Analysis of Disposal Methods for Do-It-Yourselfer Used Oil Filters

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This report fulfills the requirement of 1999 Minnesota Session Laws, Ch 231, section 201, *Analysis of Used Oil Filter Disposal Methods.*

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EXECUTIVE SUMMARY

Background

The Minnesota Pollution Control Agency (MPCA) and the Minnesota Office of Environmental Assistance (MOEA), in cooperation with many industry stakeholders, have analyzed the technical feasibility of various methods of disposing of and recycling do-it-yourselfer (DIY) used motor oil filters, as required in Laws of 1999, Ch. 231, Sec. 201.

Approximately 4 to 7.5 million passenger vehicle oil filters are used each year in Minnesota. The MOEA estimates that 840,000 to 1,400,000 of these are disposed of in the trash each year. This represents 280 to 467 tons of used oil filters (approximately 3,000 passenger car oil filters weigh one ton). Used oil filters can contain two to eight ounces of oil after they are removed. This amounts to an additional 13,000 to 88,000 gallons of used motor oil being disposed of in MSW in the state.

I. Environmental Impacts of Oil Filters

A. Impacts to water and soil

One of the more difficult issues affecting water and soil contamination from used oil filters is that the residual oil from the filter is not spilled in large quantities in one location. Microbial action and time help to break down the oil in contaminated soils so that certain contaminants do not have a detrimental impact. The impact of used oil can vary depending upon soil type, level of soil moisture/saturation, oil concentration, frequency between "dumpings," compaction and slope (run-off potential), and the type and concentration of heavy metals in the oil.

Soil contamination from mismanaged used oil found in filters may occur throughout Minnesota in small, localized doses. The degree of contamination depends upon (among other things) where and how much of the used oil is dumped. Due to the differing amounts and the distribution methods of improperly managed used oil, identification and cleanup of DIY used oil-contaminated soils becomes extremely difficult.

II. Disposal in Landfills

The addition of DIY used oil filters to the solid waste stream would not significantly increase the amount of solid waste going to the MSW landfills. Given that the proposed additional disposal associated with filters is as a percentage very small, leachate quality would not be affected in any significant way. As a result, there would be little increase in costs associated with leachate disposal.

III. Incineration

DIY oil filters in the MSW stream at municipal waste combustors (MWCs) represent an insignificant impact on the waste stream itself, the environment, or as a loss of resources (that is, the loss of steel as ash rather than being recycled). Used oil filters are noncombustible (but have some small heat value from the oil and paper filters in them). Because they are steel, they can be recovered from a waste or ash processing stream by magnetic separation. Therefore, putting used oil filters in MSW at MWCs means that the oil filters may be recycled.

IV. Collection Methods

There are basically three collection methods that can be used to collect DIY used oil filters: (1) curbside collection, (2) retail site drop-off and (3) drop-off at public collection sites. While curbside collection of DIY used oil filters may offer the greatest convenience to the consumer, it adds special handling requirements for trash collectors. It may be inconvenient, messy and ineffective from the collectors' point of view if proper materials, training and consumer education do not accompany the implementation of the curbside service.

The central element of a drop-off collection site is a container placed in a publicly accessible location, such as a solid waste transfer station, retail auto parts store, service station, quick lube facility or recycling center for used oil and used oil filters. One disadvantage of drop-off locations is the continual problem of abandoned solid and hazardous wastes. Solutions to this problem range from posting information that it is against the law to leave these wastes at the site to putting up fencing or installing surveillance cameras to monitor the activity of the site when no one is present.

Annual Recycling Impacts

Recycling one ton of oil filters annually:

- saves 10 cubic yards of landfill space;
- produces approximately 1,700 pounds of high-quality steel;
- produces approximately 300 pounds of paper filter media that, when burned as a fuel source, produce approximately 16,000 British thermal units (BTUs) per pound.

Using these figures, recycling all of the DIY used oil and oil filters would save 2,800 to 4,670 cubic yards of landfill space, provide 238 to 397 tons of high-carbon steel and reduce the depletion of natural resources.

Conclusions

A decisive consideration relative to the feasibility of disposal alternatives is: What overall level of effort is appropriate for DIY used oil filter disposal? This is a question of where to direct state resources, or more specifically, a question of how to prioritize resource use when faced with much competition for resources.

The MPCA's established major programs — along with many significant smaller programs — have achieved widespread and recognized successes in protecting and improving the quality of Minnesota's environment. As it supports these ongoing programs, the agency faces new, emerging and unanticipated demands on its resources. Moreover, in addition to environmental quality, the citizens of Minnesota are strongly committed to a broad range of other quality-of-life issues that require and compete for resources.

Recognizing these resource constraints and considering the environmental impact, the MPCA concludes:

- Resource recovery and saving landfill space are important factors in the entire waste-management system.
- Due to the Waste Management Act "hierarchy of disposal," the reuse of steel and the energy recovery from the oil in used oil filters are important.
- Adequate recycling is available once filters are collected.
- Resources are not currently available to household hazardous waste collection sites to collect more DIY used oil filters.
- The environmental risk for landfill or incineration disposal of DIY used oil filters is not substantial.

Recommendations

Minnesota Statutes 325E.112, subdivision 1, states:

> (a) "Motor oil and motor oil filter manufacturers and retailers shall seek to provide by May 31, 2001:
>
> (1) access to at least one non-governmental site for collection of used motor oil and filters from the public within a five-mile radius of any resident in the seven-county metropolitan area; and
>
> (2) access to at least one non-governmental site for collection of used motor oil and used motor oil filters from the public within a city or town with a population of greater than 1,500 outside the seven-county metropolitan area. The commissioner of the pollution control agency shall determine by June 30, 2001, whether these goals have been met."

- The MPCA will evaluate the work of the retailers and manufacturers in identifying DIY collection sites and determine if they have reached compliance with state law as soon as such information is made available. At this time, the preliminary data looks favorable and staff is hopeful that industry will meet their obligations;
- Retailers/Manufacturers will update the collection site list annually to MPCA/OEA;
- Keep the DIY used oil filter ban from landfilling;
- Continue MPCA/OEA auto waste education efforts at current levels;
- Give first priority in used oil filter education to discouraging disposal in or on land or in water bodies;
- Continue to focus efforts on the collection system problems;
- Maintain the voluntary product stewardship activities with automotive industry retailers and associations to:
  - Continue education efforts with their members;
  - Continue to encourage their members to take back DIY filters for free;
  - Provide appropriate lists of collectors/recyclers for the 800 clean up helpline; and
  - Provide public service announcements;
- Explore emerging, environmentally friendly oil filter design alternatives with automotive and filter manufacturers, ECOS, and EPA (this will be done by OEA staff); and
- Maintain the $250 refund program for DIY collectors, as an incentive to collect.

Analysis of Disposal Methods for Do-it-yourselfer Used Oil Filters

I. Problem Statement

Used oil and filters are prohibited from being placed in or on the land o in the solid waste. As a result, this essentially leaves recycling as the only legal option. Collection systems and recycling for business sources are good. However, convenient collection for do-it-yourselfers (DIYers) who change the oil in their vehicles is less established, especially in some areas outside the Twin Cities metro area.

II. Background/History

During the 1990s, different levels of regulations were enacted regarding the management of used DIY oil and filters. Currently, Minn. Statute 115A.916 says that Minnesota citizens who change their own motor oil may not knowingly place used motor oil or used motor oil filters in the solid waste. As of October 1995, Minn. Rules 7045 describes the options for DIYers to properly manage their used oil and filters.

In 1995, the MPCA and OEA were successful in getting controversial legislation passed requiring retailers who sell more than 1,000 filters a year to provide free collection at their sites or to contract with another collector nearby. After several years of strenuous opposition from retailers and many modifications to the legislation, as it *now* stands, Minn. Statutes 325E.112 states that:

> "motor oil and motor oil filter manufacturers and retailers shall seek to provide by May 31, 2001 access to at least one non-governmental site for collection of used motor oil and used motor oil filters from the public within a five-mile radius of any resident in the seven-county metropolitan area; and access to at least one non-governmental site for collection of used motor oil and used motor oil filters from the public within a city or town with a population of greater than 1,500 outside the seven-county metropolitan area.
>
> The commissioner of the pollution control agency shall determine by June 30, 2001, whether these goals have been met. If the commissioner of the pollution control agency determines that motor oil and motor oil filter manufacturers and retailers have not met the goals by May 31, 2001, then beginning July 1, 2001, all retailers that sell at an individual location more than 1,000 motor oil filters per calendar year at retail for off-site installation must provide for collection of used motor oil and used motor oil filters from the public."

The following reports have been written regarding many aspects for used DIY oil and filter disposal:

Do-It-Yourselfer Used Motor Oil Management in Minnesota (MPCA, August 1993)
Used Oil and Used Oil Filter Report (OEA, January 1996)
Do-It-Yourselfer Used Oil and Filter Recycling (MPCA and OEA, January 1999)
1999 Used Motor Oil and Oil Filter Study (OEA, January 2000)

As part of the ongoing negotiations, in 1999 the Legislature required the MPCA and the MOEA to work with industry on a study of alternative methods of disposing of and recycling used filters. The OEA commissioned a survey of DIYers, which provided data on disposal methods, recycling habits and barriers to recycling. We also looked at the environmental impacts of the filters, which primarily lie in the used oil they contain. We explored their impacts on water and soil and the impacts of collection, disposal and recycling.

III. Environmental Impacts

A. Test Results

Approximately 35 used oil filters were randomly collected from household hazardous waste collection sites throughout Minnesota. The paper filters were tested at random. The inside of each container was lightly rinsed to collect oil residue as part of the sample. The lab noted that there was a lot of liquid oil residue in each filter. This is common with DIY oil filters because DIYers do not drain or crush the filters before disposing of them. Educating DIYers to drain the filters before disposal would help decrease the amount of oil that remains in each filter.

Low levels of volatiles, especially acetone, were present in the oil residue sample. This was a surprise to the analyst, and the origin of the acetone is not known. Some benzene, ethyl benzene, xylene and toluene were present also, but these were expected. Low levels of semivolatiles, such as naphthalene (which came from a petroleum source), were also found. Tentatively identified compounds (TICs), mostly of a petroleum nature, were found. In general, the TIC report was in line with what would be expected when oil is analyzed. No polychlorinated biphenyls (PCBs) or pesticides were found in the sample. Except for the amounts of acetone and lead, the other results were typical with what is expected in a petroleum-based compound.

A total metals analysis was run on the paper media, with lead having an elevated concentration in one sample of 149 parts per million (ppm). For this sample, that is the maximum amount of lead present. However, this will vary with random samples. We can only speculate about a few possible sources of the lead, which may include gasoline burning in the oil, lead solder, and amount of lead in gasoline additives. From our limited set of samples, the lead appeared not to leach because the TCLP (Toxicity Characteristic Leaching Procedure (TCLP) levels were 0.9 ppm and 0.5 ppm.

B. Impacts of Disposal

When examining the environmental impacts of DIY used oil filters, the main concern is the residual amount of oil that remains in the filters even after they are "hot drained" (the dome of the filter is punctured to remove the vacuum of the anti-back drain valve and placed with the opening down in a collection container for 12 hours).

A properly drained used oil filter contains two to eight ounces of used oil. Using data from the MOEA 1999 DIY Survey and the Filter Manufacturers Council, it is estimated that 13,125 to 88,085 gallons of used oil are contained in mismanaged DIY filters.

1. Impact to water

According to the EPA, one gallon of improperly managed used oil can contaminate 1 million gallons of water. With this rate in mind, we have attempted to quantify the impact to water:

- Used oil contained in improperly managed oil filters in Minnesota = 13,000 to 88,000 gallons/year.
- 1 gallon used oil improperly managed = 1 million gallons contaminated water

A facility in Minnesota that provides a water-purification service to customers with oil-contaminated water quoted the following price for treatment of contaminated water. It costs $2 per gallon to separate and clean water that has been contaminated with drain oil. This rate is definitely a worst-case scenario, but its point should be taken well: cleaning up contaminated water can be expensive. If we put the time and resources that are necessary into dealing with better management of used oil filters up front, rather than dealing with the problem as an afterthought, the overall costs will be much less.

1. Impact to soil

One of the more difficult issues affecting soil contamination from used oil filters in this scenario, is that the residual oil from the filters is not spilled in large quantities in one location. If the DIY filters are drained into the soil, the overall concentration per filter may be minimal. But if this behavior is continued in one area, over time the contamination will increase. Microbial action over time helps to break down the oil in contaminated soils so that certain contaminants do not have a detrimental impact. Oil filters drained on the ground (for example, in one spot in a DIYer's backyard, where the person disposes of the used oil filters each time he/she changes oil), could pose a problem in a number of ways, but it is difficult to quantify due to the number of variables involved. For example, the potential impact of used oil can vary depending upon the factors described in the following chart:

Factor	Potential Impacts
Soil type	Some soil types are more porous than others. In some cases, the oil would not seep into the soil at any great rate but would instead run off to another location. Other times, all the oil would be absorbed by the soil and little run-off would occur.
Level of moisture/saturation	A high water table could pose more of a problem because discarded used oil could more easily seep into it.
Oil concentration	The higher the concentration of used oil, the higher the likelihood of soil or water contamination. If a site is constantly being "dumped on," the higher the likelihood that the site would pose a threat to water and vegetation.
Frequency between "dumpings"	More frequent dumping overloads the capacity of microbes to break down the soil.
Compaction (run-off potential)	Compact soils can increase the rate of oil run-off.
Slope (run-off potential)	Run-off potential can increase dramatically in soils with high slopes.
Heavy metals in oil (type and concentration)	Concentrations of certain heavy metals (*e.g.*, lead, cadmium, etc.) can build up to high levels in soils.

This list details some of the possible conditions that need to be considered when estimating the impacts of improperly managed used oil on soils. Lack of appropriate research, however, along with the large list of variable factors, make it difficult to determine any specific cost that could be attached to proper management of used oil.

Other research has been conducted by various institutions on the impact of oil spills to soil, water, vegetation and wildlife. Unfortunately, most of the available oil research focuses on such topics as tanker spills, leaking storage tanks and spills from pipelines. From this research, methods have been developed that can clean up oil-contaminated soils. For example, large areas of soil that are contaminated with oil can be cleaned up successfully through techniques like bioremediation. Bioremediation uses composting techniques to aerate the soil and allow microbial action to break down the oil to a tolerable level. Unfortunately, this form of cleanup would not be applicable to the situation surrounding used oil. Improper management of used oil, though significant in total oil volume, does not occur in one site. Soil contamination from mismanaged used oil occurs throughout the state in small, localized doses, and the degree of contamination depends (among other things) upon where and how much of the used oil is dumped. Due to the differeing amounts and distribution methods of improperly managed used oil, cleanup of used-oil-contaminated soils becomes virtually impossible.

1. Disposal in MSW Landfills

According to Minn. Statute 115A.916, a person may not knowingly place motor oil or motor oil filters in solid waste or a solid-waste-management facility. This requirement makes it illegal for a private individual to place a used oil filter in his or her garbage. There are many different types of landfills permitted including: demolition, industrial, mixed municipal and waste combustor ash

land disposal facilities. These facilities are currently prohibited from taking a waste containing free liquids and used oil. See Minn. Rules 7035.2535.

The 1988 Solid Waste Rules and Subtitle D of the Resource and Conservation and Recovery Act (RCRA) require MSW landfills to have a liner consisting of either four feet of clay or two feet of clay overlain by a geomembrane. This requirement anticipated that the liner material would need to be resistant to chemical attack. Thus, there is, with increased used filter landfilling, no need for additional liner protection. The same rules, referenced above, require a landfill owner/operator to collect and treat the leachate. Landfill owners/operators have several options to treat the leachate. First, they may haul the leachate for treatment at a wastewater-treatment plant. Typically, a plant will set influent guidelines based on receiving stream standards. Given that the proposed additional disposal associated with filters is a very small percentage, leachate quality will not be affected in any significant way. As a result, there will be little increased cost associated with leachate disposal.

The liners at MSW facilities have not been designed to completely contain landfill leachate. The MPCA believes that to require complete leachate containment would place an unnecessary cost burden on facility owners and operators. A small amount of leachate is expected to be released to the ground water over time. The solid waste rules were developed to take liner leakage into account. Facilities are required to establish compliance boundaries that may be no more than 200 feet from the waste fill. It is at the compliance boundary where conformance with ground water quality standards is determined. Therefore, this 200-foot buffer should provide adequate opportunity for chemical and biological attenuation to occur should leachate leak from a liner. With current liner design requirements, the addition of used oil filters to the waste stream should not have an adverse effect on ground water.

2. Disposal at Solid Waste Incinerators (Air)

DIY used oil filters in the MSW stream at MWCs represent an insignificant impact on the waste stream itself, the environment, or as a loss of resources (that is, the loss of steel as ash rather than being recycled).

Minnesota relies on 10 MWCs to process MSW before the waste is landfilled. In 1998, these MWCs processed about 1.4 million tons of MSW.[1]

Waste combustors process MSW to reduce the volume of waste requiring landfilling, while at the same time extracting and converting the energy contained in the waste stream itself. All MWCs in Minnesota generate hot water, steam for processing, or electricity from the heat created when solid waste is burned.

About 20% of MSW that is processed is noncombustible and must be disposed of as ash. This resulted in MWCs having generated 280,000 tons of ash in 1998 (20% of 1.4 million tons of

[1] According to Minnesota Office of Environmental Assistance, about 40% of all waste generated in Minnesota is recycled. Of the remaining waste, half is landfilled and the other half incinerated. Ref. MOEA, 2000.

MSW). The total may be slightly higher, due to the use of additional chemicals to treat flue gases to meet air-pollution-control requirements

MWCs in Minnesota burn MSW in two forms: (1) as unprocessed waste or (2) as refuse-derived fuel. The term "unprocessed waste" means that there is no further physical processing at the MWC before the waste is burned. These facilities take waste as garbage haulers deliver it, relying on community recycling and hazardous-waste-management programs to separate specific waste streams prior to combustion.

"Refuse-derived fuel" results from physically processing mixed MSW. Depending on the equipment used, refuse-derived fuel processing facilities process waste delivered by garbage haulers to eliminate non-combustibles in the waste, and reduces the size of waste components through shredding or other mechanical means.

Used oil filters are "non-combustible" (but have some small heat value from the oil and filter media in them). Because they are steel, they can be recovered from a waste or ash processing stream by magnetic separation. The following table describes the capacity of facilities in the MSW combustion system in Minnesota, and their ability to separate steel from their waste/residual streams for recycling.

Facility	**Capacity (tons per day or tons per year)**	**V. Fuel Type**	**Preprocessing/ separation at the plant**	**Postprocessing**
Hennepin Energy Resource Corporation (Minneapolis)	1,212 tpd 365, 000 tpy	Unprocessed MSW		Magnetic separation of metal from ash
Great River Energy (Elk River, combustor)	1,400 tpd	Refuse-derived fuel from NRG Elk River, sometimes NRG Newport	Metals separation prior to combusting RDF. Metals sold to scrap	
NSP Wilmarth (Mankato, combustor)	720 tpd	Refuse-derived fuel from NRG Newport	None	
NSP Red Wing (Red Wing, combustor)	720 tpd	Refuse-derived fuel from NRG Newport	Metals separation prior to combusting RDF from NRG.	
NRG Elk River (RDF production plant)	964,181 tpy		Ferrous separation project now under way; scrap metals to North Star Steel	
NRG Newport (RDF production plant)			Magentic separator after hammermill. Recovers 60 tpd, about 1,000 tons per month of ferrous.	
Olmsted Co.	200 tpd	Unprocessed MSW		
Polk County	37 tpd		Materials recovery facility at MWC facility; recovered metals resold to materials market	Metal removal from ash
Pope Douglas	49 tpd	Unprocessed MSW		
City of Fergus Falls	40 tpd	Unprocessed MSW		
City of Red Wing	40 tpd	Unprocessed MSW		

With incineration, there are often concerns about specific fractions of the waste stream contributing toxic metals to ash or to air emissions.

Minnesota's 3.8 million light-duty vehicles generate approximately 4.2 million DIY filters. The combined weight of all the filters (residual oil and filter) is about 1080 tons, representing about 0.1% of the amount of MSW processed at MWCs each year.

To investigate whether used oil filters contributed to lead or cadmium emissions at MWCs, the operators at the Olmsted Waste to Energy Facility collected used gasoline and diesel oil filters and had the filters analyzed for their lead and cadmium content. When burned, the metals that are contained in solders that would melt at furnace temperatures and the metals in paints and the oil itself could contribute to metals that are environmentally mobile in air emissions and in ash. Total lead concentrations were less than 10 ppm, and total cadmium concentrations were less than 5 ppm (reference 1)

From the information in the MPCA's 1999 report on lead in the environment, it can be calculated that the mass of lead contained in both the ash and air emissions is about 632,000 pounds per year (reference 2). This quantity represents in part the presence of some DIY filters, because there is no active enforcement at the household level of the statutory ban on filters in the MSW stream. However, if one assumes that by putting all DIY filters in the MSW stream is an incremental addition of metals to the MSW stream, the 4.2 million filters are contributing 21 additional pounds of lead, essentially an insignificant amount compared to the total lead in MSW. The same comparison (and conclusion) can be made for cadmium, at a concentration of 5 ppm.

In addition, putting used oil filters in MSW at MWCs still means the oil filters will be recycled. Most MWCs have installed magnets in their ash-handling systems so they can sell recovered ferrous metal to the secondary steel markets. For example, one small MWC in Minnesota installed a materials-recovery facility in front of the waste combustion units to recover saleable recyclables, one of them being ferrous metal. Thus, used oil filters still are potentially recoverable for recycling through processing at MWCs.

References:
1. Interpoll, *Laboratory Report #6716* for Minnesota Resource Recovery Association. October 23, 1992.
2. MPCA, *Report on Lead in the Environment*, January 1999, pp. 65, 67.

A. Summary of Environmental Impacts

DIY used oil filter disposal does not represent an emergency or the risk of an emergency. That is, if it is not immediately addressed, it will not result in significant widespread environmental damage or human health risk.

Based on MPCA evaluations, the volume of oil and associated pollutants in incinerated filters, relative to the overall volume of incinerated wastes, is so small as to be undetectable. Therefore, it neither increases nor decreases the environmental impacts associated with incineration. The

volume of oil in landfilled MSW represents a somewhat more significant problem relative to the risk of leakage, but here again the scale is remarkably small relative to the overall volume of wastes. The environmental impact of oil leaking from filters that are disposed of directly to the environment is more difficult to assess. Although motor oil is degradable in the environment, depending on the location and circumstances of discharge, it may have considerable impact, particularly on water quality. Of the three characteristic DIY used oil filter improper disposal methods, disposal to the environment would seem to have the highest potential for environmental damage and represent a relative priority consideration.

DIY-used-oil-filter-related emissions do not result in the exposure of, or the risk of exposure of, ecological systems or individuals to persistent bioaccumulative toxic pollutants, given the trace amounts of these pollutants in used motor oil (*i.e.*, below Toxicity Characteristic Leaching Procedure levels, except for lead).

VI. IV. DIY Oil Filter Mismanagement Estimates

To develop an accurate estimate of the number of DIY filters that are entering the solid waste system in the state, the MPCA and MOEA used two models to create estimates of mismanaged DIY filters. The first method used data collected in a 1999 MOEA statewide telephone survey and the second method used information submitted by the Filter Manufacturers Council on the amount of light duty filters sold in Minnesota.

According to the telephone survey done in December 1999, 32% of vehicle owners change their own oil at least once a year. Using this information and the Minnesota Department of Public Safety's data on registered vehicles in the state, the following estimates were developed.

Assuming that for every five quarts of oil (the average amount of oil used in an oil change) one oil filter is generated, approximately 4 million passenger filters are generated per year. Using the 1999 survey data that states that 35% of the filters generated by DIYs are disposed of in the trash, 1.4 million filters per year-end up in Minnesota's waste stream. Used oil filters can contain two to eight ounces of undrained oil after they are removed. This amounts to an additional 22,000 to 88,000 gallons of used motor oil being disposed of in the MSW stream in the state.

Using estimates provided by the Filter Manufacturers Council of 7.5 million passenger filters sold in Minnesota for 1999 and the same DIY generation data; 840,000 million filters containing 13,000 to 52,500 gallons of used motor oil are mismanaged in the state

Annually, **840,000 to 1.4 million used oil filters** are not being properly managed in Minnesota.

This represents 280 to 467 tons of used oil filters being disposed of in the MSW stream (approximately 3,000 passenger car oil filters = one ton).

VII. Recycling

A. Waste-Management Hierarchy

In 1980, the Minnesota Legislature passed the Waste Management Act (Minn. Stat. 115A). It states: "The waste management goal of the state is to foster an integrated waste management system in a manner appropriate to the characteristics of the waste stream and thereby protect the state's land, air, water, and other natural resources and the public health. The following waste-management practices are in order of preference:

(1) waste reduction and reuse;
(2) waste recycling;
(3) composting of yard waste and food waste;
(4) resource recovery through MSW composting or incineration;
(5) land disposal which produces no measurable methane gas or which involves the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale; and
(6) land disposal which produces measurable methane and which does not involve the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale."

As one can see the management of DIY used filters through separation and recovery of the steel, oil soaked media and liquid oil is in compliance with the states goals for waste management and fully supported by the Waste Management Act.

B. Benefits of Recycling Used Oil Filters

Recycling one ton of oil filters:

- saves 10 cubic yards of landfill space.
- produces approximately 1,700 pounds of high-quality steel.
- produces approximately 300 pounds of paper filter media. Oil filter media, when burned, yields approximately 16,000 British thermal units (Btus) per pound.
- Used oil as a fuel source is approximately 18,000 Btus/gallon.

Using these figures, proper management for all of the DIY used oil and oil filters would save 2,800 to 4,670 cubic yards of landfill space, provide 238 to 397 tons of high-carbon steel, and reduce the depletion of natural resources.

C. Factors Controlling Oil Recovery

Under EPA regulations, oil filters must be punched and hot drained to be exempt from hazardous waste designation. Puncturing of the dome and of used oil filters can significantly increase the amount of oil recovered. While puncturing of the dome end recovers much more oil than not puncturing, a significant portion of the oil is still trapped inside the filter. A market-weighted average of oil filters treated according to the EPA-recommended gravity hot draining (with dome puncturing) procedure reveals that 40% of the weight of a used oil filter is oil. The recovery of oil, from light-duty oil filters that are equipped with antisiphon valves, is enhanced by puncturing

the dome end during gravity hot draining. However, with respect to households disposing of their used oil filters, most DIYs do not properly drain their oil filters.

The heavy-duty filter contains approximately 23% of its original amount of oil after a 12-hour gravity hot drain regardless of the status of its dome end. The recovery of oil from heavy-duty filters that lack an antisiphon valve is not enhanced by puncturing of the dome end during gravity hot draining. The effect of puncturing of the filter dome end on oil recovery during draining is dependent upon the design of the filter.

In 25 draining tests that were conducted with both light-duty and heavy-duty oil filters, no significant draining was observed after the first hour, even when some of the filters were allowed to drain for 128 days. In the three filters that drained for 128 days, only a 5% decrease in the filter weight was observed. Little draining occurs after the first hour, showing that the EPA-mandated 12-hour drain is much longer than needed to effectively gravity drain.

Significant oil drainage from test filters was noticed when the filters were upset from their inverted position on the horizontal grate. The slightest tilt resulted in immediate draining of additional oil even though the filters had been draining for 12 or more hours. To investigate the impact of orientation during draining, 30 light-duty filters were drained at different angles. As expected, dome-punched filters resulted in larger oil recoveries than their unpunched counterparts. For example, the 30° filter drains only 33% of it is original oil in the unpunched condition, but drains nearly 67% of its original oil in the punched condition. The best oil recovery was found for dome-punched filter drained at angles of 30° and 180° from vertical. The unequal hydrostatic force on the antisiphon valve is thought to be responsible for the increased drainage. Draining the punched filter at 180° removed nearly 65% of its original oil content. The EPA gravity hot draining mandate allows for puncturing of either the dome end or the antisiphon valve.

These data lead to an important conclusion concerning draining as an acceptable method of removing oil to allow for landfilling of oil filters according to EPA requirements. The regulations are not specific as to the orientation of the oil filters during hot draining. Therefore, if an oil filter is removed from a vehicle and hot drained (either punched or unpunched) in any orientation other than the two most effective orientations (30° and 180°), considerable oil will remain in the filter that will most likely leak from the filter because of the changes in orientation when the filter is placed in the dumpster, being transported or while it is resting in its eventual position in the landfill. Based on these data, as much as 30% of the oil contained in the oil filter could eventually drain out into the uncontrolled environment. Observations of oil filters arriving in drums at oil filter recyclers supports this conclusion because there is always considerable oil in the bottom of the oil filter containers, whether the oil filters had been hot drained, punched and drained, or even crushed and drained. Therefore, for the best oil recovery and to minimize the amount of oil leakage during transport and final disposal, it is recommended that each filter be punctured on the dome end immediately upon removal from the vehicle, inverted to drain through the punched hole, and drained for 12 hours. This is critical only for oil filters that will be landfilled. Recycled oil filters will utilize recovery techniques that will allow recovery of the oil regardless of how much oil remains in the filter after the filter is removed from the automobile.

(Reprinted with changes from *Filter Recycling Issues —- Recycling versus Landfilling*, by permission of Kent D. Peaslee, University or Missouri-Rolla. Paper presented at the 1999 National Oil Recyclers Association Annual Conference).

VIII. D. DIY Used Oil Filter Collection Methods

There are basically three collection methods that can be used to collect DIY used oil filters: curbside collection, retail site drop-off or drop off at public collection sites. While the retail collection site and public collection site methods both involve the DIY bringing his or her used oil filters to a collection site, the circumstances surrounding the actual trip to the location are quite different.

1. Curbside collection

According to the American Petroleum Institute, 11 states have some form of curbside oil collection. It is not clear whether all of these programs also collect used oil filters.

Most curbside programs have a common structure. Residents are asked to place their used oil and oil filters at the curb on collection days in a tightly sealed, non-breakable container, such as a plastic milk jug for the oil and a coffee can with a lid for the oil filter. A hauler then collects the oil and filters during the regular garbage or recycling route. The used oil is either dumped into an on-board collection tank and the filters deposited into a leakproof drum or other container and then they are hauled to a centralized location for emptying and collection by a used oil and oil filter processor.

While curbside collection of DIY used oil filters may offer the greatest convenience to the consumer, it does add special handling requirements for the trash collector. It may be inconvenient, messy and ineffective from the collector's point of view if proper materials, training and consumer education do not accompany the implementation of the curbside service.

2. Drop-off collection

The central element of a drop-off used oil and oil filter collection site is a vessel placed in a publicly accessible location, such as a solid waste transfer station, auto parts retail store, a service station, quick lube facility or recycling center for used oil and used oil filters. The site may or may not be staffed by an attendant. The used oil is poured into the collection tank and the used oil filters are placed into a collection vessel, such as a metal or plastic drum. When full, the collection vessels are emptied by a hauler who operates either on an on-call or a "milk-route" basis. The oil and oil filters are then consolidated for centralized processing and recycling by a used oil and oil filter processor.

One disadvantage of drop-off locations is the continual problem of abandoned wastes. People often leave their used oil, oil filters and other automotive wastes at collection sites when the containers are full, the access to the site is closed, or after hours. This represents a concern to many operating these types of sites. Solutions range from posting information that is it against the law to leave your waste at the site to putting up surveillance cameras to monitor activity at the site

when no one is present. Another possible barrier for collection sites, including government collection centers, is related to the cost of disposal, lack of resources and collection space.

E. Recycling Costs for Used Oil Filters

When the costs of recycling used oil and oil filters are broken down, collection and transportation compromise most of the cost. The cost of transporting and collecting used oil and oil filters typically are 70-85% of the management cost. Costs for recycling used oil filters range from $.15 to $.87, depending on location and collection methods. Most DIYs who bring their used oil filters to a collection site currently pay a recycling fee that varies from $0.50 to $2.00 per filter.

One possible way to reduce the cost of recycling used oil filters would be to establish centralized processing locations throughout the state. Reducing collection frequency also reduces costs substantially. Using the generation numbers outlined previously, the total cost to recycle all of the used oil filters statewide would range from $126,000 to $1,200,000, depending on frequency of pickup, location and collection and storage methods.

F. Structural Change in the Design of Oil-Filtering Systems

The disposable canister filter that is almost without exception in use on light duty vehicles could be redesigned by providing either a housing for the filter membrane that is integrated into the engine block, or a re-usable canister. This approach could be developed through ECOS in conjunction with the EPA. At least one major manufacturer, General Motors, is already manufacturing a new generation of engines with a casing for the filter membrane. At least one major filter manufacturer, Fram/Honeywell, has developed an after market re-usable canister system. This re-design approach effectively eliminates the problems associated with the disposable canister.

VI. Conclusions

A decisive consideration relative to the feasibility of disposal alternatives is: What overall level of effort is appropriate for DIY used oil filter disposal? This is a question of where to direct state resources, or more specifically, a question of how to prioritize resource use when faced with much competition for resources.

The MPCA's established major programs — along with many significant smaller programs — have achieved widespread and recognized successes in protecting and improving the quality of Minnesota's environment. As it supports these ongoing programs, the agency faces new, emerging and unanticipated demands on its resources. Moreover, in addition to environmental quality, the citizens of Minnesota are strongly committed to a broad range of other quality-of-life issues that require and compete for resources.

Recognizing these resource constraints and considering the environmental impact, the MPCA concludes:

- Resource recovery and saving landfill space are important factors in the entire waste-management system.
- Due to the Waste Management Act "hierarchy of disposal," the reuse of steel and the energy recovery from the oil in used oil filters are important.
- Adequate recycling is available once filters are collected.
- Resources are not currently available to household hazardous waste collection sites to collect more DIY used oil filters.
- The environmental risk for landfill or incineration disposal of DIY used oil filters is not substantial.

VII. Recommendations

Minnesota Statutes 325E.112, subdivision 1, states:

> (a) "Motor oil and motor oil filter manufacturers and retailers shall seek to provide by May 31, 2001:
>
> (1) access to at least one non-governmental site for collection of used motor oil and filters from the public within a five-mile radius of any resident in the seven-county metropolitan area; and
>
> (2) access to at least one non-governmental site for collection of used motor oil and used motor oil filters from the public within a city or town with a population of greater than 1,500 outside the seven-county metropolitan area. The commissioner of the pollution control agency shall determine by June 30, 2001, whether these goals have been met."

- ♦ The MPCA will evaluate the work of the retailers and manufacturers in identifying DIY collection sites and determine if they have reached compliance with state law as soon as such information is made available. At this time, the preliminary data looks favorable and staff is hopeful that industry will meet their obligations;
- ♦ Retailers/Manufacturers will update the collection site list annually to MPCA/OEA;
- ♦ Keep the DIY used oil filter ban from landfilling;
- ♦ Continue MPCA/OEA auto waste education efforts at current levels;
- ♦ Give first priority in used oil filter education to discouraging disposal in or on land or in water bodies;
- ♦ Continue to focus efforts on the collection system problems;
- ♦ Maintain the voluntary product stewardship activities with automotive industry retailers and associations to:
  - Continue education efforts with their members;
  - Continue to encourage their members to take back DIY filters for free;
  - Provide appropriate lists of collectors/recyclers for the 800 clean up helpline; and
  - Provide public service announcements;
- ♦ Explore emerging, environmentally friendly oil filter design alternatives with automotive and filter manufacturers, ECOS, and EPA (this will be done by OEA staff); and
- ♦ Maintain the $250 refund program for DIY collectors, as an incentive to collect.

1999 Used Motor Oil and Oil Filters Study

Prepared for:

Minnesota Office of Environmental Assistance

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Used Motor Oil and Oil Filters

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Conclusions

This section of the report provides conclusions based on the results of the study.

Respondents' Current Methods of Changing their Vehicles' Oil

- Approximately half of the respondents indicated that their household owns or leases two cars or trucks. When asked how they change their vehicles' oil, more than two-thirds of respondents across Minnesota stated that they only have their oil changed at a service station, dealership, or shop specializing in oil changes. Almost half of the respondents who pay to have their oil changed do so between three and four times a year. Similarly, half of the respondents who change their oil at home also do so between three and four times a year.

- Over half of the respondents who change their oil and filters at home always buy their motor oil and oil filters from such retail stores as Wal Mart, Target, or Fleet Farm.

Respondents' Disposal of Used Motor Oil and Motor Oil Filters

- Respondents have used a variety of methods for disposing of their used motor oil and oil filters in the past year. Respondents also report using different methods for disposing of their oil than for disposing of oil filters. While almost half of the respondents have taken their used motor oil to an automotive repair or gas station in the past year, only 19 percent of respondents have done this with their used motor oil filters. In contrast, only three percent of respondents have put their used motor oil directly in the trash for disposal in the past year, but forty-two percent of respondents have done this with their used oil filters.

- No respondents indicated that they have poured their used motor oil down the drain, sewer, or toilet in the past year, and only two percent of respondents indicated that they had poured it on the ground or used it for dust or weed control.

- Out-state urban respondents are more likely than other respondents to have taken their used motor oil to a city- or county-operated collection site in the past year.

- Overall, respondents are satisfied with the current used motor oil and oil filter collection sites in their area. More than two-thirds of respondents are very satisfied or satisfied with used oil collection, while slightly more than half are very satisfied or satisfied with used oil filter collection. However, many respondents did not know their level of satisfaction with used oil and oil filter collection sites in their area. In addition, when asked what barriers prevent them from dropping off their used motor oil and oil filters at a collection site, approximately one in ten respondents indicated that they did not know of a site that collected used oil and oil filters. Other barriers mentioned by respondents include inconvenient locations, the hassle of disposing of oil and oil filters at a collection site, and not knowing that oil filters could be recycled.

- Most respondents have not had to pay a fee at a collection site for disposing of their used motor oil and oil filters. Only four percent of respondents have had to pay a fee to drop off their used motor oil, while 11 percent of respondents have paid a fee to dispose of their used motor oil filters. Fees paid for used oil and filter collection range between fifty cents and five dollars.

Respondents' Likelihood to Use Select Used Motor Oil and Oil Filter Disposal Methods

- Respondents are likely to use a variety of methods for disposing of used motor oil and oil filters; over half of the respondents said they would be very or somewhat likely to use all of the options mentioned in the survey. However, the highest percentage of respondents would be very likely to place their used oil and oil filters out for curbside collection. In fact, curbside collection is also respondents' most preferred method of used motor oil and filter collection. Respondents are least likely to drop their used motor oil and filters off at a retailer who sells motor oil and filters and less than one in ten respondents prefer this method of used oil and filter disposal.

- Not surprisingly, rural respondents are least likely to put their used motor oil and filters out for curbside collection. Out-state urban and rural respondents are more likely than urban respondents to take their used motor oil and oil filters to a household hazardous waste collection facility.

Cost of Used Motor Oil and Oil Filter Disposal

- As cost for collection increases, the percentage of respondents who would be very likely to take their used motor oil and oil filters to a collection site decreases. While more than eight in ten respondents are very likely to bring their used motor oil and oil filters to a collection site if the site were free, less than one-quarter of respondents are likely to do so if the site charged between fifty cents and one dollar per oil filter.

- Respondents do not have a clear idea of who should be responsible for paying for proper disposal of used motor oil and oil filters. Although most respondents are more likely to bring their used motor oil and oil filters to a collection site if the site is free, almost two-thirds of respondents are not in favor of paying a higher price for motor oil and oil filters at the time of purchase if this means they do not have to pay a disposal fee at a collection site. In addition, almost one-third of respondents believe people who change their own oil should primarily be responsible for the cost of proper disposal.

Respondents' Knowledge of Environmental Effects and Minnesota State Law

- Approximately half of respondents believe they are somewhat knowledgeable about the effects of used motor oil and filters on the environment and about Minnesota State law regarding proper disposal. More than one-quarter of respondents state they are not at all knowledgeable about the effects on the environment and more than one-third are not at all knowledgeable about Minnesota State laws regarding proper used oil and filter disposal. When compared to other respondents, more rural respondents and middle-aged respondents (between 36 and 56 years old) believe they are very knowledgeable about the effects of used motor oil and filters on the environment.

Background and Purpose

The Office of Environmental Assistance (OEA) wished to conduct a research study to determine Minnesota residents' practices in regard to their vehicles' oil changes and disposal of used motor oil and oil filters.

Specifically, the OEA sought to learn the following from this research study:

- ⇒ Minnesota residents' current method of changing their vehicles' oil
- ⇒ Do-it-yourselfers' (DIY) current disposal methods for used motor oil and oil filters
- ⇒ DIY satisfaction with current collection methods
- ⇒ DIY preferred method for disposing of used oil and filters
- ⇒ DIY attitudes about paying for used oil and filter collection
- ⇒ Respondents' personal knowledge regarding the effects of used oil and filters on the environment, and awareness of Minnesota State laws regarding proper disposal of used motor oil and filters

The OEA retained the independent market research firm of Anderson, Niebuhr & Associates, Inc. to conduct this research.

Research Method

This section of the report provides a description of the research method used to conduct the survey, including a description of the population and sample, questionnaire design, data collection, and data analysis.

Population and Sample

The Office of Environmental Assistance (OEA) was interested in obtaining information from Minnesota residents about used motor oil and oil filter disposal. In order to analyze the data based on geography, the sample was drawn to include 250 rural residents, 125 urban, and 125 out-state urban residents.

Respondents were categorized based on the following definitions:

Sample	Definition
Urban	Respondents living in Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, or Washington counties
Out-state urban	Respondents living in St. Cloud, Rochester, or Duluth
Rural	Respondents from all other areas of the state

Anderson-Niebuhr purchased a list of households from each geographical location. From this list, Anderson-Niebuhr drew an equal probability random sample of 125 urban residents, 125 out-state urban residents, and 250 rural residents. A larger sample of rural residents was drawn to reflect the high percentage of rural residents who are Do-it-Yourselfers.

The total sample of 500 Minnesota residents yields results accurate within ±4% with a 95% confidence level when generalizing from the sample to the number of households in Minnesota as a whole. Data were weighted to reflect the population distribution in the state so that the findings are representative of the entire state.

Questionnaire Design

The OEA provided a draft questionnaire to Anderson-Niebuhr. After reviewing this questionnaire, Anderson-Niebuhr met with OEA representatives to discuss additional issues and topics to be addressed.

The questionnaire was pretested with a random sample of 10 residents. Anderson-Niebuhr made recommendations for changes based on the results of the pretest and discussions with the OEA. The questionnaire was revised and finalized in consultation with OEA representatives. A copy of the questionnaire is included in Appendix A.

Data Collection

The survey was conducted using Anderson-Niebuhr's established telephone survey methods. Data collection occurred from November 17, 1999 through December 21, 1999. In total, 500 surveys were completed with an overall response rate of 66%: 70% for the urban group (N = 125), 65% for the out-state urban group (N = 125), and 64% for the rural respondents (N = 250).

Data Analysis

Anderson-Niebuhr defined analyses to be performed in consultation with OEA representatives. Anderson-Niebuhr's on-site computer facilities and computer programs contained in the Statistical Package for the Social Sciences (SPSS/Windows) were used to conduct the analyses.

In order to determine statistically significant differences between respondents based on where they live, significance testing was conducted between urban, out-state urban, and rural respondents. These findings are reported in the Summary of Overall Findings section of the report under the heading, "Other findings."

Significance testing was also conducted on select questions based on respondents' age and level of education.

Tab and banner output is also included in the report based on respondents' geographical location. This information is included in Appendix B in the report.

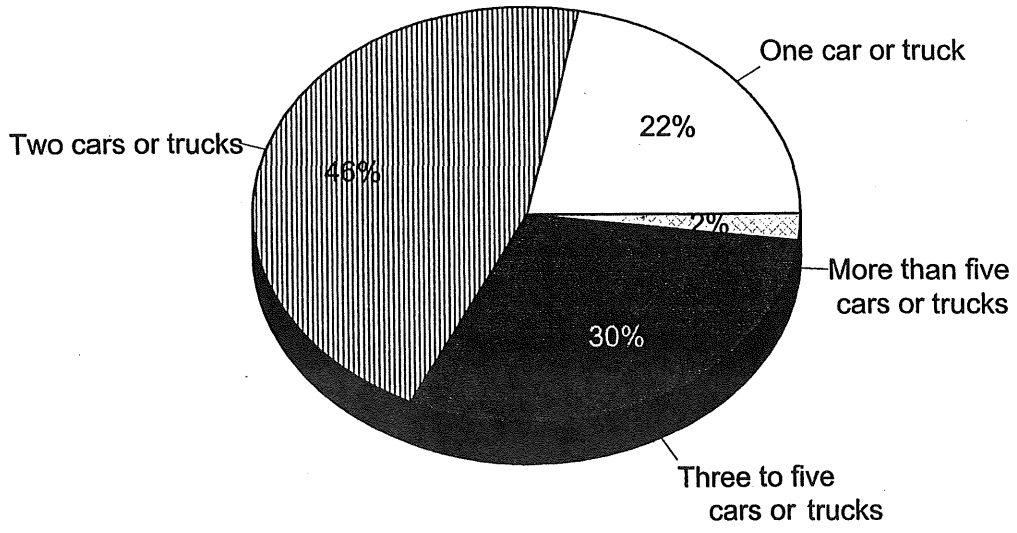
Summary of Overall Findings

This section of the report presents findings based on the responses of five hundred Minnesota residents. All responses have been weighted to accurately reflect the population of the state. Significant differences based on geography, age, and education are presented under "Other findings."

Respondents' Current Method of Changing Their Vehicles' Oil

FIGURE 1

Q1. How many cars or trucks are owned or leased by people in your household?
(N = 500)

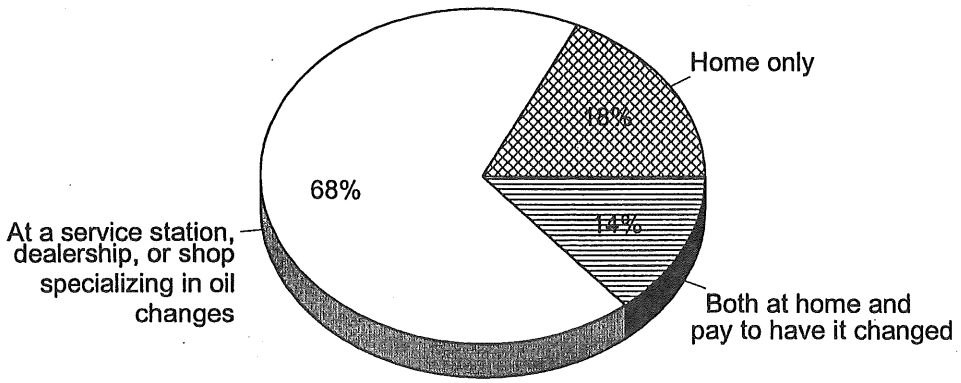


- More than two-thirds (68%) of respondents own or lease one or two cars or trucks (Figure 1). Almost one-third (32%) own or lease three or more cars or trucks.

FIGURE 2

Q2. Do you typically change your vehicle's oil at:

(N = 500)



- More than two-thirds (68%) of respondents have their oil changed at a *service station, dealership, or shop specializing in oil changes* (Figure 2). Eighteen percent only change their oil *at home*, and another 14 percent change their oil *both at home and pay to have it changed.*

Other findings

Education

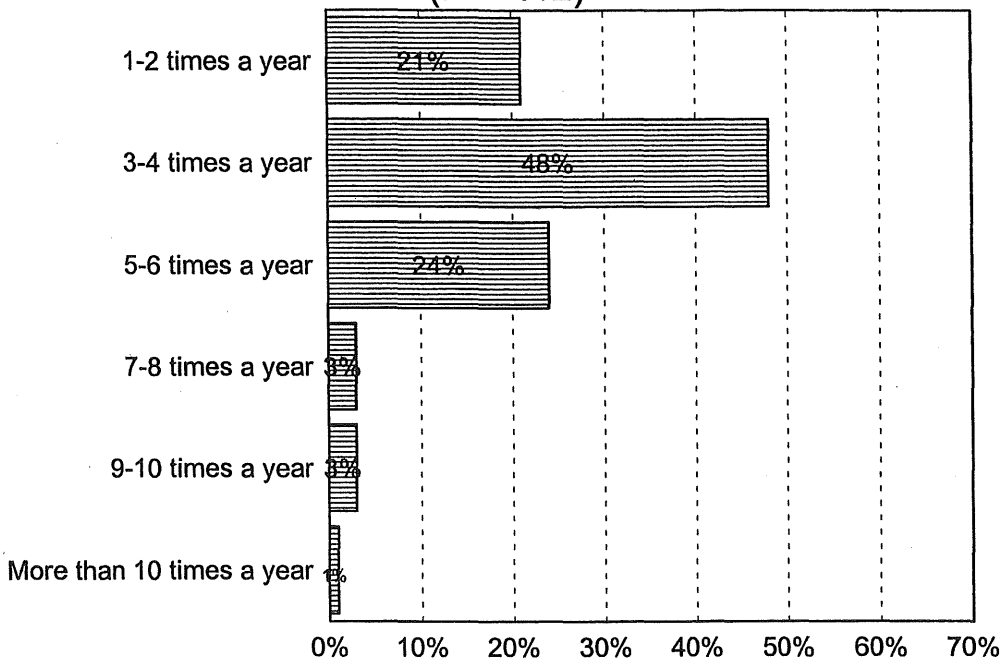
- Respondents with a college degree or higher (9%) are least likely to *change their oil at home* than are respondents with a high school diploma or less (18%) or respondents with some college or technical training (28%). Additionally, respondents with a college degree or higher are most likely *to* only *pay to have their oil changed* (78% vs. 67% with a high school diploma or less; 57% with some college or technical training).

Age

- As respondents get older, the percentage who only *pay to have their oil changed by a service station, dealership, or shop specializing in oil changes* increases (60% of 18 to 35 year olds; 66% of 36 to 45 year olds; 67% of 46 to 56 year olds; 79% of those 57 years and older).

FIGURE 3

Q3. On average, how often each year is the oil in each vehicle changed at *a service station or shop specializing in oil changes*? (N = 412)*



* Asked only of those respondents who pay to have their oil changed at a service station, dealership, or shop specializing in oil changes.

- Those respondents who pay to have their oil changed at a service station or shop specializing in oil changes were asked how often they do so (Figure 3). Almost half (48%) pay to have their oil changed *three to four times a year.*

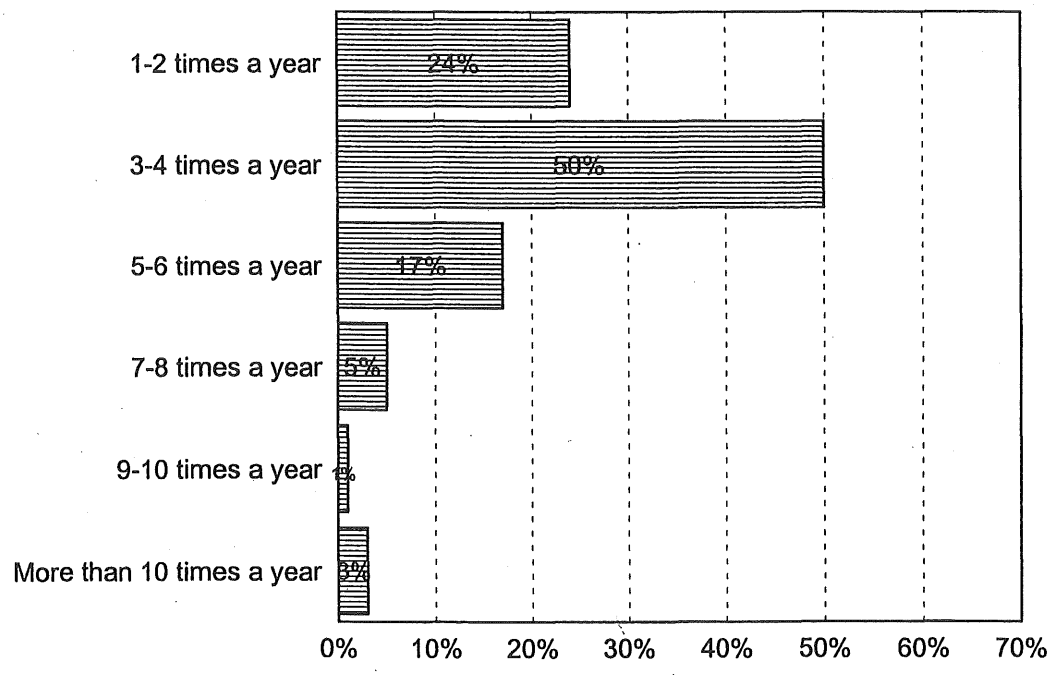
- Almost all (93%) respondents pay to have their oil changed six or fewer times a year.

Please note that Figure 4 through Figure 17 are based only on those respondents who change their motor oil and oil filters at home (N = 160). Figure 18 through Figure 23 are based on all 500 respondents.

FIGURE 4

Q4. On average, how often each year do you change the oil in each of your vehicles *at home*?

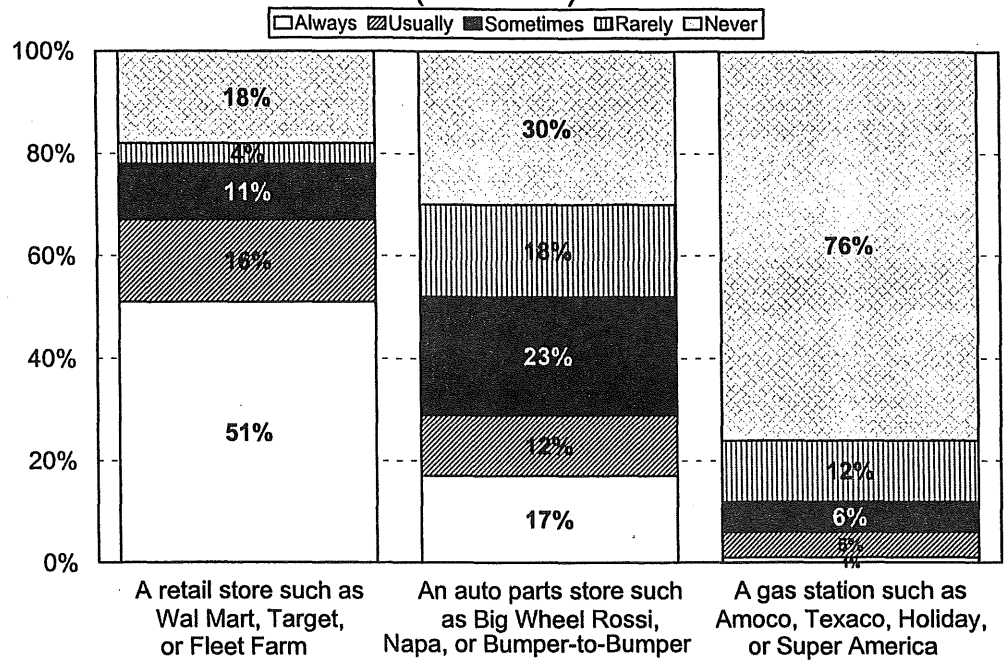
(N = 160)



- Of the respondents who change their oil at home, half do so between *three and four times a year,* and another quarter (24%) of respondents do so between *one and two times a year* (Figure 4).
- Almost three-quarters (74%) of respondents change their oil at home four or fewer times a year.

FIGURE 5

Q5. When changing your automobiles' oil, would you say you always, usually, sometimes, rarely, or never purchase oil filters and motor oil at:
(N = 160)



- Over half (51%) of respondents *always* purchase motor oil and filters from such retail stores as Wal Mart, Target, or Fleet Farm. More than three-quarters (78%) of respondents do so *always, usually,* or *sometimes* (Figure 5).

- More than one-quarter (29%) of respondents *always* or *usually* purchase oil filters and motor oil at auto parts stores, such as Big Wheel Rossi, Napa, or Bumper-to-Bumper. However, almost half (48%) of respondents *rarely* or *never* purchase their motor oil and filters at auto parts stores.

- More than three-quarters (76%) of respondents *never* purchase their motor oil and oil filters at gas stations, such as Amoco, Texaco, Holiday or Super America.

Education

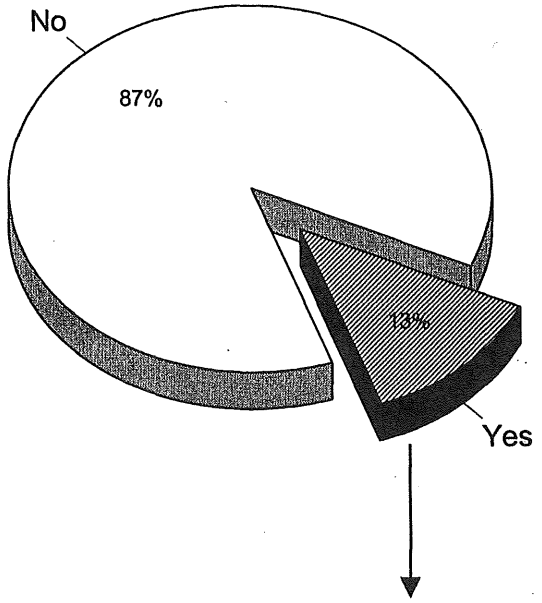
- Although most respondents *never* buy their motor oil and filters at a gas station, more respondents with a high school diploma or less (15%) or some college or technical training (13%) *usually* or *sometimes* purchase their motor oil and filters at a gas station than do respondents with a four-year college degree or higher (2%).

- As education increases, the percentage of respondents who *always* or *usually* purchase their motor oil and filters at an auto parts store decreases (43% with a high school diploma or less; 29% with some college or technical training; 12% with a four-year college degree or higher).

FIGURE 5b

Q5. Is there any other type of store where you purchase oil and oil filters for your automobile?

(N = 160)



- More than one in ten (13%) respondents said *yes* when asked if there was another type of store at which they purchase their motor oil and oil filters (Figure 5b). The types of stores mentioned are detailed in the table below.

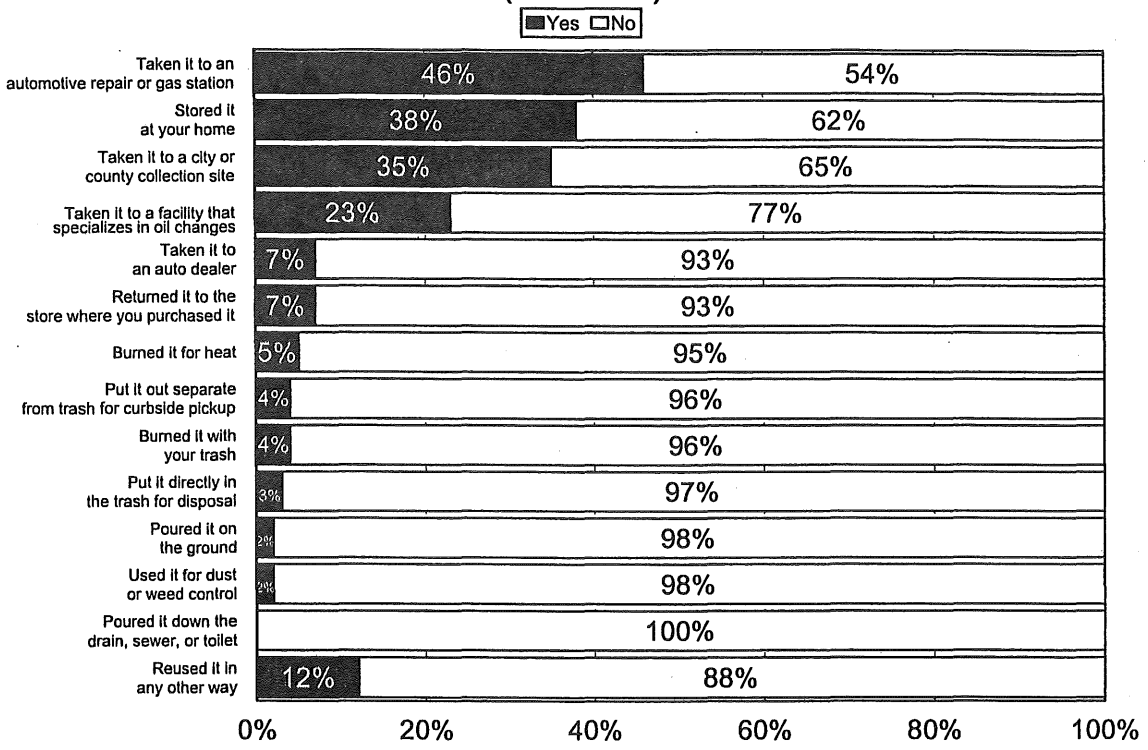
Response	Number of Respondents (N = 21)*
Variety of retail stores	7
The distributor/oil distributor/Urban's Oil Company	7
Local farmers co-op/United farmers co-op/Highway Ag co-op	3
Auto parts store	2
Cenex/gas station	2
Garage sale	1
The power company	1
From the Toyota car dealer	1

* Respondents could offer more than one response. Please note that because of the small sample size, this graph depicts numbers, not percentages. This graph is also based on un-weighted data.

- When asked at what other types of store they purchase their motor oil and oil filters, seven respondents each mentioned retail stores and oil distributors.

FIGURE 6

Q6. In the past year, have you ever done any of the following with your used motor oil? (N = 160)



- Respondents who change their oil at home were asked what motor oil disposal methods they have used in the past year (Figure 6). Almost half (46%) of respondents have taken their used motor oil to an *automotive repair or gas station.*

- Over one-third of respondents have *stored their used motor oil at home* (38%) or *taken it to a city- or county-operated collection site* (35%). Almost one-quarter (23%) have *taken it to a facility that specializes in oil changes.*

- Almost all respondents indicated that they have not used any of the other mentioned options for disposing of their used motor oil. However, 12 percent of respondents stated that they have *reused their used motor oil in different ways.* These additional uses are detailed on page 18 in Figure 6c.

Geography

- Out-state urban respondents (56%) are significantly more likely than both urban (37%) and rural respondents (32%) to take their used motor oil to a city- or county-operated public collection site.

Education

- Respondents with some college or technical training (31%) are less likely than respondents with a high school diploma or less (51%) or a college education or more (58%) to have taken their used motor oil *to an automotive repair or gas station.*

- Respondents with a high school diploma or less (12%) are more likely than those with some college or technical training (3%) or a college degree or higher (0%) to have returned their used motor oil to *the store where they purchased it.*

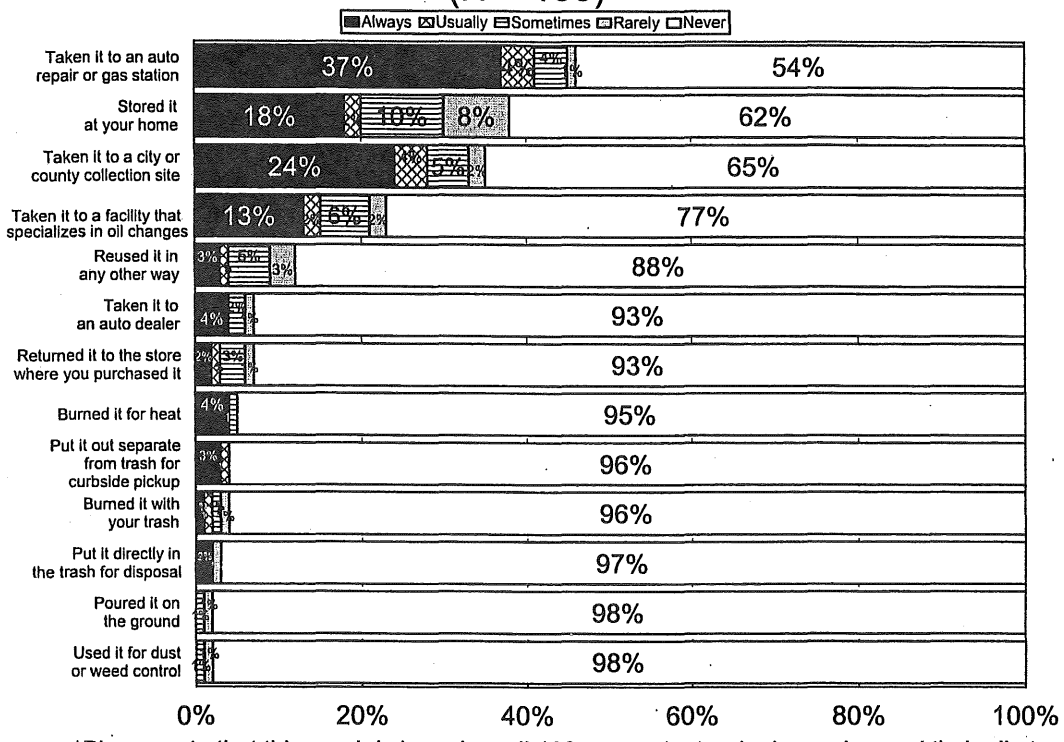
- Although only a small percentage have actually done so, respondents with some college or technical training (8%) are more likely than respondents with a high school diploma or less (0%) and a college degree or higher (0%) to have *burned their used motor oil with their trash.*

Age

- Respondents between the ages of 46 and 56 years old (58%) are more likely than all other age groups to have *stored their used oil at their home* (30% of 18- to 35-year-olds; 35% of 36- to 45-year-olds; 31% of those 57 and older).

FIGURE 6b

Q6. How often have you done the following with your used motor oil? (N = 160)



*Please note that this graph is based on all 160 respondents who have changed their oil at home. If respondents answered "No" to a specific disposal method in Figure 6, they were coded as *never* using that method in Figure 6b.

- Slightly more than four in ten (41%) respondents *always* or *usually* take their used motor oil to an automotive repair or gas station, and more than one-quarter (28%) *always* or *usually* take it to a county- or city-operated collection site (Figure 6b).

FIGURE 6c

Other Ways Respondents Have Reused Their Used Motor Oil

Responses	Number of Respondents (N = 19)*
Lubricating farm machinery/lubricating tools and equipment	13
Give it to the factory where I work/put it with the oil at the dealership where I work	2
Coat wood surfaces with it/wood preservative	2
On farm vehicle to protect from rust	1
Give it to a farmer	1
Put it in the tractor	1
Give it to the Amish community	1

* Respondents could offer more than one response. Please note that because of the small sample size, this graph depicts numbers, not percentages. In order to best reflect the open-ended responses, this table is *not* based on weighted data.

- Respondents gave a variety of answers when asked what other ways they reuse their motor oil (Figure 6c). Thirteen of the nineteen respondents who offered responses *lubricate farm machinery, tools, and equipment* with their used motor oil.

FIGURE 7

What, if any are the barriers that prevent you from dropping off your used motor oil at a used motor oil collection site?

Responses	Percent of Respondents (N = 170)*
No barriers prevent me from dropping off used motor oil at a collection site/already take it to a used oil place	37%
I don't know of a site/don't know where one is/hard to tell which places they are/never knew about it	11%
The location of the site/travelling time/too far away/accessibility to the collection site	9%
Too much of a hassle for the places to take it because there are too many regulations/inconvenient/just lazy/no desire to do that/no time	8%
The open times/closed when we can go/only have them a few times a year	7%
Most places don't have a facility for collecting it/there aren't any sites/there are not too many people who want to take it/not enough sites	7%
I have somebody else take care of it/take it to work and put it in the oil storage tank there/my work takes it/the company of the oil that we sell picks up our used oil	6%
Gas station is closer/local garage takes it with no questions asked	5%
Cost/you have to pay/have to buy it from them in order for them to take it	5%
Used it for heat by burning it/give it to a person who burns it for shop heat	4%
Don't have enough to make the trip/would have to make a special trip/it's out of my way	2%
I reuse it myself/I used it for dust control	2%
Hard to get it into a container so it doesn't spill/the container to carry it in	2%
Don't know	3%

*Respondents could offer more than one response. Responses of one percent or less are not reported. Please note that to best reflect the open-ended responses, this table is not based on weighted data.

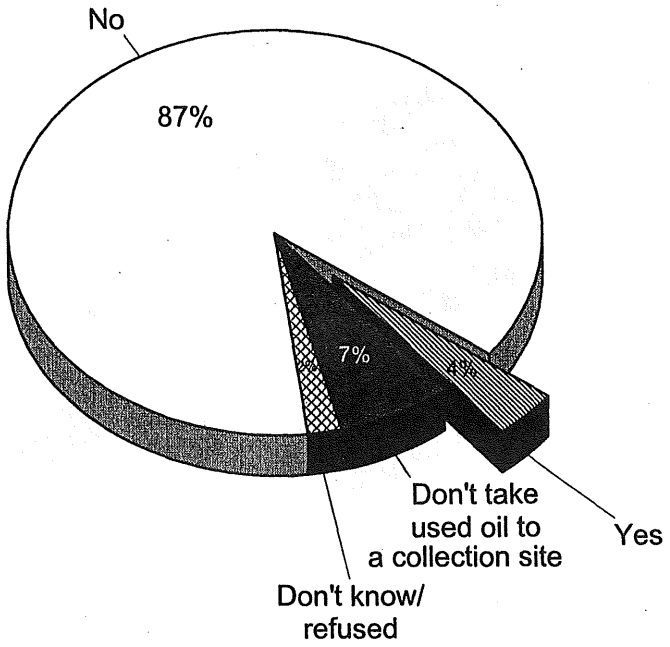
- Figure 7 shows that slightly more than one-third (37%) of respondents state that *there are no barriers preventing them from dropping off their used motor oil at a collection site*.

- Approximately one in ten respondents don't use a collection site because:
  - ⇒ *They don't know of a site* (11%)
  - ⇒ *The site is too far away or inaccessible to them* (9%)
  - ⇒ *It is too much of a hassle or inconvenient* (8%)

FIGURE 8

Q8. In the past year, have you ever had to pay a fee at a collection site to have your used motor oil disposed of?

(N = 160)



- Almost nine in ten (87%) respondents have not had to pay a fee at a collection site to dispose of their used motor oil (Figure 8).

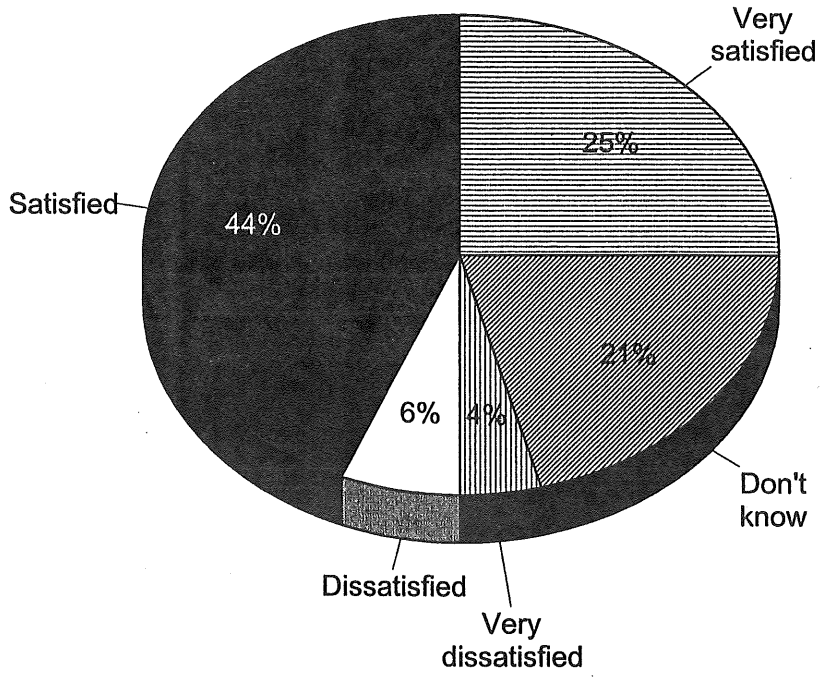
- Four percent of respondents have had to pay a fee at a collection site. The amount of these fees are listed in the table below.

Amounts	Number of Respondents (N = 11)*
$1.00	2
$.50	2
$2.00	1
$.75	1
$3.00 per 5 gallons	1
$1.00 for oil **and** filter	1
$5.00 per 5 gallons	1
Don't know	2

*Please note that because of the small sample size this graph depicts numbers not percentages. This graph is not based on weighted data

FIGURE 9

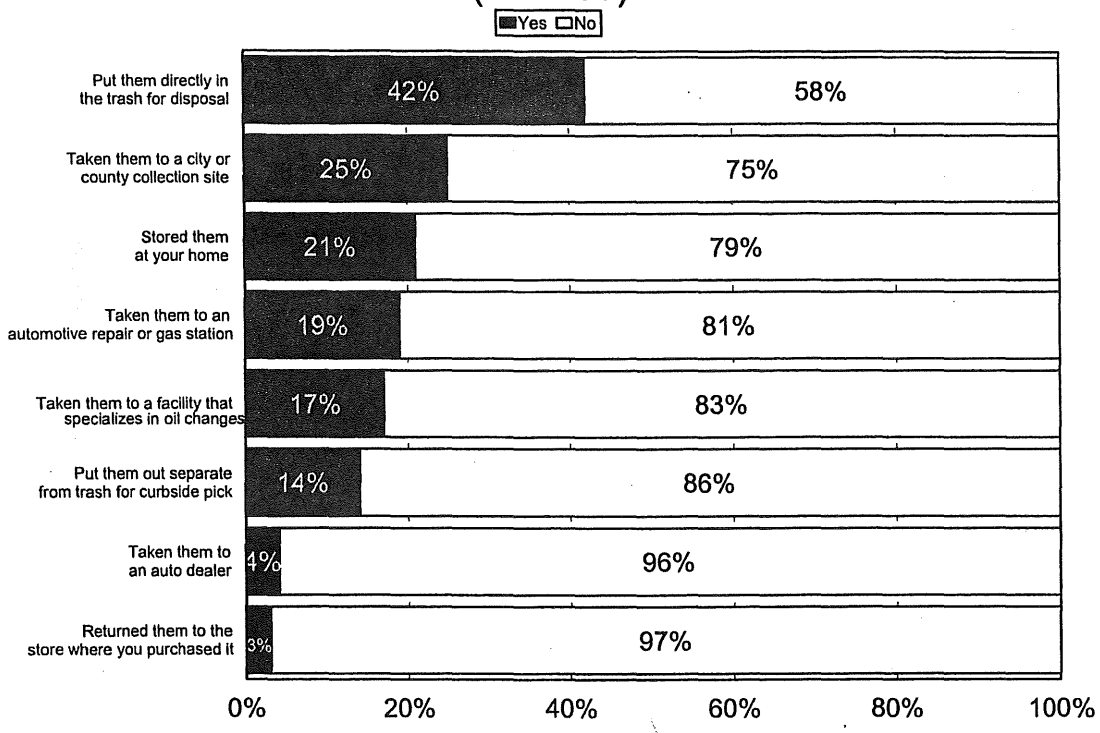
Q9. How satisfied are you with the current used oil collection sites in your area?
(N = 160)



- One-quarter (25%) of respondents are *very satisfied* with the current used motor oil collection sites in their area, and another 44 percent are *satisfied* (Figure 9).
- Only one in ten (10%) respondents indicated some level of dissatisfaction with the current used oil collection sites in their area.

FIGURE 10

Q10. In the past year, have you ever done any of the following with your used motor oil filters? (N = 160)



- In the past year slightly more than four in ten (42%) respondents have *put their used motor oil filters directly in the trash for disposal* (Figure 10). One-quarter (25%) have taken their used motor oil filters to *city- or county-operated collection sites.*

- Approximately two in ten respondents have done the following with their used motor oil filters:
  - ⇒ *Stored them in their homes* (21%)
  - ⇒ *Taken them to an automotive repair or gas station* (19%)
  - ⇒ *Taken them to a facility that specializes in oil changes* (17%)

Geography

- In the past year, urban respondents (57%) were more likely than out-state urban (28%) and rural respondents (28%) to have put their used motor oil filters *directly in trash for disposal.*

Education

- Respondents with some college or technical training (41%) are more likely than respondents with a high school diploma or less (13%) or a college degree or higher (18%) to have taken their used motor oil filters to *a city- or county-operated public collection site.*

- As level of education increases, so does the percentage of respondents who have *put their used motor oil filters directly into the trash for disposal* (33% with a high school diploma or less; 36% with some college or technical training; 66% with a college degree or higher).

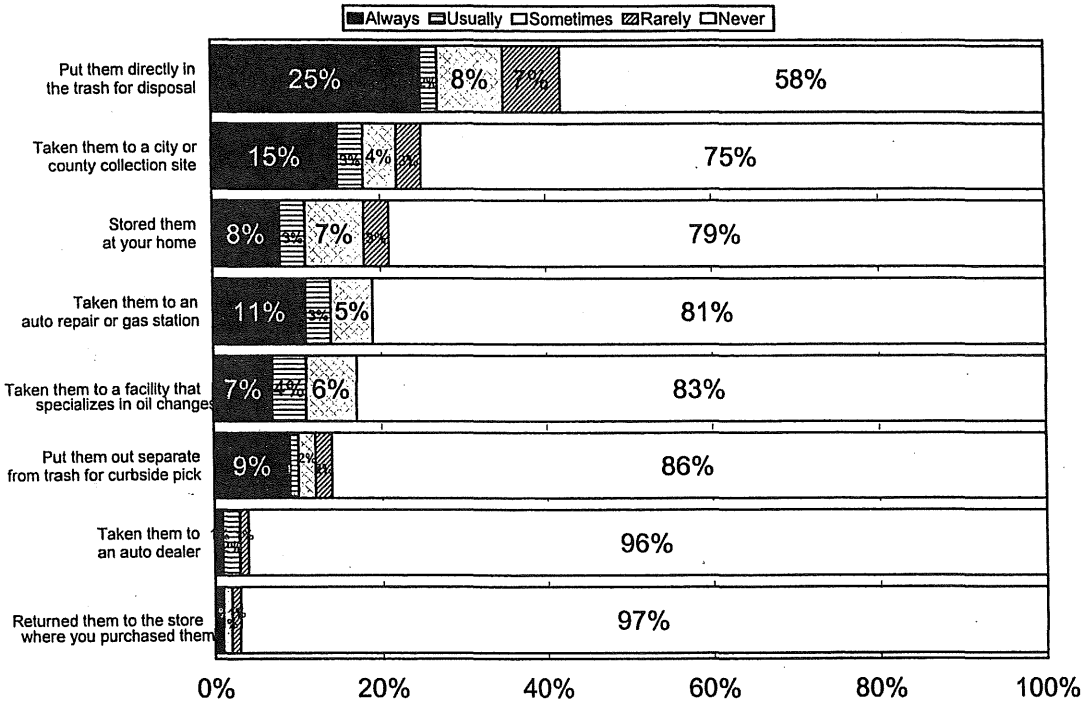
Age

- Respondents between 36 and 45 years old (31%) are more likely than all other age groups to have taken their used motor oil filters to *a facility specializing in oil changes* in the past year (9% of 18- to 35-year-olds; 13% of 46- to 56-year-olds; 15% of those 57 and older).

- Over half of the respondents between 36 and 45 years old (51%) and 46 and 56 years old (58%) have put their used oil filters *directly in the trash for disposal*, while only approximately one-quarter (26%) of respondents between 18 and 35 years old and one-third (31%) of respondents 57 and older have done so in the past year.

FIGURE 10b

Q10. How often have you done the following with your used motor oil filters? (N = 160)



- Figure 10b shows that one-quarter (25%) of respondents *always* put their used oil filters directly in the trash for disposal. More than one-third (35%) *always, usually,* or *sometimes* put their used oil filters directly in the trash.

- More than one in ten respondents *always* take their used oil filters to a city- or county-operated collection site (15%) or to an automotive repair or gas station (11%).

FIGURE 11

What, if any, are the barriers that prevent you from dropping of your used motor oil filters at a used oil collection site?

Responses	Percent of Respondents (N = 170)
No barriers to dropping off used oil filters/already take them to a used oil place	39%
I don't know of a site/don't know where one is/sites aren't available	13%
Site is across town/Location convenience/distance/don't have a site in this area/site not accessible	10%
Don't have time/inconvenience of having to drive it around, not being able to drop them off with the oil, having to drain them for 24 hours before dropping them off, and the mess of finding something to put them in	10%
I didn't know they could be recycled/didn't know they took them	9%
Would if there was a place available/do it if they wanted us to	6%
The open times/closed when we are available to go/held only once or twice a year	4%
Friends take it to their service garage/take them to work and put them with their used ones	4%
Expensive/the fee/the cost	4%
Drain them and put them in the garbage/assumed you threw them in the trash	4%
Don't know	4%

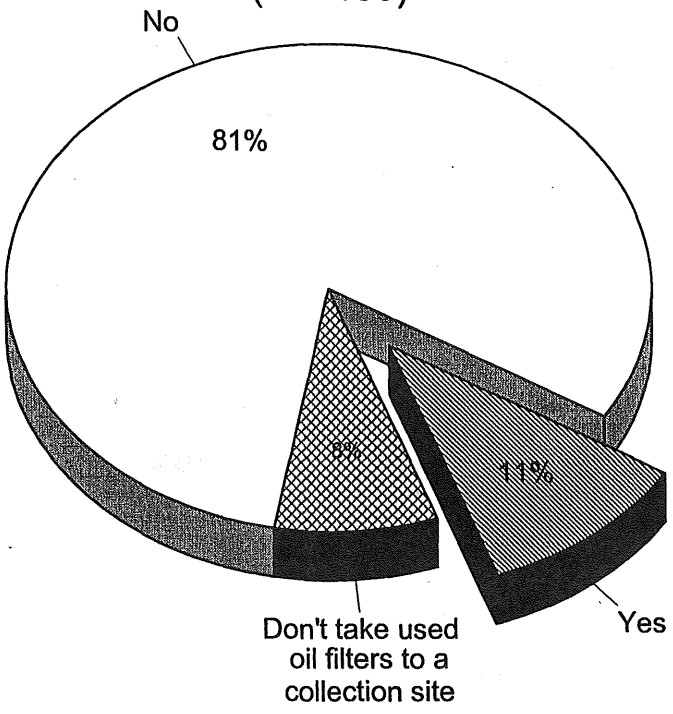
*Respondents could offer more than one response. Responses of one percent or less are not reported. Please note that in order to best reflect the open-ended responses, this table is *not* based on weighted data.

- More than one-third (39%) of respondents state that there are *no barriers* preventing them from dropping off their used motor oil filters at a used oil collection site (Figure 11).

- Approximately one in ten respondents don't use a collection site for their used motor oil filters because:
  - ⇒ *They don't know of a site* (13%)
  - ⇒ *The site is too far away or inaccessible to them* (10%)
  - ⇒ *They don't have time or it is inconvenient* (10%)
  - ⇒ *They were unaware the filters could be recycled* (9%)

FIGURE 12

Q12. In the past year, have you ever had to pay a fee at a collection site to have your used motor oil filters disposed of? (N = 160)



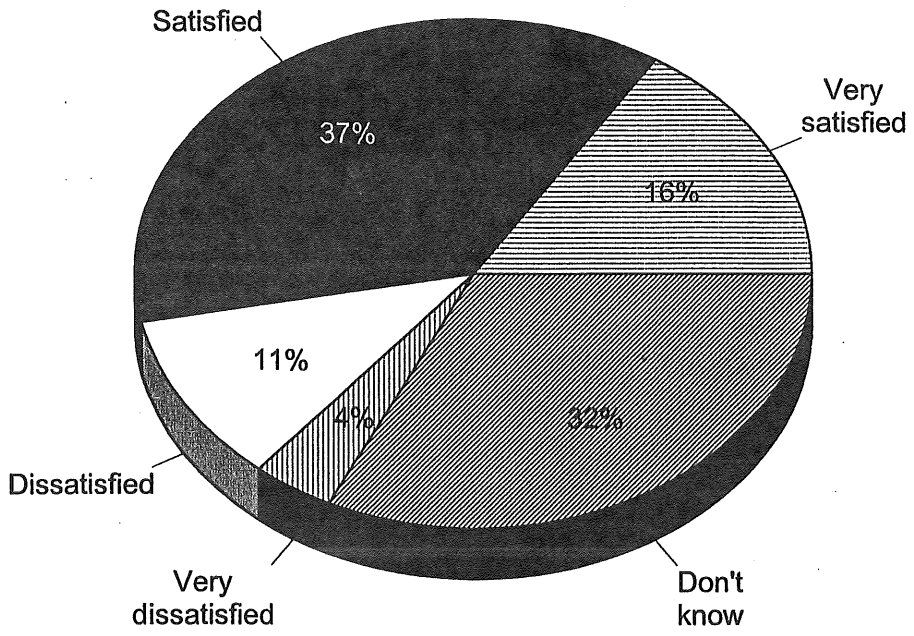
- In the past year, eight in ten (81%) respondents have *not* had to pay a fee at a collection site to dispose of their used motor oil filters (Figure 12).
- Eleven percent of respondents *have* paid a fee to dispose of their used motor oil filters. The amount of these fees is listed in the table below.

Amounts	Number of Respondents (N = 20)*
$.50	6
$2.00	3
$1.00	2
$1.25	1
$1.00 for oil and filters	1
$5.00	1
Don't know	6

*Please note that because of the small sample size, this graph depicts numbers not percentages.

FIGURE 13

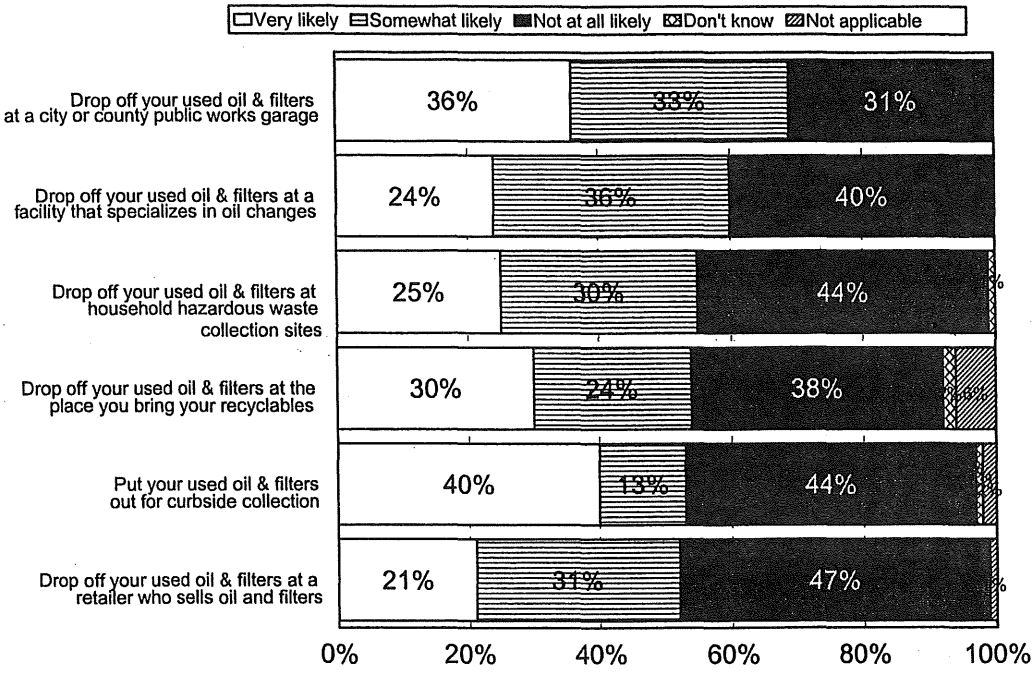
Q13. How satisfied are you with the current used oil filter collection sites in your area?
(N = 160)



- Over half (53%) of respondents are *very satisfied* or *satisfied* with the current used motor oil filter collection sites in their area (Figure 13).
- Fifteen percent indicated some level of dissatisfaction, and almost one-third (32%) *don't know* their level of satisfaction with current used motor oil filter collection sites in their area.

FIGURE 14

Q14. Please tell me if you would be very likely, somewhat likely, or not at all likely to use the following options for disposing of your used oil filters and motor oil. (N = 160)



- More than half of all respondents indicated that they are *very* or *somewhat likely* to use all of the options mentioned for disposing of used motor oil and oil filters (Figure 14). However, the highest percentage (69%) of respondents said they are *very or somewhat likely* to drop off their used motor oil and oil filters at a city or county public works garage.

- Six in ten (60%) respondents are *very or somewhat likely* to drop off their used motor oil and oil filters at a facility that specializes in oil changes.

- The highest percentage (47%) of respondents indicated that they are *not at all likely* to drop off their used motor oil and oil filters at a retailer who sells oil and filters.

Geography

- Significantly fewer rural respondents (39%) are *very* or *somewhat likely* to place their used motor oil filters out for curbside collection than are urban (66%) and out-state urban respondents (54%).

- Out-state urban (77%) and rural respondents (64%) are more likely than urban respondents (43%) to be *very* or *somewhat likely* to drop off their used motor oil filters at a household hazardous waste collection facility.

Education

- More respondents with a high school diploma or less (31%) or some college or technical training (28%) are *very likely* to drop off their used motor oil and oil filters at a household hazardous waste collection facility than are respondents with a college degree or higher (8%).

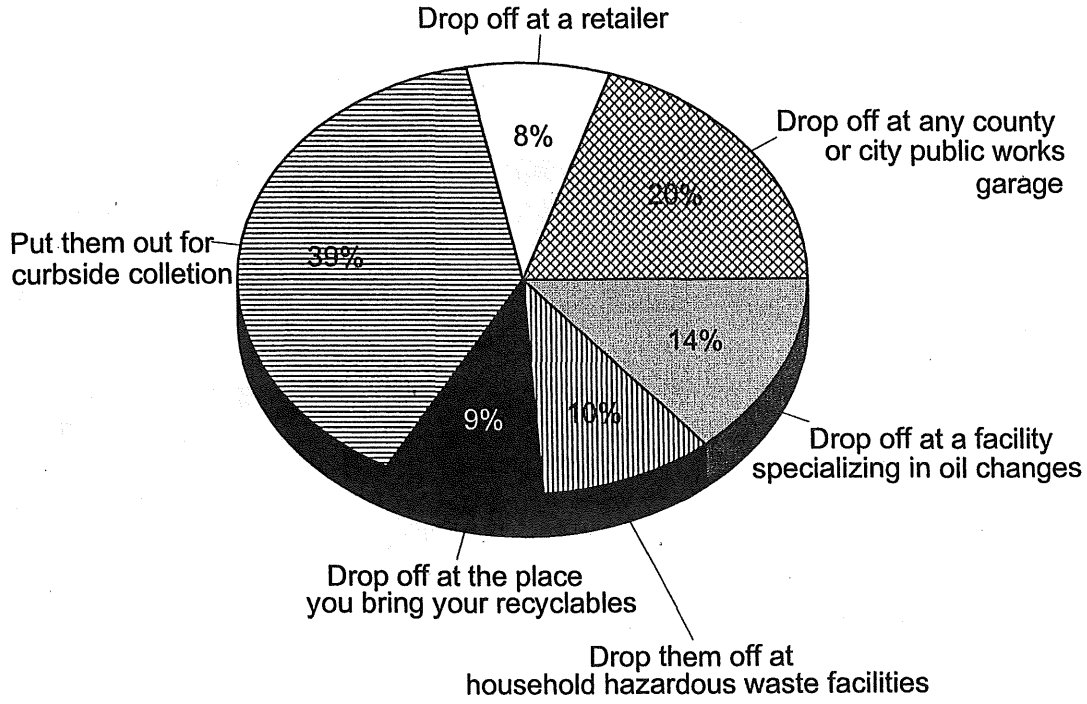
Age

- More respondents aged 57 and older (73%) are *not at all likely* to put their used motor oil and oil filters out for curbside collection than are respondents of all other age groups (36% of 18- to 35-year olds; 39% of 36- to 45-year-olds; 40% of 46- to 56-year-olds).

FIGURE 15

Q15. Of all the options we have just discussed, which one do you most prefer for disposing of your used oil filters and motor oil?

(N = 160)



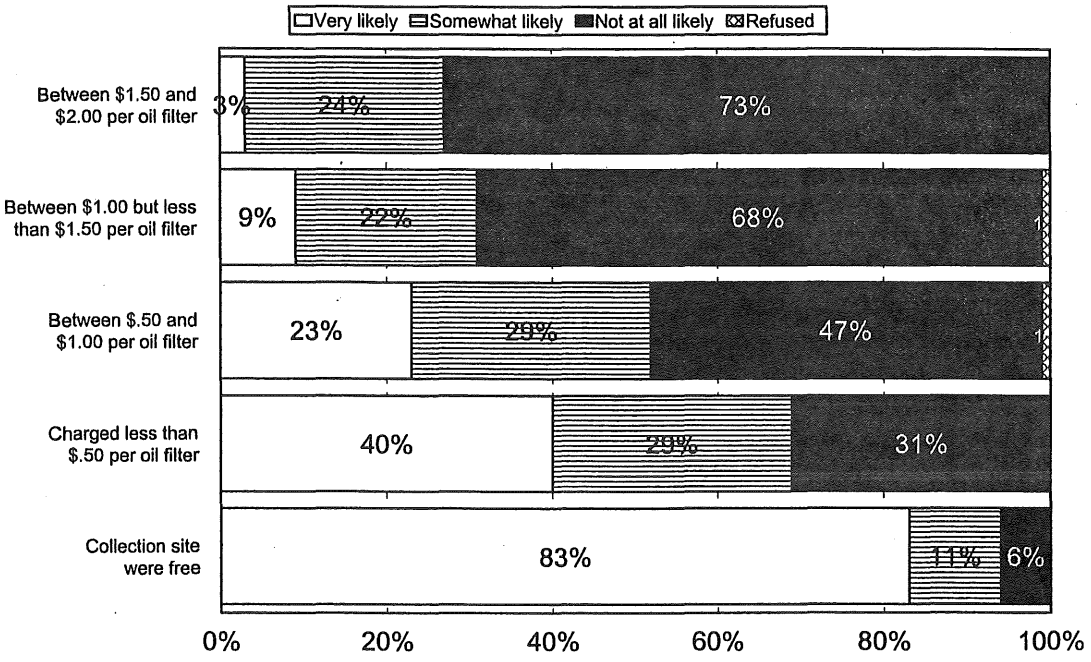
- When asked what one option for disposing of used motor oil and oil filters they would prefer, 39 percent of respondents indicated that they would prefer *putting their oil and filters out for curbside collection* (Figure 15).

- Two in ten (20%) respondents prefer to drop their used motor oil and oil filters off *at a city or county public works garage*.

- Ten percent or less of respondents prefer:
  - ⇒ *Dropping off their used oil and filters at a household hazardous waste collection site* (10%)
  - ⇒ *Dropping their used oil and oil filters off at the place they drop off their recyclables* (9%)
  - ⇒ *Dropping off their used oil and filters at a retailer who sells oil and oil filters* (8%)

FIGURE 16

Q16. Would you be very likely, somewhat likely, or not at all likely to bring your used oil filters and motor oil to a collection site if the site charged:
(N = 160)



- Overall, as cost for collecting used motor oil filters increases, the likelihood that respondents would take their used motor oil and filters to a collection site decreases (Figure 16).
- More than eight in ten (83%) respondents would be *very likely* to take their used motor oil and oil filters to a collection site if the collection site were free.
- More than two-thirds (69%) of respondents would be *very or somewhat likely* to take their used motor oil and oil filters to a collection site if the site charged less than fifty cents per oil filter.
- Almost three-quarters (73%) of respondents are *not at all likely* to bring their used motor oil and oil filters to a collection site if the site charged between $1.50 and $2.00 per oil filter.

Age

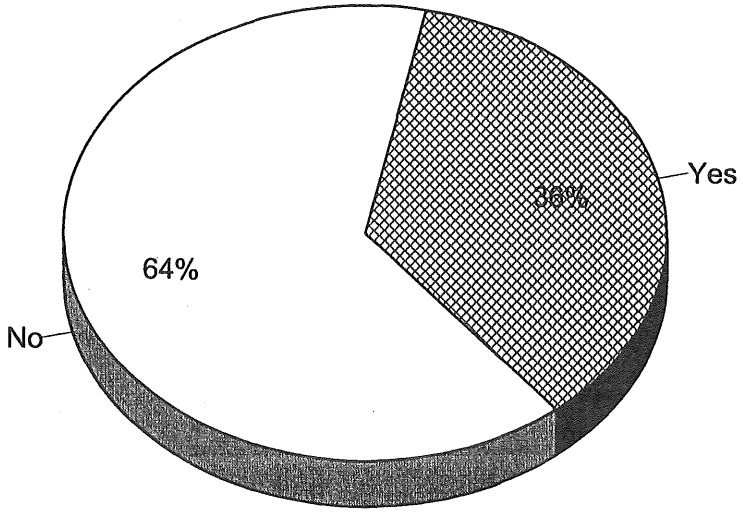
- As respondents' age increases, the percentage who would be *very or somewhat likely* to take their motor oil and oil filters to a collection site if the site charged between $1.50 and $2.00 decreases (49% of 18- to 25-year-olds; 31% of 36- to 45-year-olds; 11% of 46- to 56-year-olds; 12% of those 57 and older).

- When compared to all other age groups, significantly fewer respondents between the ages of 46 and 56 (8%) would be *very* or *somewhat likely* to take their used motor oil and oil filters to a collection site that charged more than $1.00 but less than $1.50 per filter (47% of18- to 25-year-olds; 37% of 36- to 45-year-olds; 23% of those 57 and older).

FIGURE 17

Q17. Would you be in favor of paying a higher price when purchasing motor oil and oil filters if this meant you did not have to pay a fee for disposing of your used oil filters and motor oil at a collection site?

(N = 160)



- Almost two-thirds (64%) of respondents are *not* in favor of paying a higher price when purchasing motor oil and oil filters even if this means they do not have to pay a fee for disposing of the used oil and filters at a collection site (Figure 17).

Other findings

Education

- When compared to respondents with a college degree or higher (17%), more respondents with high school diplomas or less (44%) or some college or technical training (41%) *are* in favor of paying a higher price when purchasing motor oil and oil filters if this meant they did not have to pay a fee for disposing of used oil and filters at a collection site.

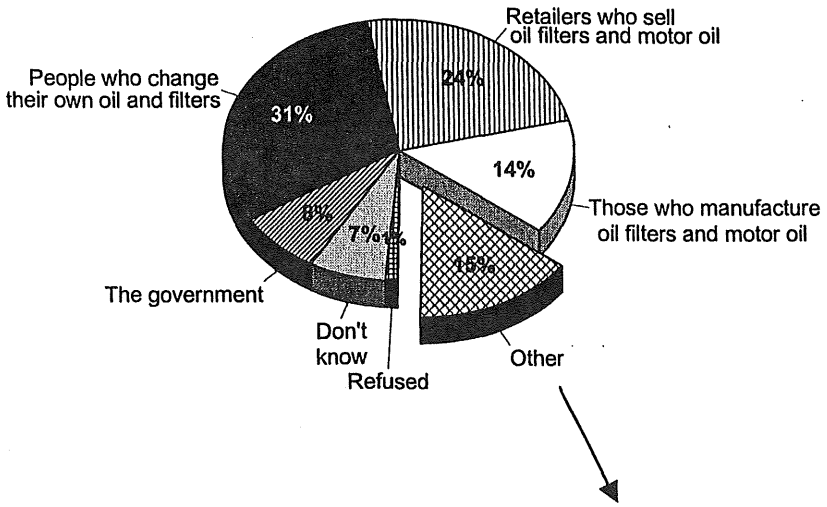
Age

- Approximately four in ten respondents between 18 and 35 years old (45%) or 36 and 45 years old (43%) *are* in favor of paying a higher price when purchasing motor oil and oil filters if this means they do not have to pay a fee for disposing of used oil and filters at a collection site. In contrast, only 18 percent of respondents between 46 and 56 years old and 31% of respondents 57 and older are in favor of this option.

FIGURE 18

Q18. Who do you think should be primarily responsible for paying for proper disposal of your used motor oil and oil filters.

(N = 500)



- Figure 18 shows that almost one-third (31%) of respondents *believe that people who change their own motor oil and filters* should primarily be responsible for paying for proper disposal, while almost one-quarter (24%) believe *retailers who sell motor oil and filters* should be primarily responsible.
- Less than one in ten (8%) respondents believe *the government* should be primarily responsible for the cost of proper disposal of used motor oil and filters

FIGURE 18b

Who else should be primarily responsible for paying for proper disposal of used motor oil and oil filters?

Responses	Percentage of Respondents (N = 72)*
The garage where you have your oil changed/people who make a living changing oil filters	81%
Everyone should have the responsibility	10%
People who purchase them/the consumer	4%
The retailers, those who change their own oil, and the government	1%
Whoever is dealing with the used product	1%
The industry who makes the oil and the people who change the oil	1%
It should be built into the price	1%

*Please note that in order to best reflect the open-ended responses, this table is not based on weighted data.

- Figure 18b shows that eight in ten (81%) respondents believe *the garage that changes your motor oil and filters* should be primarily responsible for paying for proper disposal.

Education

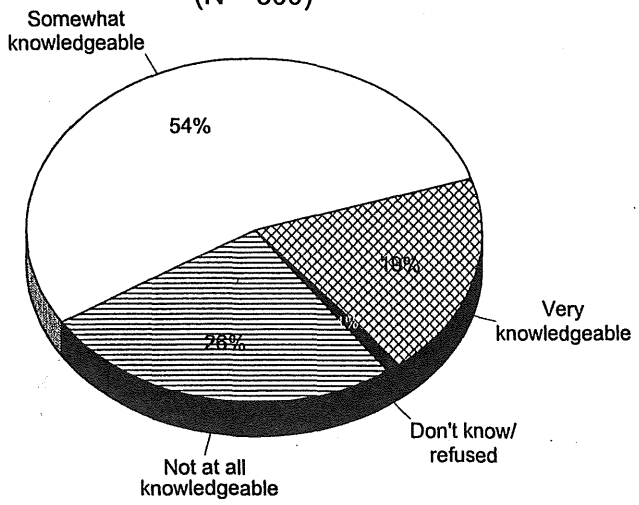
- Respondents with four-year college degrees or higher (23%) are significantly more likely than respondents with a high school diploma or less (12%) or some college or technical training (10%) to believe *someone other than the groups mentioned in question 18* should primarily be responsible for the cost of properly disposing of used motor oil and oil filters. Eighty-two percent of the respondents with a college degree or higher who feel that someone else should be responsible for the cost of proper disposal believe *the garage where you have your oil changed* should be primarily responsible for the cost.

Age

- With the exception of respondents who are 57 and older, the highest percentage of respondents in each of the age groups believe that people who change their own motor oil and oil filters should be primarily responsible for paying for proper disposal (32% of 18- to 35-year-olds; 31% of 36- to 45-year-olds; 37% of 46- to 56-year-olds). In contrast, the highest percentage of respondents aged 57 and older (36%) believe retailers who sell motor oil and filters should be responsible.

FIGURE 19

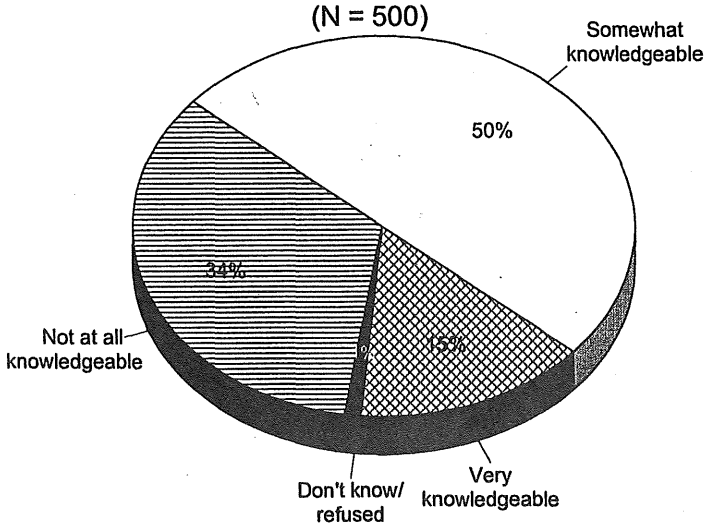
Q19. How would you rate your personal knowledge of the effects of used oil filters and motor oil on the environment?
(N = 500)



- Over half (54%) of respondents rate themselves as *somewhat knowledgeable* about the effects of used motor oil and oil filters on the environment (Figure 19).
- More than one-quarter (26%) of respondents state they are *not at all knowledgeable* about the effects of used motor oil and oil filters on the environment.

FIGURE 20

Q20. How would you rate your personal knowledge of Minnesota State laws regarding the proper disposal of used oil filters and motor oil?
(N = 500)



- Half of respondents state that they are *somewhat knowledgeable* about Minnesota State laws regarding the proper disposal of used motor oil and oil filters (Figure 20).
- More than one-third (34%) state that they have *no knowledge at all* of Minnesota State laws regarding proper used motor oil and oil filter disposal.

Geography

- More rural respondents (24%) rate themselves *very knowledgeable* of the effects of used motor oil and filters on the environment than do urban (15%) or out-state urban respondents (17%)

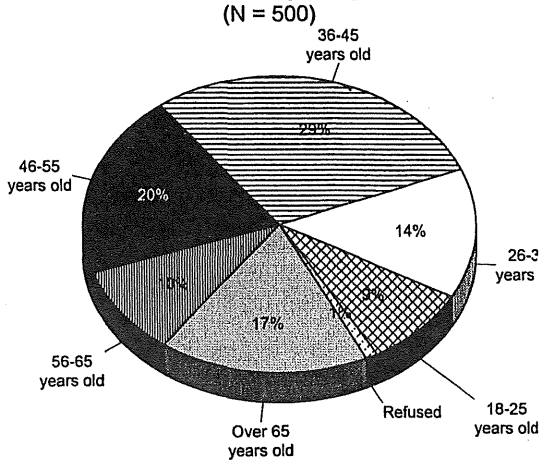
- More out-state urban respondents (64%) rate themselves *somewhat knowledgeable* about Minnesota State laws regarding proper used motor oil and oil filter disposal than do urban (46%) and rural respondents (52%)

Age

- Middle-aged respondents (between 36 and 56 years old) are more likely than younger and older respondents to rate themselves as *very knowledgeable* about the effects of used motor oil and filters on the environment (9% of 18- to 35-year-olds; 24% of 36- to 45-year-olds; 26% of 46- to 56-year-olds; 16% of those 57 and older).

FIGURE 21

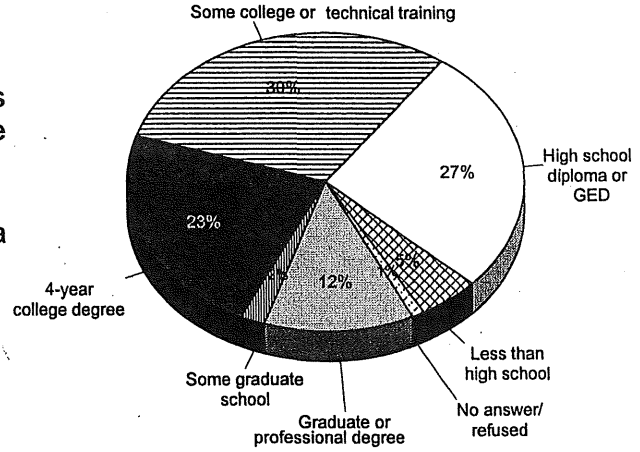
Q21. What is your age?
(N = 500)



- Over half (52%) of respondents are between 18 and 45 years old (Figure 21)
- More than one-quarter (27%) of respondents are over 55 years old.

FIGURE 22

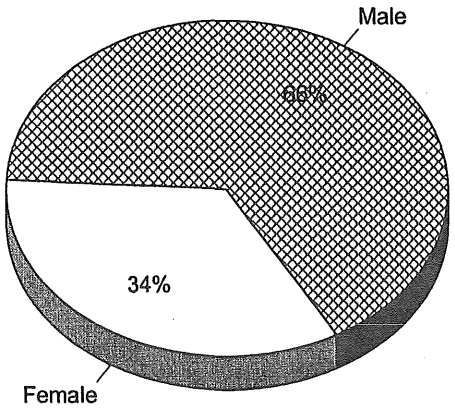
Q22. What is the highest level of education you have completed?
(N = 500)



- Over one-third (37%) of respondents have at least a four-year college degree (Figure 22).
- Approximately one-third (32%) have a high school diploma or less.

FIGURE 23

Respondents' Gender
(N = 500)



- Two-thirds of the respondents are *male* and one-third of respondents are *female* (Figure 23).

Appendix A:

Survey Questionnaire

Hello! I am calling on behalf of the State of Minnesota. We are calling people across the state in order to understand how we can help Minnesotans better manage their automobiles' used oil filters and motor oil. Please be assured that this survey is completely confidential! Your responses will never be tied to your name and the data will only be reported as a group. Is now a good time to complete this survey?

SCREENER: First, does anyone in your household own an automobile?

a. _____ Yes **(CONTINUE TO NEXT SCREENER)**

b. _____ No **(THANK AND TERMINATE)**

SCREENER: Are you the person in your household who makes most of the decisions regarding automobile oil changes?

a. _____ Yes

b. _____ No ⟶ May I please speak with that person? **(RE-READ INTRO)**

SCREENER: Do you work in the automotive industry?
(*Automotive industry includes: Car dealership, automotive repair or service station, quick tire, muffler, or oil change shop, automotive manufacturing plant, or body shop*)

a. _____ Yes **(THANK AND TERMINATE)**

b. _____ No **(CONTINUE TO Q1)**

1. How many cars and trucks are owned or leased by people in your household?

_____ cars/trucks

2. Do you typically change your vehicle's oil: **(READ a. thru c.; MARK ONE)**

a. _____ At home only, **(SKIP TO Q4)**

b. _____ Pay to have it changed at a service station, dealership, or shop specializing in oil changes only, or **(CONTINUE TO Q3)**

c. _____ Do you change your oil both at home and pay to have it changed? **(CONTINUE TO Q3)**

d. _____ Haven't had to change oil yet? **(SKIP TO Q18)**

3. On average, how often each year is the oil in each vehicle changed *at a service station or shop specializing in oil changes*? **(READ a. THRU e.; MARK ONE) (IF ANWERED b. IN Q2, SKIP TO END Q18) (IF ANSWERED c. TO Q2, CONTINUE TO Q4)**

a. _____ 1 – 2 times a year,

b. _____ 3 – 4 times a year,

c. _____ 5 - 6 times a year,

d. _____ 7 – 8 times a year

e. _____ 9 – 10 times a year,

f. _____ More than 10 times a year?

AVERAGE OIL CHANGE: EVERY 3000 MILES

4. On average how often each year do you change the oil in each of your vehicles at *home*? **(READ a. THRU e.; MARK ONE)**

a. _____ 1 – 2 times a year,
b. _____ 3 – 4 times a year,
c. _____ 5 - 6 times a year,
d. _____ 7 – 8 times a year
e. _____ 9 – 10 times a year,
f. _____ More than 10 times a year?

AVERAGE OIL CHANGE: EVERY 3000 MILES

5. When changing your automobile's oil, would you say you always, usually, sometimes, rarely, or never purchase oil filters and motor oil at: **(READ a. THRU d., CIRCLE ONE FOR EACH)**

	Always	Usually	Sometimes	Rarely	Never
a. A retail store such as Wal Mart, Target or Fleet Farm?	A	U	S	R	N

How about:

b. At a gas station such as Amoco, Texaco, Holiday or Super America?	A	U	S	R	N
c. An auto parts store such as Big Wheel Rossi, Napa, or Bumper-to-Bumper?	A	U	S	R	N

d. Is there any other type of store where you purchase oil and oil filters for your automobile?

1. _____ No
2. _____ Yes Specify: _____

6. This first series of questions deal with your used motor oil. In the past year, have you ever done any of the following with your used motor oil? **(READ a. THRU m.; CIRCLE ONE FOR EACH.)**

	Yes		No	Would you say you do this: Always	Usually	Sometimes	Rarely	Don't Know
a. Taken it to an automotive repair station or gas station?	Y	→	N	A	U	S	R	DK
b. Taken it to a facility that specializes in oil changes?	Y	→	N	A	U	S	R	DK
c. Taken it to an auto dealer?	Y	→	N	A	U	S	R	DK
d. Returned it to the store where you purchased it?	Y	→	N	A	U	S	R	DK
e. Taken it to a city or county operated public collection site?	Y	→	N	A	U	S	R	DK
f. Put it out separate from your trash for curbside pickup?	Y	→	N	A	U	S	R	DK
g. Put it directly in the trash for disposal?	Y	→	N	A	U	S	R	DK

(Cont'd)

Would you say you do this:

	Yes		No	Always	Usually	Sometimes	Rarely	Don't Know
h. Burned it with your trash?	Y	→	N	A	U	S	R	DK
i. Poured it down the drain, sewer, or toilet?	Y	→	N	A	U	S	R	DK
j. Poured it on the ground?	Y	→	N	A	U	S	R	DK
k. Used it for dust or weed control?	Y	→	N	A	U	S	R	DK
l. Stored it at your home?	Y	→	N	A	U	S	R	DK
m. Burned it for heat?	Y	→	N	A	U	S	R	DK
n. Reused it in any other way?	Y	→	N	A	U	S	R	DK

If yes, how have you reused it? _____

7. What, if any, are the barriers that prevent you from dropping off your used motor oil at a used oil collection site?

8. In the past year, have you ever had to pay a fee at a collection site to have your used motor oil disposed of?

   a. _____ Yes → How much? $ _____
   b. _____ No
   c. _____ Don't take used oil to a collection site
   d. _____ Don't know/refused

9. How satisfied are you with the current used oil collection sites in your area? Are you: **(READ a. THRU d., MARK ONE)**

   a. _____ Very satisfied,
   b. _____ Satisfied,
   c. _____ Dissatisfied, or
   d. _____ Very dissatisfied?
   e. _____ Don't know

10. This next series of questions deal with your used oil filters. In the past year, have you ever done any of the following with your used motor oil filters? **(READ a. THRU j.; CIRCLE ONE FOR EACH.)**

	Yes		No	Would you say you do this: Always	Usually	Sometimes	Rarely	Don't Know
a. Taken them to an automotive repair station or gas station?	Y	→	N	A	U	S	R	DK
b. Taken them to a facility that specializes in oil changes?	Y	→	N	A	U	S	R	DK
c. Taken them to an auto dealer?	Y	→	N	A	U	S	R	DK
d. Returned them to the store where you purchased them?	Y	→	N	A	U	S	R	DK
e. Taken them to a city or county operated public collection site?	Y	→	N	A	U	S	R	DK
f. Put them out separate from the trash for curbside pickup?	Y	→	N	A	U	S	R	DK
g. Put them in the trash for disposal?	Y	→	N	A	U	S	R	DK
h. Stored them at your home?	Y	→	N	A	U	S	R	DK

11. What, if any, are the barriers that prevent you from dropping off your used motor oil filters at a used oil collection site?

12. In the past year, have you ever had to pay a fee at a collection site to have your used oil filters disposed of?

e. _____ Yes → How much? $ _____

f. _____ No

g. _____ Don't take used oil filters to a collection site

h. _____ Don't know/refused

13. How satisfied are you with the current used oil filter collection sites in your area? Are you: **(READ a. THRU d.; MARK ONE)**

a. _____ Very satisfied,

b. _____ Satisfied,

c. _____ Dissatisfied, or

d. _____ Very dissatisfied?

e. _____ Don't know

14. Now I am going to read a list of possible options for collecting used oil filters and motor oil. For each option, please tell me if you would be very likely, somewhat likely, or not at all likely to use it for disposing of your used oil filters and motor oil. How likely would you be to: **(ROTATE; READ a. THRU f., CIRCLE ONE FOR EACH)**

	Very Likely	Somewhat Likely	Not at all Likely	Don't Know	Refused	Not Applicable
a. Drop off your used oil filters and oil at a city or county public works garage?	VL	SL	NL	DK	R	NA
b. Drop off your used oil filters and oil at a retailer who sells oil and oil filters?	VL	SL	NL	DK	R	NA
c. Put your used oil filters and oil out for curbside collection?	VL	SL	NL	DK	R	NA
d. Drop off your used oil filters and oil at the place you bring your recyclables?	VL	SL	NL	DK	R	NA
e. Drop off your used oil filters and oil at household hazardous waste collection facilities?	VL	SL	NL	DK	R	NA
f. Drop off your used oil filters and oil at a facility that specializes in oil changes?	VL	SL	NL	DK	R	NA

15. Of all of the options we just discussed, which **one** do you **most** prefer for disposing of your used oil filters and motor oil?

_____ **(WRITE LETTER FROM Q14 HERE)**

16. Would you be very likely, somewhat likely, or not at all likely to bring your used oil filters and motor oil to a collection site if the site: **(READ a. THRU e., CIRCLE ONE FOR EACH)**

	Very Likely	Somewhat Likely	Not at all Likely	Don't Know	Refused
a. Charged between $1.50 and $2.00 per oil filter?	VL	SL	NL	DK	R
b. Charged more than $1.00 but less than $1.50 per oil filter?	VL	SL	NL	DK	R
c. Charged between 50 cents and one dollar per oil filter?	VL	SL	NL	DK	R
d. Charged less than 50 cents per oil filter?	VL	SL	NL	DK	R
e. How about if the collection site were free?	VL	SL	NL	DK	R

17. Would you be in favor of paying a higher price when purchasing motor oil and oil filters if this meant you did not have to pay a fee for disposing of your used oil filters and motor oil at a collection site?

a. _____ Yes

b. _____ No

18. Please tell me who you think should be ***primarily*** responsible for paying for proper disposal of your used motor oil and oil filters. Should it be: **(ROTATE; READ a. THRU d.; MARK ONE)**

a. _____ Those who manufacture oil filters and motor oil,

b. _____ Retailers who sell oil filters and motor oil,

c. _____ People who change their own oil filters and motor oil,

d. _____ The government?

e. _____ Don't know

f. _____ Refused

g. _____ Other: _____

19. How would you rate your personal knowledge of the effects of used oil filters and motor oil on the environment? **(READ a. THRU c.; MARK ONE)**

a. _____ Very knowledgeable,

b. _____ Somewhat knowledgeable, or

c. _____ Not at all knowledgeable?

d. _____ Don't know/Refused

20. How would you rate your personal knowledge of Minnesota State laws regarding the proper disposal of used oil filters and motor oil? **(READ a. THRU c.; MARK ONE)**

a. _____ Very knowledgeable,

b. _____ Somewhat knowledgeable, or

c. _____ Not at all knowledgeable?

d. _____ Don't know/Refused

21. What is your age? _____

22. What is the highest level of education you have completed? **(DO NOT READ, MARK ONE)**

a. _____Less then high school

b. _____High school diploma or GED

c. _____Some college or technical training school

d. _____4-year college degree

e. _____Some graduate school

f. _____Graduate or professional degree

g. _____No Answer/Refuse

That's it! Thank you for your time!

Respondent's gender: _____ Male :_____ Female

Interviewer ID: _____ _____ _____ _____

Interview Length: _____ _____: _____ _____