Status of mercury bearing waste and used electronics acceptance at MRW facilities, 1999

Accepting Mercury Bearing Waste:	6
Not accepting Mercury Bearing Waste	8
Exploring acceptance:	0
Not Exploring	6
Total	20
Accepting Used Electronics:	1
Not Accepting Used Electronics:	23
Exploring Acceptance:	3
Not Exploring	16
Total	43

The majority of counties are currently neither accepting mercury nor used electronics. A low response rate was received for all questions concerning mercury. A higher response rate is seen with used electronics, with the highest response rate being “Not Accepting Used Electronics” (53% of those who answered this question). When combined with “Not Exploring” (used electronics), the highest response rate provides a sense of how Washington State’s moderate risk waste system is currently handling televisions, computers, monitors, and

other electronic devices containing substances of concern. It may be that in some jurisdictions these wastes are being examined for disposal options by non-MRW staff.

Since this 1999 survey was conducted, a subsequent informal survey of local MRW programs indicates that many local MRW collection facilities are currently accepting fluorescent tubes including compact fluorescent lamps, commonly used by households. With the increasing attention on energy conservation, this may be an increasing need for which MRW collection programs will need to be prepared.

Currently, costs of accepting used electronics and mercury are high. The costs associated with recycling these products may reach 80% or more of production, according to one Minnesota based study. Sponsored by the Minnesota Office of Environmental Assistance*, Sony Electronics Inc., Waste Management-Asset Recovery Group, Matsushita Electric Corporation of America, and the American Plastics Council, this collection effort attempted to test a variety of strategies for managing end-of-life electronic products, in order to remove them from the Minnesota municipal waste system.

Although a large amount of used electronics was collected during a three-month collection period (events, drop-off sites, and curbside collections), many of the electronics came from households – not businesses. This led to a large number of televisions and personal computers. Although there were markets for these products, the costs of transporting the product parts were somewhat high. In contrast, business electronics are generally worth more, and more than pay for themselves when recycled. The study pointed out there was a need to encourage more businesses to recycle used electronics in order to obtain these valuable products. This would reduce the overall cost burden.

There is also a need for clear and consistent commodity specifications, such as with CRT glass and thermoplastics from television sets. Without these specifications for recycling, there is a lack of communication between the recyclers and the waste managers concerning quality of products.

The issue of electronics and other problematic solid waste streams is being addressed in the State Solid Waste Planning process as well as by the Northwest Product Stewardship Council. Ecology and some Washington State local governments are represented on this regional council. The National Product Stewardship Institute is working with state, local, and regional governments and industry to better meet the needs of solid waste managers' and manufacturers' needs.

For a copy of the Minnesota study, *Minnesota's Multi-Stakeholder Approach To Managing Electronic Products At End-Of-life*, please visit: <http://www.sel.sony.com/SEL/esh/mnproj/wpaper.html>

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APPENDICES

APPENDIX A: CESQG AND HHW WASTE TYPES COLLECTED

1998 CESQG AND HHW WASTE TYPES COLLECTED

Table A-1. CESQG

WASTE TYPE	LBS COLLECTED
Aerosols	0
CFC/ Freon filters	0
Pentachlorophenol	0
Personal Protect. Equip.	0
Oil with PCBs	6
Flammable Gas (Poison)	24
Flammable Solids	52
Reactives	58
Mercury	106
Lead	162
Chlorinated Solvents	310
Oil (Contaminated)	511
Oxidizers	551
Oil with Chlorides	680
Dry Cell Batteries	1,513
Oil Filters	2,569
CFC/ Freon	2,576
Flammable Liquids (Poison)	2,703
Flammable Gas	2,754
Pesticide Poison (Liquid)	3,215
Pesticide Poison (Solid)	3,417
Crushed Cans	6,000
Bases	6,492
Oil Filters (Crushed)	9,957
Acids	11,355
Other Dangerous Waste	14,040
Lead Acid Batteries	14,241
Latex Paint	17,476
Flammable Liquids	55,880
Antifreeze	69,078
Oil Based Paint	97,100
Oil (Non-Contaminated)	174,035
Total	496,861

Table A-2. Household Hazardous Waste

WASTE TYPE	LBS COLLECTED
Lead	0
Mercury	0
Pentachlorophenol	0
Personal Protect. Equip.	806
Oil with PCBs	980
CFC/ Freon filters	1,652
Chlorinated Solvents	1,795
CFC/ Freon	1,930
Aerosols	3,127
Flammable Gas (Poison)	7,074
Reactives	9,247
Oil (Contaminated)	10,383
Oil with Chlorides	14,430
Oxidizers	15,153
Oil Filters (Crushed)	16,177
Other Dangerous Waste	20,484
Oil Filters	29,897
Flammable Solids	31,055
Flammable Gas	37,914
Flammable Liquids (Poison)	44,771
Bases	55,192
Dry Cell Batteries	62,036
Crushed Cans	75,125
Acids	75,652
Pesticide Poison (Solid)	118,458
Pesticide Poison (Liquid)	231,429
Antifreeze	326,323
Lead Acid Batteries	858,001
Flammable Liquids	1,224,104
Latex Paint	1,248,729
Oil Based Paint	1,343,045
Oil (Non-Contaminated)	2,747,577
Total	8,612,545

1999 CESQG AND HHW WASTE TYPES COLLECTED

Table A-3. CESQG

WASTE TYPE	LBS COLLECTED
Acids, aerosols	0
Bases, aerosols	0
CFC/ Freon	0
CFC/ Freon filters	0
Crushed Cans	0
Flammable Liquid Poison, aerosols	0
Oil with Chlorides	0
Oil with PCBs	0
Personal Protect. Equip.	0
Wood Preservatives	0
Flammable Gas (Poison)	4
Organic Peroxides	31
Flammable Gas (Poison), aerosols	84
Oil (Contaminated)	111
Oil Filters	1,497
Pesticide/Poison (Solid)	2,248
Oxidizers	2,320
Flammable Liquids (Poison)	2,818
Dry Cell Batteries	3,103
Flammable Gas	3,367
Flammable Solids	3,555
Chlorinated Solvents	3,634
Other Non Hazardous	5,250
Acids	5,635
Reactives	7,160
Bases	10,592
Lead Acid Batteries	14,184
Other Dangerous Waste	14,697
Flammable Liquids, aerosols	27,592
Latex Paint	28,226
Oil Filters (Crushed)	28,770
Flammable Liquids	33,684
Pesticide/Poison (Liquid)	36,868
Antifreeze	68,277
Oil Based Paint	126,828
Oil (Non-Contaminated)	206,868
Total	637,403

Table A-4. Household Hazardous Waste

WASTE TYPE	LBS. COLLECTED
Acids, aerosols	0
CFC/ Freon filters	0
Oil with Chlorides	0
Personal Protect. Equip.	0
Wood Preservatives	0
Bases, aerosols	10
Flammable Liquid (Poison), aerosols	85
Organic Peroxides	223
Flammable Gas (Poison)	496
Reactives	1,219
Oil with PCBs	1,935
CFC/ Freon	2,094
Flammable Liquids Poison	2,325
Chlorinated Solvents	7,532
Oil Filters (Crushed)	9,538
Other Dangerous Waste	13,040
Flammable Gas (Poison), aerosols	13,298
Flammable Gas	23,651
Flammable Solids	24,526
Oxidizers	24,694
Flammable Liquids, aerosols	29,706
Oil Filters	30,171
Crushed Cans	55,160
Other Non Hazardous	60,766
Acids	62,980
Bases	66,134
Pesticide/Poison Solids	97,799
Pesticide/Poison Liquids	189,693
Dry Cell Batteries	196,088
Oil (Contaminated)	257,629
Antifreeze	333,884
Lead Acid Batteries	993,855
Flammable Liquids	1,349,080
Latex Paint	1,587,913
Oil Based Paint	1,694,536
Oil (Non-Contaminated)	2,400,658
Total	9,530,718

APPENDIX B: METROPOLITAN STATISTICAL AREAS

Part III. Official Standards for Metropolitan Areas.

Basic Standards. Sections 1 through 7 apply to all States except the six New England States, that is, Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. They also apply to Puerto Rico.¹

Section 1. Population Size Requirements for Qualification

Each metropolitan statistical area must include:

- A. A city of 50,000 or more population, or²
- B. A Census Bureau defined urbanized area of at least 50,000 population, provided that the component county/counties of the metropolitan statistical area have a total population of at least 100,000.³

Section 2. Central Counties

The central county/counties of the MSA are:

- A. Those counties that include a central city (see section 4) of the MSA, or at least 50 percent of the population of such a city, provided the city is located in a qualifier urbanized area; and
- B. Those counties in which at least 50 percent of the population lives in the qualifier urbanized area(s).

Section 3. Outlying Counties

- A. An outlying county is included in an MSA if any one of the six following conditions is met:
 1. At least 50 percent of the employed workers residing in the county commute to the central county/counties, and either
 - a. The population density of the county is at least 25 persons per square mile, or
 - b. At least 10 percent, or at least 5,000, of the population lives in the qualifier urbanized area(s);
 2. From 40 to 50 percent of the employed workers commute to the central county/counties, and either
 - a. The population density is at least 35 persons per square mile, or
 - b. At least 10 percent, or at least 5,000, of the population lives in the qualifier urbanized area(s);
 3. From 25 to 40 percent of the employed workers commute to the central county/counties and either the population density of the county is at least 50 persons per square mile, or any two of the following conditions exist:

- a. Population density is at least 35 persons per square mile,
 - b. At least 35 percent of the population is urban,
 - c. At least 10 percent, or at least 5,000, of the population lives in the qualifier urbanized area(s);
4. From 15 to 25 percent of the employed workers commute to the central county/counties,⁴ the population density of the county is at least 50 persons per square mile, and any two of the following conditions also exist:
- a. Population density is at least 60 persons per square mile,
 - b. At least 35 percent of the population is urban,
 - c. Population growth between the last two decennial censuses is at least 20 percent,
 - d. At least 10 percent, or at least 5,000, of the population lives in the qualifier urbanized area(s);
5. From 15 to 25 percent of the employed workers commute to the central county/counties,⁴ the population density of the county is less than 50 persons per square mile, and any two of the following conditions also exist:
- a. At least 35 percent of the population is urban,
 - b. Population growth between the last two decennial censuses is at least 20 percent,
 - c. At least 10 percent, or at least 5,000, of the population lives in the qualifier urbanized area(s);
6. At least 2,500 of the population lives in a central city of the MSA located in the qualifier urbanized area(s).⁵
- B. If a county qualifies on the basis of commuting to the central county/counties of two different MSAs, it is assigned to the area to which commuting is greatest, unless the relevant commuting percentages are within 5 points of each other, in which case local opinion about the most appropriate assignment will be considered.
- C. If a county qualifies as a central county under section 2 and also qualifies as an outlying county of another metropolitan area under section 3A on the basis of commuting to (or from) another central county, both counties become central counties of a single merged MSA.

Section 5. Combining Adjacent Metropolitan Statistical Areas

Two adjacent MSAs defined by sections 1 through 4 are combined as a single MSA provided:

- A. The total population of the combination is at least one million, and:
 - 1. The commuting interchange between the two MSAs is equal to:
 - a. At least 15 percent of the employed workers residing in the smaller MSA, or

- b. At least 10 percent of the employed workers residing in the smaller MSA, and
 - i. The urbanized area of a central city of one MSA is contiguous with the urbanized area of a central city of the other MSA, or
 - ii. A central city in one MSA is included in the same urbanized area as a central city in the other MSA; and
 - 2. At least 60 percent of the population of each MSA is urban.
- B. The total population of the combination is less than one million and:
- 1. Their largest central cities are within 25 miles of one another, or their urbanized areas are contiguous; and
 - 2. There is definite evidence that the two areas are closely integrated with each other economically and socially; and
 - 3. Local opinion in both areas supports the combination.

Source: US Census Bureau
www.census.gov

APPENDIX C: COUNTY POPULATION, 1998 AND 1999 ⁷

County	1998 Population
<i>Nonmetropolitan</i>	
Ferry	7,170
Lincoln	9,734
Skamania	9,805
Pend Oreille	11,526
San Juan	12,493
Adams	15,324
Klickitat	19,295
Pacific	20,802
Asotin/Garfield	23,594
Jefferson	26,232
Kittitas	31,714
Douglas	33,631
Okanogan	38,237
Stevens	39,464
Whitman	39,487
Franklin	46,459
Mason	49,867
WallaWalla/ Columbia	57,858
Chelan	60,052
Clallam	64,169
Grays Harbor	67,739
Lewis	68,163
Island	70,319
Grant	70,545
Cowlitz/Whakiakum	95,431
Skagit	99,357
<i>Metropolitan</i>	
Benton	136,250
Whatcom	156,830
Thurston	202,255
Yakima	218,062
Kitsap	232,623
Clark	326,943
Spokane	408,669
Snohomish	587,783
Pierce	676,505
King	1,654,876

County	1999 Population
<i>Nonmetropolitan</i>	
Ferry	7,188
Lincoln	9,759
Skamania	9,831
Pend Oreille	11,604
San Juan	12,898
Adams	15,235
Klickitat	19,530
Pacific	20,768
Asotin/Garfield	23,545
Jefferson	26,748
Kittitas	32,021
Douglas	34,191
Whitman	38,386
Okanogan	38,432
Stevens	40,137
Franklin	46,782
Mason	50,357
Walla Walla/Columbia	58,009
Chelan	60,835
Clallam	64,690
Grays Harbor	67,102
Lewis	68,621
Grant	72,019
Island	73,490
Cowlitz/Whakiakum	95,790
Skagit	101,180
<i>Metropolitan</i>	
Benton	137,844
Whatcom	160,310
Thurston	205,459
Yakima	220,785
Kitsap	236,560
Clark	336,268
Spokane	409,736
Snohomish	596,598
Pierce	688,807
King	1,664,846

⁷ Source: Table (CO-98-2) County Population Estimates for 01-Jul-98 and Population Change for April 1, 1990 (includes revised April 11 1990 Census Population counts) Internet Release Date: March 12, 1999 Population Estimates Program, Population Division, US Bureau of the Census, Washington DC 20233 Contact: Statistical Information Staff, US Bureau of the Census, (301) 457 2422

APPENDIX D: MRW DISPOSITION

Table D-1. 1998 Household Hazardous Waste disposition, waste types in pounds

HHW Waste type	Haz. Waste Disposal	Recycled/ Reused	Energy Recovery	Treated/ Landfilled	Treated/ Wastewater	Other	Totals	Not Stated
Acids	32,312	166		3,815	15,474	42	75,652	23,844
Aerosols	0						3,127	3,127
Antifreeze	11,124	291,784	15,200	15			326,323	8,200
Bases	12,499	225		6,443	19,882		55,192	16,143
CFC/ Freon	177	1,753					1,930	
CFC/ Freon filters	0	1,652					1,652	
Chlorinated Solvents	885					910	1,795	
Crushed Cans	0	75,125					75,125	
Dry Cell Batteries	54,476		1,600	3,893			62,036	2,067
Flammable Solids	1,824	1,664	300	261		406	31,055	26,600
Flammable Liquids	495,143	1,192	709,406			3,774	1,224,104	14,590
Flammable Gas	3,471		30,990	240		1,803	37,914	1,410
Flammable Liquids (Poison)	27,438			1,753		9,242	44,771	6,338
Flammable Gas (Poison)	3,635			500		1,379	7,074	1,560
Latex Paint	155,594	768,778		231,688		24,000	1,248,729	68,670
Lead	0						0	
Lead Acid Batteries	0	853,981		420			858,001	3,600
Mercury	0						0	
Oil Based Paint	357,523	78,573	840,137				1,343,045	66,812
Oil (Contaminated)	0	4,079	2,520				10,383	3,784
Oil Filters	0	21,057	8,800				29,897	40
Oil Filters (Crushed)	15,400	777					16,177	
Oil (Non-Contaminated)	1,316	860,342	1,676,950				2,747,577	208,970
Oil with Chlorides	14,400					30	14,430	
Oil with PCBs	880					100	980	
Other Dangerous Waste	7,346	3,684		70			20,484	9,384
Oxidizers	4,314			802		2,708	15,153	7,329
Pentachlorophenol	0						0	
Personal Protect. Equip.	806						806	
Pesticide Poison Liquid	131,386					24,898	231,429	75,145
Pesticide Poison Solid	40,522	576				3,498	118,458	73,862
Reactives	204		900	95		342	9,247	7,706
TOTALS	1,372,674	2,965,406	3,286,803	249,995	35,356	73,131	8,612,545	629,181

Table. D-2. 1999 Household Hazardous Waste disposition, waste types in pounds

HHW Waste Type	Haz. Waste Disposal	Recycled/ Re-used	Energy Recovery	Treated/ Landfilled	Treated/ Wastewater	Other	Totals	Not Stated
Acids	20,946	866		8,439	26,874	1,579	62,980	4,277
Acids, aerosols	0						0	
Antifreeze	307	312,752	18,000	2,825			333,884	
Bases	23,236	1,441		6,718	22,481	2,211	66,134	10,047
Bases, aerosols	5			5			10	
CFC/ Freon	590	1,464					2,094	40
CFC/ Freon filters	0						0	
Chlorinated Solvents	5,871		900			761	7,532	
Crushed Cans	0	55,160					55,160	
Dry Cell Batteries	187,059	1,844		6,985			196,088	200
Flammable Solids	14,324	3,920	1,480	3,111		731	24,526	960
Flammable Liquids	305,697	6,420	1,032,113	4,100			1,349,080	750
Flammable Liquids, aerosols	1,570		27,936	200			29,706	
Flammable Liquids (Poison)	680			745		500	2,325	400
Flammable Liq. (Poison}, aerosols	0					85	85	
Flammable Gas	3,751	429	14,950	330			23,651	4,191
Flammable Gas (Poison)	0			436		60	496	
Flammable Gas (Poison), aerosols	5,849		294	945		6,210	13,298	
Latex Paint	299,128	1,077,988		203,487		3,640	1,587,913	3,670
Lead Acid Batteries	735	903,085					993,855	90,035
Oil Based Paint	498,625	158,169	1,034,392				1,694,536	3,350
Oil (Contaminated)	2,350	110,229	143,893				257,629	1,157
Oil Filters	30	16,790	11,751				30,171	1,600
Oil Filters (Crushed)	0	9,538					9,538	
Oil Non-Contaminated	2,548	1,032,983	1,187,768				2,400,658	177,360
Oil with Chlorides	0						0	
Oil with PCBs	15					1,920	1,935	
Other Dangerous Waste	2,152	278		20		929	13,040	9,661
Organic Peroxides	51			161		12	223	
Oxidizers	7,067	4,120		12,266		1,222	24,694	20
Personal Protect. Equip.	0						0	
Pesticide/Poison Liquid	118,587	786	22,842	23,400		7,555	189,693	16,523
Pesticide/Poison Solids	54,902			3,866		38,512	97,799	519
Reactives	334			760		125	1,219	
Wood Preservatives	0						0	
Other Non Hazardous	26,310	22,301		410		8,955	60,766	2,790
TOTALS	1,582,717	3,720,563	3,496,320	279,207	49,355	75,007	9,530,718	327,549

Table D-3. 1998 CESQG Disposition methods, waste types in pounds

CESQG Waste Type	Haz. Waste Disposal	Recycled/ Reused	Energy Recovery	Treated/ Landfilled	Treated/ Wastewater	Other	Totals	Not Stated
Acids	3,384			2,115		8	11,355	5,848
Aerosols	0						0	
Antifreeze	330	68,584					69,078	164
Bases	3,286			2,512			6,492	695
CFC/ Freon	1,680	891				5	2,576	
CFC/ Freon filters	0						0	
Chlorinated Solvents	169						310	141
Crushed Cans	0	6,000					6,000	
Dry Cell Batteries	1,183						1,513	330
Flammable Solids	20			1			52	31
Flammable Liquids	19,084	25,846	8,271			15	55,880	2,665
Flammable Gas	249			2,493			2,754	12
Flammable Liquids (Poison)	1,413					260	2,703	1,030
Flammable Gas (Poison)	4					20	24	
Latex Paint	1,566	9,238		3,769			17,476	2,903
Lead	162						162	
Lead Acid Batteries	0	13,296		945			14,241	
Mercury	106						106	
Oil Based Paint	25,482	52,277	13,413				97,100	5,928
Oil (Contaminated)	0						511	511
Oil Filters	0	2,449					2,569	120
Oil Filters (Crushed)	0	9,182		775			9,957	
Oil (Non-Contaminated)	888	159,957	10,767				174,035	2,423
Oil with Chlorides	680						680	
Oil with PCBs	6						6	
Other Dangerous Waste	3,760	65				17	14,040	10,198
Oxidizers	385	15				3	551	148
Pentachlorophenol	0						0	
Personal Protect. Equip.	0						0	
Pesticide Poison Liquid	1,266					1,202	3,215	748
Pesticide Poison Solid	1,100					711	3,417	1,606
Reactives	25						58	33
TOTALS	66,229	347,799	32,451	12,610	0	2,240	496,861	35,532

Table D-4. 1999 CESQG Disposition methods, waste types in pounds

CESQG Waste Type	Haz. Waste Disposal	Recycled/ Reused	Energy Recovery	Treated/ Landfilled	Treated/ Wastewater	Other	Totals	Not Stated
Acids	3,235	253		83		1,564	5,635	500
Acids, aerosols	0						0	
Antifreeze	0	68,277					68,277	
Bases	6,724	165		889		2,748	10,592	66
Bases, aerosols	0						0	
CFC/ Freon	0						0	
CFC/ Freon filters	0						0	
Chlorinated Solvents	679		2,279				3,634	676
Crushed Cans	0						0	
Dry Cell Batteries	2,444	659					3,103	
Flammable Solids	3,383		93	37		42	3,555	
Flammable Liquids	14,826		14,100	70			33,684	4,687
Flammable Liquids, aerosols	26,680		875			37	27,592	
Flammable Liquids Poison	2,767			18			2,818	33
Flammable Liq. (Poison), aerosols	0			0			0	
Flammable Gas	2			3,365			3,367	
Flammable Gas (Poison)	0	0		4			4	
Flammable Gas (Poison), aerosols	71					14	84	
Latex Paint	10,928	11,320		5,978			28,226	
Lead Acid Batteries	282	13,902					14,184	
Oil Based Paint	47,870	70,965	7,994				126,828	
Oil (Contaminated)	30		81	0			111	
Oil Filters	0	1,497					1,497	
Oil Filters (Crushed)	0	28,770					28,770	
Oil (Non-Contaminated)	0	197,824	8,804				206,868	240
Oil with Chlorides	0						0	
Oil with PCBs	0						0	
Other Dangerous Waste	11,006	3,348				7	14,697	335
Organic Peroxides	1					29	30	
Oxidizers	267			2,030		13	2,320	10
Personal Protect. Equip.	0						0	
Pesticide/ Poison Liquid	36,605					253	36,868	10
Pesticide/ Poison Solid	905			20		1,123	2,248	200
Reactives	20		7,140				7,160	
Wood Preservatives	0						0	
Other Non Hazardous	3,827	273		1,150			5,250	
TOTALS	172,551	397,253	41,366	13,644	0	5,830	637,402	6,757

Table D-5. 1998 Used Oil Collection Site Disposition methods, waste types in pounds

Waste types	Recycled/ Re-used	Energy Recovery	Haz. Waste Disposal	Not Stated	Total Pounds
Used Oil	2,253,729	3,983,483	60,769	2,862,572	9,160,553
Oil Filters	787,809	0	0	400	788,209
Antifreeze	163,440	600	304	4,800	169,144
Total Pounds	3,204,978	3,984,083	61,073	2,867,772	10,117,906

Table D-6. 1999 Used Oil Collection Site Disposition methods, waste types in pounds

Waste types	Recycled/ Re-used	Energy Recovery	Haz. Waste Disposal	Not Stated	Total Pounds
Used Oil	5,365,072	3,808,472	740	83,473	9,257,757
Oil Filters	37,306	0	0	54	37,360
Antifreeze	270,744	2,960	440	13,072	287,216
Total Pounds	5,673,122	3,811,432	1,180	96,599	9,582,333

APPENDIX E: County Per Capita Collection

Table E.1a
Per capita used oil and HHW collection by county: 1997 and 1998⁸

County	HHW lbs. Per capita			Used Oil lbs. Per capita			1998 Population
	1997	1998	Percent Change	1997	1998	Percent Change	
Adams	2.22	0.31	-86.0%	1.99	0.14	-92.7%	15,324
Asotin	1.82	2.00	10.0%	9.25	3.50	-62.2%	23,594
Benton	3.06	1.79	-41.5%	0.94	2.54	169.6%	136,250
Chelan	0.65	3.43	423.4%	0.73	5.11	597.5%	60,052
Clallam	0.40	0.56	38.1%	2.12	2.47	16.5%	64,169
Clark	1.49	2.77	85.9%	2.03	1.99	-2.0%	326,943
Cowlitz	5.13	1.37	-73.3%	3.24	2.57	-20.7%	95,431
Douglas	1.02	0.80	-21.1%	0.75	1.70	127.9%	33,631
Ferry	1.16	0.75	-35.0%	1.54	1.51	-1.8%	7,170
Franklin	0.13	0.16	26.5%	1.73	2.23	29.4%	46,459
Grant	0.40	0.43	7.3%	0.15	0.06	-57.5%	70,545
Grays Harbor	0.90	0.89	-1.6%	1.86	0.00	-100.0%	67,739
Island	1.55	1.64	6.0%	2.17	0.00	-100.0%	70,319
Jefferson	4.66	3.61	-22.5%	3.72	3.51	-5.6%	26,232
King	1.57	1.52	-2.8%	1.73	1.83	5.6%	1,654,876
Kitsap	1.07	1.01	-5.3%	1.58	1.42	-10.1%	232,623
Kittitas	2.63	3.26	23.9%	1.19	2.26	90.7%	31,714
Klickitat	1.34	4.95	268.1%	2.47	3.82	55.1%	19,295
Lewis	0.06	3.23	5293.7%	2.08	2.22	6.7%	68,163
Lincoln	0.00	1.03	N/A	0.00	0.00	0.0%	9,734
Mason	2.44	0.82	-66.3%	1.46	1.02	-29.9%	49,867
Okanogan	0.00	0.00	0.0%	0.67	1.00	48.5%	38,237
Pacific	0.71	0.36	-48.9%	1.76	1.61	-8.8%	20,802
Pend Oreille	0.95	1.72	82.0%	0.38	2.12	457.5%	11,526
Pierce	0.67	1.35	101.7%	0.57	0.91	58.4%	676,505
San Juan	0.28	1.99	619.7%	4.71	3.67	-22.0%	12,493
Skagit	3.58	0.67	-81.3%	0.86	0.96	11.7%	99,357
Skamania	0.18	0.00	-100.0%	3.17	0.00	-100.0%	9,805
Snohomish	2.29	0.02	-99.0%	0.79	1.34	70.6%	587,783
Spokane	2.29	2.46	7.3%	1.04	1.53	46.8%	408,669
Stevens	1.18	5.07	328.2%	1.25	3.88	210.6%	39,464
Thurston	1.86	0.87	-53.3%	1.32	1.64	23.5%	202,255
Walla Walla	2.11	2.11	-0.1%	0.88	1.10	24.3%	57,858
Whatcom	0.99	1.04	4.6%	2.44	2.56	4.8%	156,830
Whitman	1.22	0.84	-31.3%	0.80	0.00	-100.0%	39,487
Yakima	0.98	3.34	241.9%	1.76	3.02	71.6%	218,062
Statewide	1.40	1.40	8.1%	1.40	1.69	20.7%	5,689,263

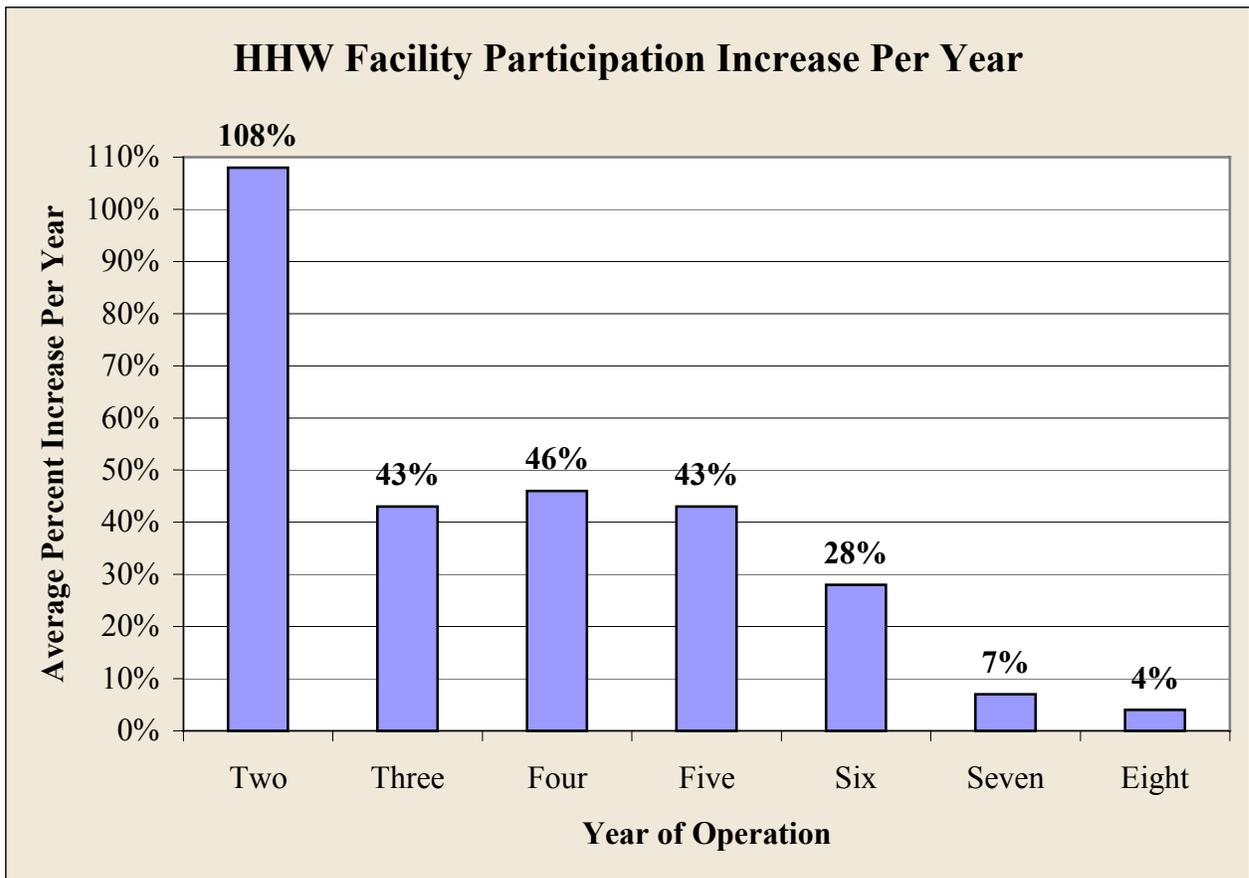
⁸ HHW includes oil filters or antifreeze collected from used oil collection sites for 1998 and 1999. Used oil reflects oil collected from used oil sites only.

Table E.1b
Per capita used oil and HHW collection by county: 1998 and 1999

County	HHW lbs. Per capita			Used oil lbs. Per capita			1999 Population
	1998	1999	Percent Change	1998	1999	Percent Change	
Adams	0.31	0.00	-100.0%	0.14	0.00	-100.0%	15,235
Asotin	2.00	1.01	-49.5%	3.50	4.15	18.8%	23,545
Benton	1.79	2.06	15.1%	2.54	1.32	-48.0%	137,844
Chelan	3.43	0.97	-71.8%	5.11	0.34	-93.3%	60,835
Clallam	0.56	1.03	84.1%	2.47	2.90	17.4%	64,690
Clark	2.77	2.62	-5.5%	1.99	2.46	23.6%	336,268
Cowlitz	1.37	1.33	-3.2%	2.57	3.06	18.7%	95,790
Douglas	0.80	0.67	-16.7%	1.70	1.60	1.4%	34,191
Ferry	0.75	1.73	128.8%	1.51	1.85	22.8%	7,188
Franklin	0.16	0.50	203.4%	2.23	2.47	10.7%	46,782
Grant	0.43	0.56	30.6%	0.06	0.06	0.0%	72,019
Grays Harbor	0.89	1.06	19.1%	0.00	0.00	0.0%	67,102
Island	1.64	2.47	50.3%	0.00	2.26	N/A	73,490
Jefferson	3.61	2.78	-23.0%	3.51	3.00	-14.6%	26,748
King	1.52	1.77	15.9%	1.83	1.78	-2.5%	1,664,846
Kitsap	1.01	1.17	16.3%	1.42	1.35	-5.1%	236,560
Kittitas	3.26	3.97	21.7%	2.26	1.64	-27.4%	32,021
Klickitat	4.95	3.02	-38.9%	3.82	3.70	-2.7%	19,530
Lewis	3.23	3.62	12.0%	2.22	2.56	15.2%	68,621
Lincoln	1.03	0.27	-73.4%	0.00	0.66	N/A	9,759
Mason	0.82	0.68	-16.9%	1.02	0.97	-5.5%	50,357
Okanogan	0.00	0.00	0.0%	1.00	0.79	-20.6%	38,432
Pacific	0.36	0.00	-100.0%	1.61	2.23	38.5%	20,768
Pend Oreille	1.72	0.16	-90.8%	2.12	1.32	-37.5%	11,604
Pierce	1.35	0.38	-71.7%	0.91	0.94	4.2%	688,807
San Juan	1.99	2.28	14.5%	3.67	6.05	64.8%	12,898
Skagit	0.67	1.80	168.3%	0.96	0.17	-81.9%	101,180
Skamania	0.00	4.14	N/A	0.00	4.25	N/A	9,831
Snohomish	0.02	1.18	5240.9%	1.34	1.51	12.3%	596,598
Spokane	2.46	2.79	13.5%	1.53	1.44	-5.5%	409,736
Stevens	5.07	1.25	-75.4%	3.88	4.03	3.9%	40,137
Thurston	0.87	1.40	60.3%	1.64	2.62	60.3%	205,459
Walla Walla	2.11	2.33	10.6%	1.10	0.00	-100.0%	58,009
Whatcom	1.04	1.39	34.2%	2.56	0.00	-100.0%	160,310
Whitman	0.84	0.92	9.5%	0.00	0.00	0.0%	38,386
Yakima	3.34	4.00	19.7%	3.02	2.26	-25.0%	220,785
Statewide	1.40	1.66	9.4%	1.69	1.61	-4.8%	5,756,361

APPENDIX F: HHW COLLECTION FACILITY PARTICIPATION INCREASES OVER TIME
Based on a national survey of facilities that had been operating at least six years

Figure. F-1. HHW Participation over time⁹



⁹ Adapted from Nightingale and McLain, 1997.

WARNING

USED OIL ONLY IN OUR RECYCLING TANK



DO NOT MIX with solvents, gasoline, engine degreasers, brake fluid, or antifreeze.

