

Used Motor Oil Disposal

Submitted to:

Southwest Florida Water Management District

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Background

Imagine this scenario — a man walks over to his car. He jacks it up and slides underneath. He takes his wrench and loosens the drain plug out of the oil pan and licks his lips. Instead of releasing the oil into a drain pan, he opens his mouth and begins to guzzle back the oil. “Drinks the oil,” one may ask in disbelief? While this scenario certainly sounds ridiculous, used motor oil disposed of improperly, down a drain or on the ground, can quite possibly end up in our drinking water. Five percent of the 2.3 million Americans who change their own oil dispose of their used motor oil improperly.¹ These numbers are quite frightening considering that the EPA estimates that it only takes one gallon of used oil to contaminate up to one million gallons of drinking water.²

Households that change their own oil, dubbed do-it-yourselfers (DIYers), account for 19% of all used oil generation.³ A 1981 EPA survey revealed that 14% of DIYers returned their used oil for reuse or recycling, usually to service stations, and 21% disposed of it with other household wastes.⁴ The remaining 65% released it directly into the environment.⁵ The Department of Environment estimates an even higher rate of improper disposal by DIYers — 80%.⁶ DOE estimates that 348 million gallons of used oil were improperly disposed of in the U. S. in 2004.⁷ Aside from DIYers, other generators include automotive sources, transportation facilities and industrial sources, with the latter responsible for nearly 50% of used oil generation.⁸

The illegal dumping of used motor oil and other hazardous wastes affects a region's water quality because contaminated runoff can enter ground and surface water, affecting drinking water, public health and aquatic habitat.⁹ Also, open burning in illegal dumping sites can cause forest fires that result in severe erosion and sediment loading in streams.¹⁰ Economically speaking, the property value of an illegal dumping site is reduced and can affect the local tax base and thus ability to maintain pollution prevention programs.¹¹ By reducing the improper disposal of used motor oil, there will be a reduced need for removing oil from water sources, which is a difficult and costly procedure.¹² The only method for doing so is with an activated charcoal filter that binds hydrocarbons as well as other organic compounds such as pesticides.¹³ There are also overwhelming energy and crude oil savings, if proper oil processing/recycling facilities exist. It takes approximately 40% less energy to produce base oils from used oil in a state-of-the-art process plant than it does to produce base oils from crude oil.¹⁴ An even newer method of processing, soon to be introduced in Germany, avoids creating any waste during production.¹⁵ Recycling used oil contributes significantly to conserving coveted oil resources, since the production of only one ton of synthetic oil requires between 150 and 190 tons of crude oil.¹⁶ The U. S. EPA estimates that if improperly disposed used motor oil was properly managed, the U. S. could save thousands of barrels of oil each day.¹⁷

Barriers and Benefits

Research conducted for California's Integrated Waste Management Board on do-it-yourselfers (DIYers) and used oil disposal uncovered that convenience was a major barrier to properly disposing of oil.¹⁸ DIYers who reported living three or more miles away from a certified collection center were most likely to improperly dispose of oil and improper disposers were more likely than other DIYers to claim that closer collection centers and curbside collection would encourage more frequent recycling.¹⁹ A Bureau of Transportation survey somewhat paralleled these results, revealing that approximately 40% of illegal dumpers claim they did not know where a recycling facility was located or that their recycling facility's location was inconvenient.²⁰ Therefore, the absence of a routine pickup service for hazardous waste is a barrier to its proper disposal.²¹

Interestingly, there were no reported differences in awareness of environmental impacts related to the improper disposal of oil between proper and improper disposers.²² Thus, a lack of environmental awareness was not cited to be a barrier to the proper disposal of oil in the CIWMB survey.²³ However, in another survey of household behaviors conducted by the Bureau of Transportation Statistics (BTS), 60% of the estimated 5% of people who admit to disposing of their oil improperly said that they had never heard of recycling used motor oil or that there was no recycling facility in their area.²⁴

The CIWMB study also revealed that the fewer years a resident has lived in California, the more likely he or she was to dispose of used motor oil improperly.²⁵ Immigrant workers and migrants who have lived in the U.S. for 5 or fewer years have improper oil disposal rates of 40%, while only 8.5% of people who have lived in the U. S. for 15 or more years report disposing of oil improperly.²⁶ Unlike CIWMB's 1994 survey of oil disposal behavior, which indicated that Hispanics were most likely to improperly dispose of oil, this study found no racial differences for proper oil disposal.²⁷ However, in focus groups conducted by Wesley Schultz of California State University with Latino immigrants, it was found that there was no difference in the percentage of proper and improper disposers and the time spent in the U.S.²⁸ Only 16% of those who spoke Spanish only reported recycling as an option, while 72% who spoke at least some English reported recycling as an option. This survey concludes that a high level of acculturation and not years spent in the U.S. is related to proper disposal of used motor oil.²⁹

Hazardous waste policies have also been linked to the improper disposal of used motor oil. Policies that raise the cost of legal disposal encourage illegal dumping. Therefore, the cost of the proper disposal method can be a barrier to proper disposal if high, or a benefit if low.³⁰ Inadequate existing laws or a lack of understanding of applicable laws, therefore, are barriers to proper disposal of hazardous wastes.³¹ In fact, a used oil disposal ban increases illegal dumping by a midrange estimate of 28%.³² Another cost barrier that needs to be considered is if the fee for dumping at a proper waste disposal facility is higher than the fine for an illegal dumping offense³³, people are given an incentive to *not* dispose of their used oil properly.

A benefit to disposing of used motor oil properly is that if there is a deposit/refund system in place, collection of a refund gives people an incentive to take their used oil to a collection facility.³⁴ A 10% increase in the salvage value of oil results in a 6% decrease in illegal dumping.³⁵ Also, if enforcement is in place, there is a lower number of self-reported illegal dumpings. Therefore, complying with the law in order to avoid receiving a fine is a benefit to properly disposing of one's used motor oil.³⁶

Summaries of Programs

Germany's Return Collection Legislation

Germany has been working fervently toward nationwide proper disposal of used oil since their 1986 Waste Avoidance and Management Act.³⁷ This Act introduced the principle that waste avoidance and recycling should be given precedence over disposal.³⁸ The law created the foundation for what is now called product responsibility, whereby the petroleum industry became responsible for the free collection and proper environmentally compatible disposal of used oil from consumers.³⁹ Every store that sells new oil must accept return of equivalent quantities of used combustion engine or gearbox oil, free of charge.⁴⁰ The outlets must also clearly display signs in their windows, indicating that such a return policy exists.⁴¹ All combustion engine and gearbox oil can now only be sold accompanied by this message: "This oil must be returned to a used oil collection center at the end of its useful life. Improper disposal of used oil poses a risk to the environment! The addition of other products such as solvents, brake fluid and coolant is prohibited."⁴² Illegal disposal and blending of oil with harmful chemicals such as PCBs were greatly reduced as a result of the act.⁴³ The illegal disposal of hazardous waste is liable to severe penalties, which increases the probability that people will observe the law.⁴⁴

A revised waste management act, The Closed Substance Cycle and Waste Management Act, entered into full force in 1996.⁴⁵ A number of substance and process-related provisions governing the recycling of certain types of waste have since been drawn up, including the Ordinance on Waste Oils, which entered into full force May 1, 2002.⁴⁶ This ordinance regulates which types of waste oil must be separately stored and which are subjected to recycling by priority material.⁴⁷ Before the Ordinance on Waste Oils came about, there was a regulation governing the reprocessing of used oil issued in November of 1987.⁴⁸ Only combustion engine, gearbox and mineral-based machine, turbine and hydraulic oils can be reprocessed.⁴⁹ Other oils can be reprocessed if they are within pollutant limits, and priority is given to the processing of waste oil into base oil for the production of new lubricants.⁵⁰ Other processing methods include combustion oil to produce cement clinkers, reprocessing used oil into heating oils, and pressurized gasification with subsequent methanol synthesis.⁵¹ To make the material recycling of waste oil competitive compared with energetic use, waste oil refineries receive a nonrepayable allowance for every ton of base oil produced from used oil.⁵²

For a program as large-scale and diverse as Germany's, it is difficult to assess how in particular proper disposal of used motor oil by DIYers has improved since Germany's efforts began. However, this program attempts to overcome the barriers of cost and

convenience and emphasizes the benefit of complying with the law to avoid receiving a fine. And not only is waste oil being diverted from ground and surface water, it is being recycled — which saves energy and crude oil resources. About 500,000 tons of used oil is collected each year under Germany's return collection legislation, and some 65% (325,000 tons) of that total is reprocessed.⁵³ Since it has been estimated that a top-of-the-line process plant can reprocess used motor oil into base oil using about 40% less energy than it takes to produce base oil from crude oil, the program also results in significant energy savings.^{54 55}

CIWMB's Used Oil Recycling Program

California's Integrated Waste Management Board (CIWMB) has undertaken a number of steps to overcome the barriers to properly disposing of used motor oil. CIWMB does so through a statewide network of collection opportunities and outreach efforts to inform and motivate the public to recycle used oil.⁵⁶ The major goals of the program include providing Californians with convenient collection locations for used oil, increasing the demand for re-refined oil, motivating residents to recycle their used oil and providing grants to local governments, nonprofit organizations and for research and demonstration projects.⁵⁷ Under California's Oil Recycling Enhancement Act, administered by CIWMB, oil manufacturers are required to pay CIWMB \$0.16 for each gallon of lubricating oil sold in California.⁵⁸ In turn, registered industrial generators, curbside collection programs and certified collection centers are eligible to receive \$0.16 from CIWMB for each recycled gallon of used lubricating oil.⁵⁹

Los Angeles⁶⁰

The city of Los Angeles, California, has an education and ordinance program designed to encourage DIY oil changers to dispose properly of their used motor oil. The city uses a number of approaches to increase the proper disposal of used oil. Their education outreach is targeted to DIYers audiences, as identified in three Los Angeles public surveys: Latino (English and Spanish) and African-American males, ages 25–29; Caucasian and Asian males ages 25–29; and Latino (English and Spanish) and African-American males ages 45–49.⁶¹ The public outreach includes a mass-media campaign consisting of point-of-purchase displays and in-store floor graphics, public service announcements and radio spots, and billboard and bus shelter displays. In addition to public outreach for older males, school children from elementary to high school age were also targeted. At the high school level, students learned in shop class and through journalism projects tips for proper disposal of used oil and stormwater pollution prevention.⁶² In addition, through high school newspapers, the city conducted an advertising campaign. During this reporting period, 12 high schools were targeted and ads were placed in 25 newspaper publications.⁶³

In addition to these educational outreach efforts, Los Angeles makes it easier for citizens to dispose of their used motor oil by offering over 300 recycling collection centers citywide. Certified centers will pay residents up to \$0.16 per gallon for returned used motor oil, and most centers take up to five gallons at a time.⁶⁴ In addition, the city employs a team of 20 inspectors whose job is to canvass the city to find, respond to and investigate reports of illegal discharges into the streets and stormdrain system.⁶⁵ They

have posters and other message mediums, including refrigerator magnets, with the city's stormwater hotline number.⁶⁶

Los Angeles city offers public outreach, convenient recycling facilities and incentives to residents to return their used motor oil to a certified center. However, a community-based social marketing (CBSM) pilot study conducted by the CIWMB and the California State University, San Marcos (CSUSM), revealed additional barriers to the proper disposal of used motor oil.⁶⁷ In Los Angeles, DIYers reported being turned away from certified collection centers because they didn't have proper collection containers.⁶⁸ To overcome this barrier, a CBSM intervention strategy was developed whereby free oil collection containers affixed with motivational prompts were distributed to DIYers at auto parts stores.⁶⁹ Through this pilot, 1,468 customers received free oil collection containers with the traditional CIWMB "Recycle Used Oil and Filters" sticker from four Kragen Auto Parts stores.⁷⁰ Another 1,476 residents received the same free containers affixed with a different, more motivational "Take the Last Step" sticker at an additional four Kragen stores.⁷¹ A third group of consumers who acted as the control group did not receive collection containers from another eight Kragen stores.⁷²

This pilot study found that following the intervention, Kragen stores who distributed the free oil collection containers with the motivational "Take the Last Step" sticker experienced a 22% increase in the volume of used oil collected, compared to the control group.⁷³ Kragen stores who distributed free containers with the standard CIWMB "Recycle Used Oil and Filters" stickers only experienced a six percent increase in volume of used oil collected, compared to the control group.⁷⁴ Information on the total budget for Los Angeles city's program was not available; however, CIWMB and CEPA fund a significant portion of the program — \$157,934 USD for 2002–2003.⁷⁵

Napa⁷⁶

In Napa County another CBSM pilot sought to improve the proper disposal of used motor oil by overcoming Napa's specific barriers to recycling used motor oil. The majority of surveyed DIYers in Napa knew little about the county's curbside oil recycling program or were not sufficiently motivated to use it. In addition, many believed that other DIY residents rarely recycled their used oil, suggesting that this behavior was not yet normative.⁷⁷ To counter these barriers, Napa's intervention strategy was to send residents informational curbside program enrollment mail-outs with testimonials from community role models about the value of the program.⁷⁸

Of 1,026 pilot-targeted DIY households that could potentially use the curbside oil program, only 339 (33%) were taking advantage of the service.⁷⁹ Mail brochures were redesigned by the contractor and used oil coordinator in order to better inform and motivate DIY residents to participate in the curbside oil collection program. The brochures included program enrollment procedures as well as testimonials about the value of the county's curbside oil collection service from respected and well-known Napa residents, along with their photographs.⁸⁰ Potential curbside users were divided into one of three conditions: the control in which no mail-outs were sent; Area A, which

received the brochures with a call-in curbside oil enrollment number; and Area B, which received a mail-in curbside oil enrollment card with the brochure.⁸¹

Results of this pilot indicate that the best approach was the brochure mail-out containing the mail-in curbside oil enrollment card, as 25 new participants signed up, a 45% increase in participation.⁸² The brochures containing a call-in curbside oil enrollment number were less effective, with 15 new participants, a 22% increase in enrollment.⁸³ There was no increase in enrollment in control areas. Perhaps the most impressive finding from this pilot was the 248% increase in the number of curbside oil pickups in the month following the intervention.⁸⁴ This program was funded by CIWMB, and for 2002–2003, it was granted \$671,825 USD for oil recycling purposes.⁸⁵

Madera

A similar CBSM pilot study was conducted in Madera County. The following barriers were identified: a lack of commitment from DIYers to recycle used oil; and no oil collection centers in certain areas of the county.⁸⁶ To overcome these barriers, the pilot consisted of a distribution of oil funnels affixed with commitment pledge stickers for DIYers, as well as recruitment of new collection centers in the unincorporated portions of the county.⁸⁷ To determine the most effective motivators for used oil recycling, DIY customers exiting a Napa Auto Parts collection center were given one of three incentive packets.^{88 89} Packet #1 consisted of a \$5 gift certificate and used oil recycling brochure which acted as the control; Packet #2 consisted of a \$5 gift certificate, the brochure and an oil funnel; and Packet #3 consisted of the gift certificate, brochure, and oil funnel, but the funnel was affixed with an oil recycling pledge sticker.⁹⁰

Measurements of behavior change as a result of this pilot were based on self-evaluations conducted one month following the intervention.⁹¹ Six percent of DIYers who received Packet #1 reported improper disposal of oil, and 22% reported recycling their oil at a certified collection center.⁹² No one who received Packet #2 reported improper disposal, and 40% reported recycling their oil.⁹³ Those who received Packet #3, with the pledge sticker, did not report any used oil disposal differences from those who received Packet #2, which indicates that the free funnel encouraged proper disposal and recycling of used motor oil, but the pledge sticker did not encourage behavior beyond the free funnel incentive level.⁹⁴

Efforts to expand certified collection centers (CCC) to underserved rural areas were not as positively received. None of the 12 potential certified CCCs who initially were receptive to at least receiving more information about becoming a CCC, decided to become one because of all of the associated hassles.⁹⁵ This study concludes that alternative methods to certified collection centers, such as curbside collection, may be more useful in rural areas.⁹⁶ The cost of the program was not mentioned in this review, but for 2002–2003, CIWMB granted Madera \$174,883 for used oil recycling program costs.⁹⁷

Santa Monica

The city of Santa Monica also conducted a CBSM pilot study to determine the barriers and come up with solutions to properly disposing of used motor oil. Santa Monica overcomes the barriers of a lack of education, inconvenience and costs with their program. By partnering with 300 businesses, the city distributed “Dump Used Oil and We All Get Soaked” posters and tip cards, which illustrate a young girl stepping into an oil-filled pan, to over 17,000 residents in the Pico Neighborhood area.⁹⁸ The Pico area was chosen because it was underserved in environmental education and had a low participation rate at the city’s HHW facility.⁹⁹ Specifically, the city contracts with a local Latino nonprofit organization to target oil recycling messages to Santa Monica’s Latino communities, and staff from the Environmental Programs Division conduct education programs on oil recycling for public and local Santa Monica schools.¹⁰⁰ To overcome the barriers related to convenience, the city also offers a weekly curbside recycling program that includes collection of used motor oil and filters and a permanent Household Hazardous Waste Collection Facility open Wednesday to Saturday from 8 a.m. to noon for residents who live in areas without access to curbside recycling.¹⁰¹ Also, there are several local auto parts and lube shops that will accept used motor oil and filters for free, and there is an easy-to-remember number to call — (888) CLEANLA — for locations. Also for convenience sake, the city provides the public with free reusable oil recycling containers that can be obtained at the city’s HHW facility.¹⁰² There is also a law that prohibits the improper disposal of used motor oil, with fines ranging from \$500 to \$250,000 USD if one is caught breaking this law.¹⁰³

The City of Santa Monica Environmental Programs Division reached over 17,000 residents with their used oil recycling message during the campaign and reported a 60% increase in the amount of used motor oil collected as a result of their campaign efforts.¹⁰⁴ This pilot study was conducted with money from a community grant from CIWMB.¹⁰⁵ ¹⁰⁶ While the amount of that grant was not listed, in 2002 CIWMB announced giving Santa Monica a grant of \$246,400 USD for used oil recycling program costs.¹⁰⁷

Used Motor Oil Disposal Pilot

The above pilots reveal several important elements of an effective used oil collection program. The collection program must be understood by DIYers, they need to be provided with free containers to collect used oil, collection of the used oil must be convenient, and there should be strong disincentives for improper disposal. Each of these elements is discussed below.

Education: As demonstrated by the CIWMB research, residents, not surprisingly, are unlikely to participate if they are unaware of the program. In addition, level of acculturation was found in California to be an important barrier to participation. As a consequence, it is suggested that the onus of education be placed upon the stores that sell motor oil. Further, it is suggested that they be mandated to provide culturally appropriate information on how and where to dispose of used motor oil.

Collection Containers: In addition to providing information on the proper disposal of used oil, retail outlets should also distribute free containers that can be used for used oil collection. Further, these containers should provide motivational information on the importance of recycling oil, as well as information regarding curbside collection.

Convenient Collection: It is suggested that curbside collection of used motor oil be provided and be supplemented with requiring that every retail outlet that sells oil be mandated to collect used motor oil. Further, these stores should be required to clearly advertise that used oil can be dropped off at their store.

Fines: Finally, to discourage illegal dumping of motor oil, significant fines should be established and advertised. Further, the public should be encouraged to report illegal dumping of motor oil through a 1-800 line. Encouraging the public to provide information on illegal dumping may serve as an effective deterrent, as it substantially increases the perception that an individual may be caught illegally disposing of motor oil.

It is suggested that two concurrent pilots be conducted to test their relative impacts on oil disposal.

Strategy 1: In the first strategy, retail clerks inform residents who are purchasing oil of the importance of properly disposing of their used oil. Further, the retail clerks provide free collection containers in addition to informing customers that oil can be collected at the curbside along with their recyclables.

Strategy 2: The second strategy is identical to the first, however, the stickers on the side of the free recycling containers will also indicate that individuals who illegally dump used motor oil are subject to significant fines and provides a 1-800 number to report illegal dumpers. The addition of fines in Strategy 2 will allow the importance of enhancing motivation to properly dispose of used motor oil to be determined.

Pilot Evaluation

Given the nature of the proposed pilots, two smaller communities with nonexistent curbside collection programs for used motor oil will be used as pilot areas. Both communities will need to be similar regarding demographics and the percentage of motorists who are DIYers. Further, they must be geographically separate so that information on fines in the second pilot community cannot influence behavior in the first pilot community. The evaluation of these pilots is straightforward — electronic inventory data on the amount of oil sold by each retail outlet is compared to the amount of oil collected curbside and at the retail outlets. It should be mandated that retail outlets in each community must provide information on the amount of oil that they sell. Since these programs are likely to be ongoing given their communitywide deployment, evaluations of the amount of oil collected should be sought for as long as the programs stay in place to evaluate whether initial changes in disposal behavior are maintained.

Finally, it should be noted that the American Petroleum Institute (API) Model Bill helps states establish a used oil fund designed to provide grant funding for municipalities that wish to provide used oil drop-off or curbside collection programs.¹⁰⁸ The Bill also mandates that the state establish a 1-800 number to provide information to residents about used oil recycling and that signs be posted with the 1-800 number and information about the need for proper collection and recycling of used motor oil.¹⁰⁹ Under the Bill, used oil collection centers are reimbursed for the costs associated with receiving contaminated used oil.¹¹⁰

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DTooley@cityofmadera.com. Web site: <http://www.cityofmadera.org/default.asp>

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