American Petroleum Institute

Study of Used Motor Oil Recycling in Eleven Selected Countries

By the Used Oil Working Group
November 1997

Strategies for Today's Environmental Partnership

One of the most significant long-term trends affecting the future vitality of the petroleum industry is the public's concerns about the environment, health and safety. Recognizing this trend, API member companies have developed a positive, forward-looking strategy called STEP: Strategies for Today's Environmental Partnership. This initiative aims to build understanding and credibility with stakeholders by continually improving our industry's environmental, health and safety performance; documenting performance; and communicating with the public.

API ENVIRONMENTAL, HEALTH AND SAFETY MISSION AND GUIDING PRINCIPLES

The members of the American Petroleum Institute are dedicated to continuous efforts to improve the compatibility of our operations with the environment while economically developing energy resources and supplying high quality products and services to consumers. We recognize our responsibility to work with the public, the government, and others to develop and to use natural resources in an environmentally sound manner while protecting the health and safety of our employees and the public. To meet these responsibilities, API members pledge to manage our businesses according to the following principles using sound science to prioritize risks and to implement cost-effective management practices:

- To recognize and to respond to community concerns about our raw materials, products and operations.
- To operate our plants and facilities, and to handle our raw materials and products in a manner that protects the environment, and the safety and health of our employees and the public.
- To make safety, health and environmental consider-ations a priority in our planning, and our develop-ment of new products and processes.
- To advise promptly, appropriate officials, employ-ees, customers and the public of information on significant industry-related safety, health and environmental hazards, and to recommend protective measures.
- To counsel customers, transporters and others in the safe use, transportation and disposal of our raw materials, products and waste materials.
- To economically develop and produce natural re-sources and to conserve those resources by using energy efficiently.
- To extend knowledge by conducting or supporting research on the safety, health and environmental effects of our raw materials, products, processes and waste materials.
- To commit to reduce overall emission and waste generation.
- To work with others to resolve problems created by handling and disposal of hazardous substances from our operations.
- To participate with government and others in creating responsible laws, regulations and standards to safeguard the community, workplace and environment.
- To promote these principles and practices by sharing experiences and offering assistance to others who produce, handle, use, transport or dispose of similar raw materials, petroleum products and wastes.

Study of Used Motor Oil Recycling In Eleven Selected Countries

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Executive Summary

The study described in this report obtained information about used motor oil collection and recycling programs in eleven selected countries around the world. As the number of motor vehicles, including not only passenger automobiles but also trucks, construction equipment, buses, and other public conveyances increases, countries face a growing need to find ways to collect and reuse the lubricating oil that these vehicles use. In the United States, the American Petroleum Institute (API) has sponsored a range of programs to promote the environmentally protective management and recycling of used motor oil. API and its members have served as a resource for the development of used motor oil recycling programs in other countries, and have a long-term interest in how other countries address used motor oil. API and its Used Oil Working Group therefore sponsored a review of a range of programs, from the most highly developed to the most preliminary, as a means of understanding how a variety of countries are addressing the issue.

The eleven countries examined are, in alphabetical order, Argentina, Brazil, France, Germany, Japan, Mexico, the Philippines, South Africa, Sweden, Thailand, and Trinidad and Tobago. They span a wide range of geographic locations, as well as different economic and political systems. As the study indicates, they have, in particular, many different approaches to used motor oil recycling.

Although a broad range of source materials were examined in the course of the research, in the end much of the most useful information came from person-to-person contacts between API's researchers and key persons in the countries of interest. Literature searches, collections of international legislative materials, and the Internet were used to collect background information, and in some cases (e.g., Germany and France) the Internet, in particular, proved to be a very valuable source of information. The embassies in the United States of the eleven countries, and U.S. embassies abroad, in some cases provided the names of key contacts. Ultimately, a written protocol of questions was sent to one or more contacts in each of the eleven countries. Telephone contacts led to additional sources. Extensive followup telephone interviews were necessary to collect the desired information.

In several countries, little or no data were available on some of the core questions. In particular, information is frequently difficult to obtain on do-it-yourself motor oil changers, especially their numbers and the amounts of used motor oil that they generate. Statistics also do not always distinguish clearly between used motor oil and other categories of used oil. Frequently, too, the definition of what it means to "recycle" used motor oil is imprecise; burning such oil, even burning before impurities have been removed, sometimes is considered recycling.

Recognize that a more structured program about used motor oil is needed. About half of the countries surveyed, including Japan, Mexico, the Philippines, Thailand, and Trinidad and Tobago, have embarked on efforts to learn more about the issue and design programs to address it. Brazil, France, Germany, South Africa, and Sweden, in contrast, seem to have effectively functioning programs at the present time, although the structures of those programs are very different. Brazil has a nationally-mandated program that apparently is implemented, and may vary significantly, on the local level. France and Germany have relatively centralized and prescriptive programs, mandated by national law. Sweden, in contrast, uses a decentralized and non-prescriptive approach. In South Africa, manufacturers of motor oil subsidize the used motor oil collection and recycling program.

The following table summarizes the broad outlines of the programs in the eleven countries. As the table shows, almost all of them rely on collection of used motor oil at service and repair shops. Germany is almost unique in the emphasis it places on the responsibility of motor oil sales outlets to accept used motor oil.

Table 1—Oil Management Program Overview for the Eleven Countries Surveyed

	National Legislation On Used Motor Oil Recycling	Collection of Used Oil at Sales Points	Collection of Used Oil at Service and Repair Shops	Program(s) to Involve Do-It-Yourselfers	Licensed Collectors of Used Motor Oil
France	✓		✓	✓	✓
Germany	✓	✓	✓	✓	
Sweden			✓		
South Africa			✓	✓	
Mexico			✓		
Trinidad & Tobago		✓	✓		
Argentina					
Brazil	✓	✓	✓	✓	
Japan	✓		✓		
Philippines	✓		✓		
Thailand			✓		

Relatively few of the eleven countries have enacted national legislation pertaining expressly to used motor oil. Several have defined used motor oil as a hazardous waste. Such a definition, however, does not always carry with it a high level of attention to enforcement of prohibitions on dumping or other prohibited forms of disposal.

As the report details, only a few countries of the eleven surveyed are currently recycling a high proportion of the used motor oil generated annually. In some cases, in fact, unused recycling capacity is available. In summary, the picture conveyed is one of high potential for increased used motor oil recycling in many of these countries, if the factors that currently are inhibiting recycling can be overcome.

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FRANCE

INTRODUCTION

France is pursuing an active used motor oil management program. Initial used motor oil policy efforts were focused on conserving the nation's oil supply, while later policy measures have concentrated on recycling and re-use for the good of the environment. The laws and decrees created to support used oil recycling have evolved over the years into the legislation that mandates France's current program.

LAWS AND REGULATIONS

General National Policy

The Decree of September 21, 1973, prohibits the dumping of petroleum or petroleum products into navigable waters. This was followed by the Decree of March 8, 1977, which prohibits the dumping of new or used oil in oceans and other bodies of water. General policies such as these led to the Decree of November 21, 1979, which provided the basis for France's used oil management program until revised in 1989 and 1995.

Decree of November 21, 1979 (No. 79-981)

The Decree of November 21, 1979, imposed obligations and restrictions on the collection and elimination of used oil in France. The policy was expected to ensure the effective collection of used oil and the realization of the highest possible economic yield from the used oil collected. This decree defined recycling or regeneration as the acceptable methods of eliminating used oil, although it also allowed for the possibility of other industrial uses, such as combustion. Commercial generators were required to give their used oil to a licensed collector. The collectors of used oil were responsible for its transport to a licensed end use facility, and were granted an exclusive three-year franchise by the French government. Permits were granted on a lowest-bid basis. The price of used oil when sold to end use facilities was established and regulated by Agence Nationale pour la Récupération et l'Elimination des Déchets (ANRED), the agency responsible for the administration of France's used oil management program. The established system, however, proved uneconomical, and the government amended this law with the Decree of August 31, 1989.

Decree of August 31, 1989

The Decree of August 31, 1989, relinquished the French government's control over used oil prices, and eliminated the transportation franchise system. Permits were now issued by the French government to the most qualified transportation firms, who collected and transported the used oil in the most environmentally sound manner. The sale price of used oil was to be negotiated by collectors and end use facilities. The decree also authorized licensed transporters to sell used oil to foreign recyclers who were licensed in an EC Member State.

Law No. 95-101 of February 2, 1995

This law modified Law No. 92-643 of July 13, 1992, addressing the elimination of wastes. Activities such as the elimination of industrial waste are regulated, as outlined in this law, by regional or inter-regional bodies. Moreover, the 1995 law provided that the elimination of used oil, and the activities surrounding this process, was to be a national program regulated by a national entity. The waste oil collection program in France is currently administered by Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME). ADEME is responsible for the following, in order to ensure the collection of used oil:

- Administration of a tax on base oil.
- Participation in the licensing of collectors.
- Participation in the licensing of owners/operators of used oil treatment facilities.
- Intermediary role between the public and concerned professionals.
- Support for the development of technologies associated with the collection and end use of used oils.
- Completion of technical and economic audits on the used oil collection program.
- Implementation of awareness programs, including the placement of "Please Dispose of Properly" stickers on oil containers.

CURRENT USED OIL MANAGEMENT ACTIVITIES

Motor Oil Sales

According to a report produced by ADEME in 1990,[1] a total of 945,576 kilotons of oil is sold annually in France (Figure 1). More than half of this oil is for automotive uses, including passenger car engine oil, heavy duty diesel oil, transmission fluid, and gear oil. Figure 2 demonstrates the distribution of sales within these categories. More than half of the motor oil that is sold, 51.6 percent, is bought at garages and car dealers.[2] The remainder is sold by supermarkets, service stations, and specialists.

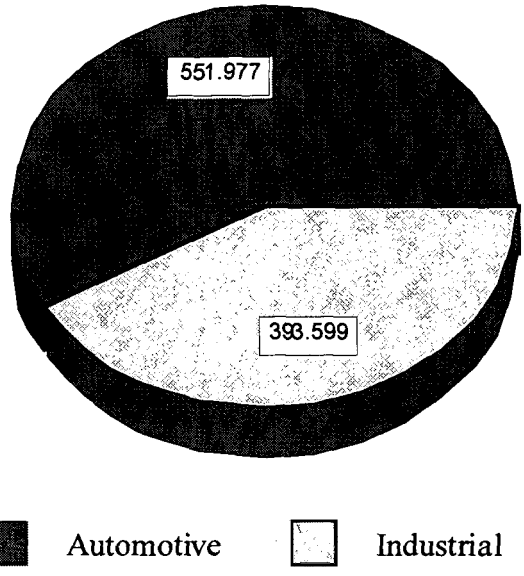
Used Motor Oil Collection

Used motor oil is generated by a number of establishments and businesses. These generators are the persons or legal entities who accumulate within their establishments used oil from business-related

[1] Data from 1990 are the most recent data available.

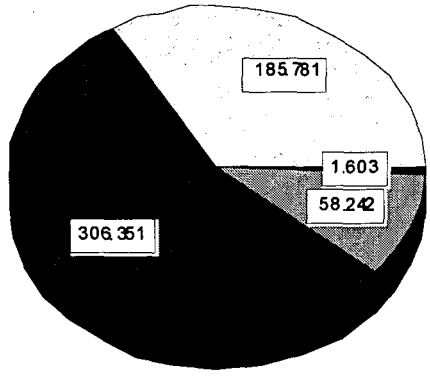
[2] CONCAWE . *Collection and Disposal of Used Lubricating Oil.* Brussels: November 1996, pp. 82.

Figure 1
1990 Total Oil Sales (KTONS)



Source: ADEME Report.

Figure 2
1990 Motor Oil Sales (KTONS)



Source: ADEME Report.

activities. They are required by law to follow specific procedures, including the separation of used oil and other mixtures during storage. Generators may dispose of the used oil in three ways:

- Sale of used oil to a licensed collector.
- Transport of used oil to a licensed collection establishment.
- Elimination of used oil under a license granted by the Minister of the Environment.

The percentage of DIY-ers in France was estimated in 1991 at 30–35 percent.[3] No more recent estimate has been obtained.

Licensed collectors are the persons or legal entities who collect or transport used oil that has been transferred to them by those that generate it. Collectors must be licensed by the Minister of the Environment. As of 1995, 230 collectors were licensed in France.[4] Licensed collectors are responsible for picking up all used oil quantities greater than 200 liters upon request from a holder, free of charge. Small quantity generators or DIY-ers may dispose of their used oil at a gas station or garage collection site.

The amount of used motor oil that has been collected for end use has increased steadily since 1990. A little over 50 percent was collected in 1990, according to a report produced by the Institut FranHais de l'Environnement (IFEN). By 1995, IFEN reported that 78 percent of used motor oil was collected for recycling (Figure 3).[5]

In 1990 the total amount of oil collected was approximately 409 kilotons (Figure 4).[6] Almost three-fourths of this oil was automotive oil. The total amount of used motor oil collected in 1990 was 290,525 kilotons (Figure 5). More than half of the used oil collected is heavy duty diesel oil, and this figure has increased by 1.38 percent since 1989.[7] HazNews reports that 220,000 kilotons of used motor oil were collected in 1995.[8]

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[3] American Petroleum Institute. *Used Oil Management In Selected Industrialized Countries.* Washington DC: January 1991, p. 41.

[4] France. Agence de l'Environnement et de la Maîtrise de l'Energie: Centre d'Angers. *Ramassage des huiles usagées: Liste des ramasseurs agrées.* February 1995.

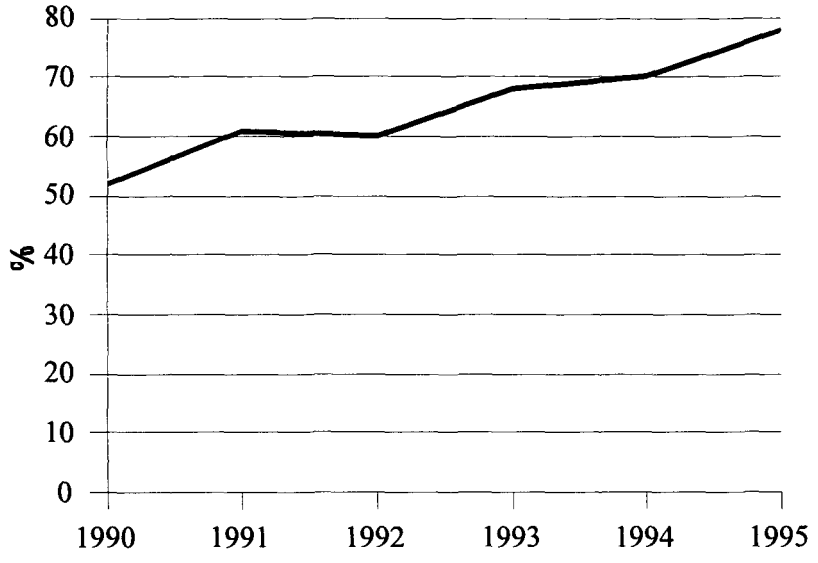
[5] France. Institut Français de L'Environnement. *Indicateurs de performance environnementale de la France.* Edition 1996–1997.

[6] France. Agence de l'Environnement et de la Maîtrise de l'Energie: Centre d'Angers. *Collecte et elimination des huiles usagées en France.* Angers: October 15, 1992.

[7] France. Agence de l'Environnement et de la Maîtrise de l'Energie: Centre d'Angers. *Collecte et elimination des huiles usagées en France.* Angers: October 15, 1992.

[8] HazNews. *Eco-Huile to Build Second Oil Recycling Plant.* August 1, 1996.

Figure 3
Used Motor Oil Collection



Source: IFEN Report.

Figure 4
1990 Total Used Oil Collection (KTONS)

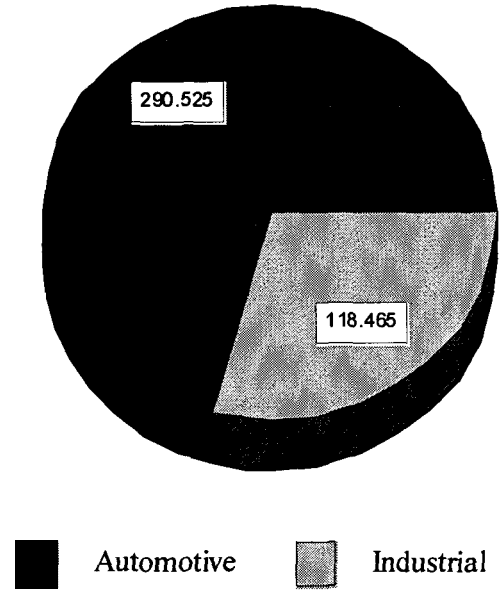
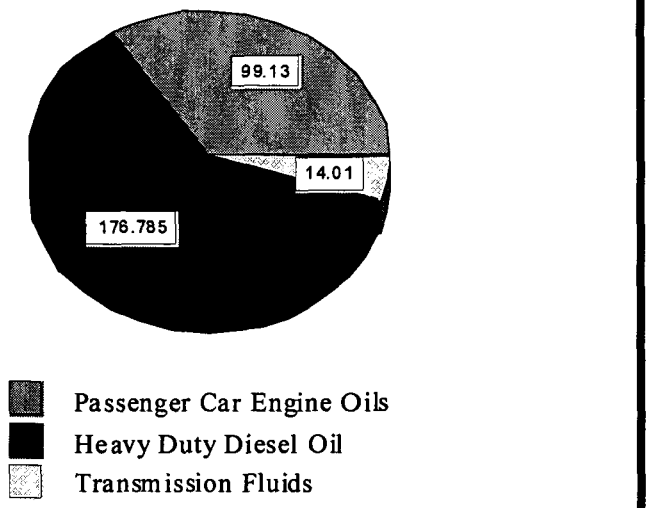


Figure 5
1990 Used Motor Oil Collections (KTONS)



Motor Oil Recycling Facilities

The owner/operator of a used oil treatment facility must be approved and licensed by the Minister of the Environment. Used oil treatment facilities can be re-refining plants, combustion plants, reclaiming plants, or reprocessing plants. At the end of 1991, there were 39 licensed end use facilities: 9 licensed for industrial combustion and 30 licensed for recycling or reprocessing. As of 1995, an additional 14 facilities were licensed for the combustion of used oil, and burned 121.7 kilotons that year.[9]

France's used oil recycling program experienced some problems in 1992 when three recycling plants were forced to close down, reducing treatment capacity from 120,000 kilotons to 80,000 kilotons per year.[10] This crisis was induced by the increasing costs of modernizing old equipment and an all-time low in the price of base oil. Until 1992, oil recycling efforts in France had been efficient and profitable. While all plants were eventually forced to close, the French government upgraded the recycling process and created Eco-Huile, an oil recycling association, in 1993. Eco-Huile was designed to help remove some of the financial burden of used oil collection and disposal.[11] The majority of recycling that still occurs is completed by Eco-Huile.

In July 1996, the French company Chimirec opened a new treatment unit to pretreat oil filters for the future recycling of their various components. Chimirec is a company that specializes in collecting and recycling used oil and toxic products.[12]

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[9] France. Institut Français de L'Environnement. *Indicateurs de performance environnementale de la France.* Edition 1996–1997.

[10] HazNews. *Eco-Huile to Build Second Oil Recycling Plant.* August 1, 1996.

[11] Escande, Phillippe. *Eco-Huile va piloter le recyclage des huiles usagées.* Les Echos, 1993. This article indicates that in 1992, 80,000 tons of used oil was recycled by Compagnie des Bases Lubrifiantes, who declared bankruptcy in late 1992. Eco-Huile was expected to assume a large portion of this business. The January 1997 edition of *L'Observateur de l'environnement* reported that an American company created in 1994, Puralube, has the capacity to recycle 80,000 tons of used oil per year. Eco-Huile and Puralube are the only facilities presently capable of recycling used oil in France.

[12] CBNB. *Chimirec Opens New Treatment Unit in France.* August 13, 1996.

Amounts and Types of Recycling

ADEME reported that 107,963 kilotons of used motor oil were recycled in 1991.[13] HazNews reports that in 1995, 220,000 kilotons of used motor oil were collected by licensed private firms and local authorities. Of this, about 100,000 kilotons were recycled by Eco-Huile, and the remainder was incinerated.[14] These data are consistent with data from a 1995 CONCAWE report, which indicate that reprocessing has disappeared as a method of used oil disposal in recent years. Figure 6 demonstrates that direct burning, or combustion, now accounts for 52.1 percent of used oil disposal.[15] This category encompasses cement kilns, power generating plants, steel plants, waste incinerators, and garage heaters. Re-refining of used oil accounts for the second largest quantity, approximately 42 percent annually, while 5.9 percent of used oil is reclaimed.[16]

Used Motor Oil Contaminants

An important aspect of used oil management is the prevention of danger posed by used oil contamination. PCB is the contaminant of greatest concern. The French government has prohibited the mixing of used oil with other substances, and collectors are required to sample used oil to identify extreme levels of PCB.[17] Chlorine and heavy metals are also a concern, and studies on heavy metal content have been completed by a number of companies in France.[18]

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[13] France. Agence de l'Environnement et de la Maîtrise de l'Energie. *Comite de gestion de la taxe parafiscale sur les huiles de base.* Rapport D'Activite, 1991.

[14] HazNews. *Eco-Huile to Build Second Oil Recycling Plant.* August 1, 1996.

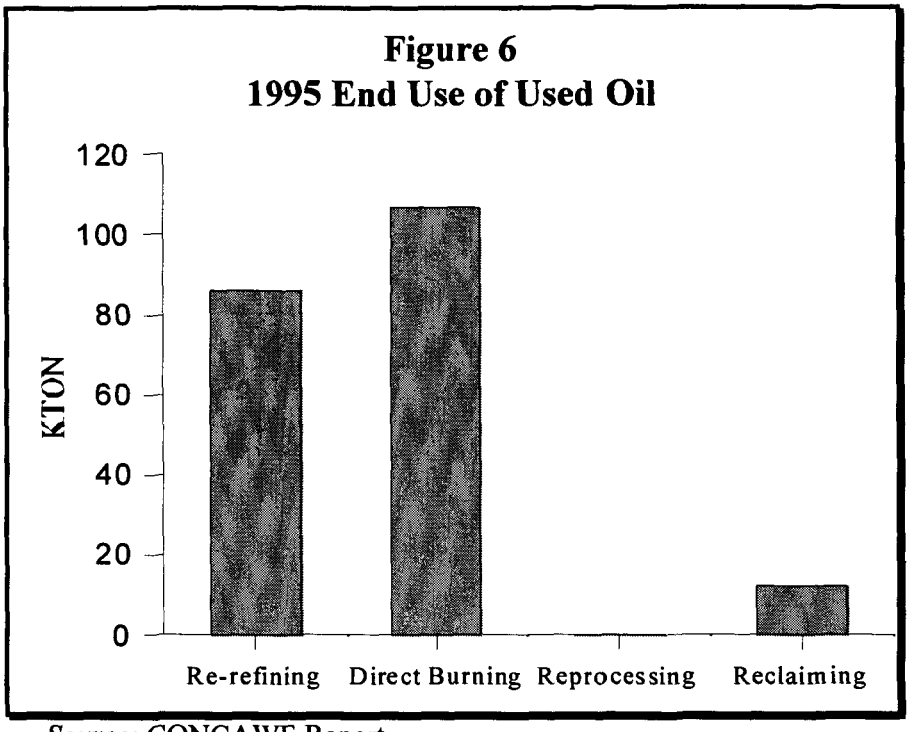
[15] CONCAWE . *Collection and Disposal of Used Lubricating Oil.* Brussels: November 1996, p. 82.

[16] CONCAWE . *Collection and Disposal of Used Lubricating Oil.* Brussels: November 1996, p. 82.

[17] American Petroleum Institute. *Used Oil Management In Selected Industrialized Countries.* Washington DC: January 1991, p. 41.

[18] France. Agence de l'Environnement et de la Maîtrise de l'Energie: Centre d'Angers. *Collecte et elimination des huiles usagées en France.* Angers: October 15, 1992.

Figure 6
1995 End Use of Used Oil



Source: CONCAWE Report.

GENERAL PROGRAM INFORMATION

Used Motor Oil Recycling Program Funding

The used motor oil recycling program in France is subsidized by federal taxes. Such taxes are applied to all virgin and regenerated base oils, whether they are produced in France or imported. These taxes are created to facilitate the collection and the treatment of used oil. Money collected is used to subsidize the following persons and activities:

- Collectors of used oil, proportional to the quantity collected.
- Owners/operators of end use facilities that treat and/or eliminate used oil.
- Public education programs, including programs designed for generators of used oil.
- Technical and administrative costs of ADEME's operations.

Specific decrees subsidizing the used oil management program in France are outlined below.

The Decree of August 31, 1989 (No. 89-649) created a tax on virgin and regenerated base oil. This decree modified the original Used Oil Decree of November 21, 1979, as well as the Decree of March 29, 1985. All taxable oils are defined in Article 2 of the decree. The Decree of August 31, 1989, established a tax period beginning in October of 1989 and ending in December of 1992, with a flat tax of 90 French francs per ton of base oil.[19] ADEME was identified as the administrating agency. Due to financial

[19] France. Agence de l'Environnement et de la Maîtrise de l'Energie. *Comite de gestion de la taxe parafiscale sur les huiles de base.* Rapport D'Activite, 1991.

difficulties, the flat tax was raised from 90 French francs per ton to 150 French francs per ton in early 1993. This tax period ran through February 28, 1994. In 1991, 80 million French francs were raised by this base tax, and it is estimated over 75 million French francs were raised in 1992.[20] The Decree of August 31, 1994 (No. 94-753) renewed the tax on virgin and regenerated base oil. This decree established a tax period of five years and again identified ADEME as the administrating agency. This tax applies to all base oils defined in Article 2 of the decree, and is limited to 150 French francs per ton of base oil.

Public Education Programs

Public awareness is essential to the success of the used oil management program, and ADEME spends almost one-quarter of a million dollars annually on public education programs.[21]

Future Prospects

The current program appears to be stable. However, the federal taxes currently supporting the program will need to be renewed in 1999, and the program could be reexamined at that time.

[20] France. Agence de l'Environnement et de la Maîtrise de l'Energie: Centre d'Angers. *Collecte et elimination des huiles usagées en France*. Angers: October 15, 1992.

[21] CONCAWE. *Collection and Disposal of Used Lubricating Oil*. Brussels: November 1996, pp. 82.

GERMANY

INTRODUCTION

Used motor oil recycling has followed a pattern of steady growth in Germany. The country regulates the collection, transportation, and disposal of used motor oil. Despite the fact that Germany did away with all subsidies for recycling in 1986, the country boasts a remarkable record associated with the regulation of used oil collection and disposal. One hundred percent of all sales points for motor oil report having collection facilities on or near their premises.[22] In addition, of the 690 ktonnes of used oil produced annually, the government reports that 94 percent is returned and is either reprocessed or burned.[23]

LAWS AND REGULATIONS

History of Used Oil Management Program

Waste oil, including used motor oil, has been regulated in Germany under a number of different acts. The Used Oil Act of 1968 (*Altoelgesetz*) provided the legal basis for the used oil management system through much of the 1980s. Despite the high percentage of used oil recycled under this program, however, a number of problems plagued the system. Many of these problems stemmed from the act's definition of used oil, which included oil that had been contaminated by such substances as PCBs and PCTs, and from a tax/subsidy system that was set up to help finance the collection and disposal of used oil and lubricants.[24] In addition, the law did not take regional and geographical differences associated with oil collection into account, thereby placing heavier burdens on more rural areas that were not in close proximity to a used oil recycling plant or any of the four authorized incineration facilities for contaminated oils.

The Waste Disposal Act of October 6, 1972 (*Abfall-Beseitigungsgesetz, AbfG*) was a federal ordinance that worked in conjunction with the Used Oil Act of 1968. It was based primarily on existing state waste laws, and was directed at monitoring and regulating all wastes, including used oil. This Act incorporated regulations from a number of German states, consolidating and reorganizing them into one uniform, national law. It defined:

- What constitutes waste.
- Who has an obligation to dispose of waste.
- How waste is disposed.
- Where (in terms of authorized facilities) specific wastes can or must be disposed.[25]

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[22] CONCAWE. *Collection and Disposal of Used Lubricating Oil.* Brussels, November 1996, p. 84.

[23] Press release: Fachkonferenz in Bonn: "Altoelrecycling muss Vorrang vor Verbrennung erhalten." Dortmund. February 8, 1996.

[24] American Petroleum Institute. *Used Oil Management in Selected Industrialized Countries.* Prepared by Andrew Lohof. Discussion Paper #064. January 1991, p. 109.

[25] Umweltbundesamt. Waste Avoidance, Recycling and Disposal Act. http://www.umweltbundesamt.de/uba-info-daten-e/daten-e/waste-avoidance.htm.

Although the Waste Disposal Act primarily regulated domestic waste, it also included provisions for the federal government to regulate and monitor the import and export of wastes, specifically those that presented a possible threat to the environment.

The Waste Disposal Act of 1972 was replaced in 1986 by the Waste Avoidance and Waste Management Act (*Gesetz ueber die Vermeidung und Entsorgung von Abfaellen, AbfG, BGBl.I*), adopted on August 27, 1986.[26] This new act was supplemented by a number of targets, or recycling quotas, and by a number of directives, which were more specific in defining certain wastes and the ways in which they could be disposed (e.g., the Sewage Sludge Directive, the Waste Incineration Plant Directive).[27]

Waste Oil Ordinance of 1987 (*Altoelverordnung*)

In 1987, the German federal government drafted the Waste Oil Ordinance (*Altoelverordnung*), replacing the Used Oil Law of 1968 and supplementing the general rules set forth under the Waste Law of 1986.

Under German law, consumers are required to return all used motor oil to designated collection sites, from which it is collected for reprocessing, burning, or disposal, depending on the contamination level of the substance. Previously, taxes and subsidies were used to finance the transportation and disposal costs associated with used motor oil recycling. However, the Waste Oil Ordinance adopted in 1987 did away with any government-sponsored subsidy or rebate programs. The German government believed that because there was such high compliance with the law, taxes and subsidies were no longer needed.

The regulations associated with this act revised the definition of used oil to include internal combustion engine oil, transmission oil, mineral motor and transmission oils, and any oils that, "because of the products from which they are derived and where they appear, can be considered for reprocessing."[28] In addition, the new ordinance forbade mixing used oil with foreign substances. This was to discourage collectors from contaminating the oil with other substances in order to avoid paying handling and disposal fees for the other substances. In order to help regulate the reprocessing and recycling of used oil, the federal government licensed used motor oil recycling and reusing plants under the Federal Emissions Control Act (*Bundesimmissionsschutzgesetz*).

The Waste Oil Ordinance also changed the regulations associated with the collection of waste oils. The key sections are numbers 8 to 11:

> 8. Any person or facility that sells unused oil must accept, without charge, a quantity of used engine or transmission oil, equal to any quantity of unused oil they deliver themselves. This applies either when the buyer purchases unused oil in the same quantity as that which is being turned in, or when the buyer can provide evidence of having purchased the same quantity at an earlier date.
>
> 9. Sellers of lubricants must display a notice of the requirements for proper disposal of used motor or transmission oil. This can be done either on the packaging of the product or at the point of sale. If the seller is catering to private users of the product, the seller

[26] Umweltbundesamt Waste Oil Disposal. http://www.umweltbundesamt.de/uba-info-daten-e/daten-e/waste-oil-disposal.htm.

[27] Waste Avoidance, Recycling and Disposal Act.

[28] Waste Oil Disposal.

also must indicate the location of the collection site for the used oil at the point of sale to encourage DIYs to return the used motor oil for recycling.

10. In circumstances where it is not possible for the suppliers to collect the used oil, they may enter onto a contractual agreement with a third party, such as a filling station or garage, to fulfill their obligations.

11. If there is no collection point at the point of sale, the supplier must indicate where, in the vicinity, a collection point exists for the used oil.

Prior to the adoption of the Waste Oil Ordinance, recyclers of motor oil were required to pick up used motor oil at no charge to the suppliers. Subsidies were paid to the collectors and recyclers to compensate them for the costs associated with the transport, reprocessing, or burning of the oil. These subsidies were financed through taxes imposed on applicable products. Because this and other laws regulating the collection, recycling and disposal were thought to be strictly adhered to by all involved parties, the subsidies were no longer considered necessary and were phased out.

Waste Avoidance, Recycling, and Disposal Act of 7/10/96

In 1993, the German federal government decided to update the Waste Avoidance and Waste Management Act of 1986 to take into account the economic and environmental benefits that could be derived from recycling materials in a market economy. The Waste Avoidance, Recycling, and Disposal Act was signed into law on July 10, 1996. This new act applied the concept of waste from European law to the national level by reinterpreting the traditional definition of waste to include all substances, surpluses and residues that are not produced or used for any specific purpose (i.e., industrial residues).[29] Overall, the main goal of the act is to integrate and direct waste management and regulation to more of a recycling economy, and to avoid the production of waste as much as possible, in all stages of production.

The new act places a great deal of responsibility on manufacturers both for their methods of production, and for the end products themselves. Manufacturers are expected to integrate the recycling of substances that are essential to the manufacture of products, such as solvents and oils, in the production cycle of goods and ensure that the final products are environmentally sound in both their use and disposal. End products are expected to be re-usable, have a long life-span, be easily repairable, emit low levels of pollutants, and be either easily recyclable or disposable in an environmentally sound manner.

The act recognizes that the production of some wastes is unavoidable. However, these substances are required to be recycled in an environmentally acceptable manner. Both thermal and material recycling are permissible; however, the more environmentally sound manner has priority. Only those substances that cannot be recycled at any stage of the production cycle may be disposed. A number of supplements to the act define and regulate the substances that may be disposed, and the environmentally appropriate treatment and disposal of these substances.

The directives and guidelines of the law came into effect when the law was signed, and a number of transitional regulations were developed for the directives on waste certification, waste requiring special supervision, and waste transportation. Many of the new regulations, especially those with substantially new regulations regarding the designation of wastes as being recyclable and the materials used, will not come into effect until January 1, 1999.[30]

[29] Waste Avoidance, Recycling and Disposal Act.

[30] Waste Avoidance, Recycling and Disposal Act.

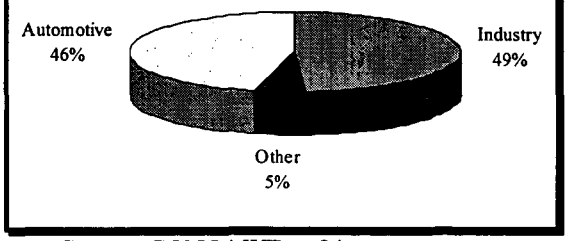
Update of the Waste Oil Ordinance

The German federal government is currently in the process of revising and updating the regulations for used oil collection, transportation, and disposal under the Waste Oil Ordinance of 1987. Although the update to the ordinance was expected to be completed by September 1996, the precise changes have not been finalized.[31] Much of the present legislation is expected to remain intact; however, a number of clauses are expected to become more stringent. Only engine and transmission, and mineral machine, turbine, or hydraulic oils may be reprocessed under this law. In addition, any oil that contains over 20 ppm PCBs may only be reprocessed by using methods that destroy the contaminants.[32] All oils not subject to reprocessing must observe the regulations under the Federal Emissions Control Act (*Bundesimmissionsschutzgestz*) for thermal recycling. Only those substances that cannot be reprocessed or thermally recycled may be disposed of as hazardous waste (as provided by the Waste Avoidance, Recycling, and Disposal Act). The government intends to update the regulation in a way that will maintain the current proportions of reprocessing versus burning. Currently, approximately two thirds of used motor oils are recycled or reprocessed, and one third is disposed of thermally, primarily through burning in cement kilns. The German cement industry uses approximately 90 percent of the oil which is disposed of thermally for fuel in its kilns.[33]

CURRENT USED OIL MANAGEMENT ACTIVITIES

Currently, automobiles account for approximately half of the total lubricating oil consumed in Germany. Industries, using oil and oil-based lubricants in their manufacturing processes, are the other major consumer. Together, industries and automobiles account for approximately 95 percent of all of the motor oil used in Germany (see Figure 7). Although it is important to note that industries use motor oil in their manufacturing processes, it is not regulated in the same manner, or under the same legislation, as motor oil used in automobiles. Therefore, this analysis is addressed primarily at the collection, transportation, and disposal of used motor oil produced by automobiles.

Figure 7
Estimated Distribution of Motor Oil Consumption



Source: CONCAWE, p.84.

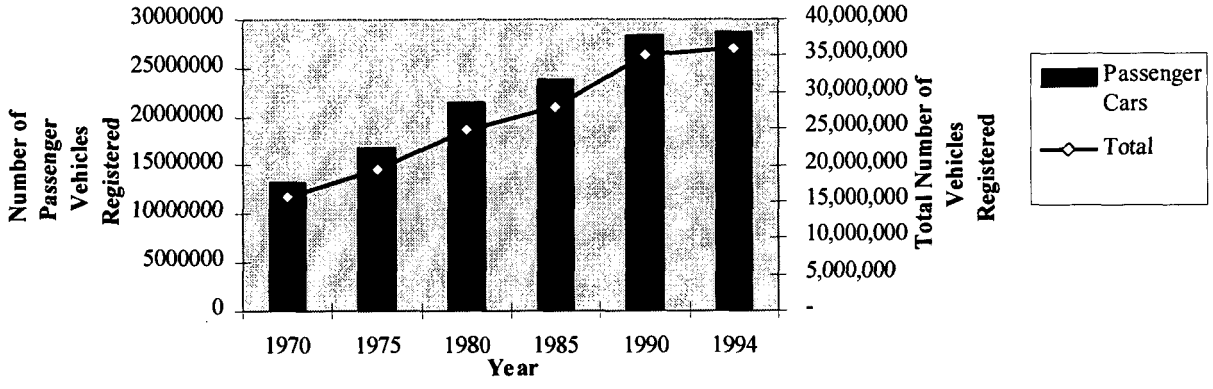
[31] Personal Communication: Hans Wischmann, Trade Specialist, Consulate of the United States of America, the Commercial Service, Hamburg, Germany. April 9, 1997.

[32] Precise directions for the testing and analysis of oils must be observed to ensure that the PCB levels remain within the prescribed limits. Waste Oil Ordinance. http://www.umweltbundesamt.de/uba-info-daten-e/daten-e/waste-oil-ordinance.htm

[33] Wischmann, Consulate of the United States of America.

The number of vehicles registered in Germany has been steadily increasing since the early 1950s, and has only recently started to level off. In 1994, approximately 36 million vehicles were registered in Germany, 28 million, or approximately 80 percent, of which were passenger cars.[34] This ratio, illustrated in Figure 8, which shows the trends for both passenger and total vehicles since 1970, has remained relatively consistent over the last 25 years. In addition, it is estimated that 13 percent of all the oil changes performed annually are done by do-it-yourselfers.[35] Due to these factors, the general populace is the single largest producer of used motor oil from automobiles in Germany.

Figure 8
Vehicle Registrations in West Germany: 1970 to 1994



Source: Germany—Total Registrations 1954–1994. Verband der Automobilindustrie e.V.

Motor Oil Sales

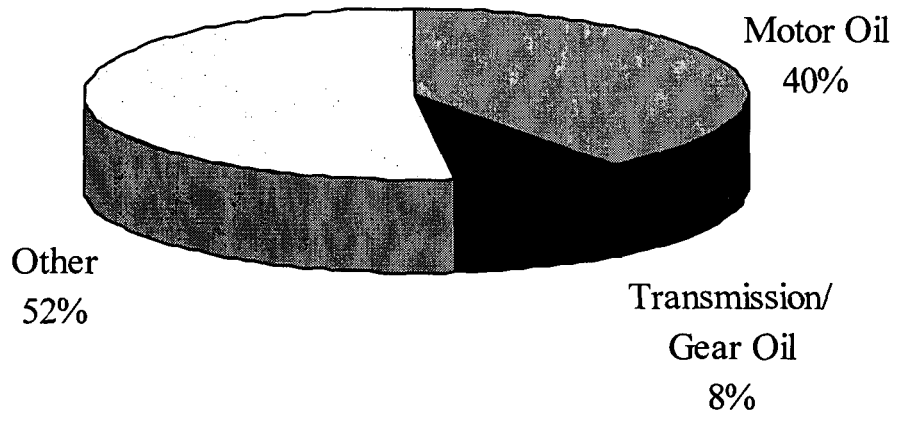
In 1993, an estimated 420.9 ktonnes of motor oil was purchased, accounting for approximately 40 percent of all the oil sold in Germany that year; transmission and gear oils accounted for an additional 84.3 ktonnes (see Figure 9).[36] A 1995 study by CONCAWE estimated that, of the total motor and transmission oil sold in 1995, approximately 327 ktonnes were purchased for use in passenger cars. Motor oil accounted for approximately 75 percent of this demand, with all the other substances making up the remaining quarter (see Figure 10). Under German law, consumers are required to treat all of these substances as hazardous materials, and must dispose of them accordingly. In addition, it is illegal for both consumers and collectors to mix used motor oil with any other substance, such as brake fluids, solvents, or other toxic or hazardous materials.

[34] Germany—Total Registrations 1954–1994. Verband der Automobilindustrie E.V.

[35] CONCAWE, p. 84.

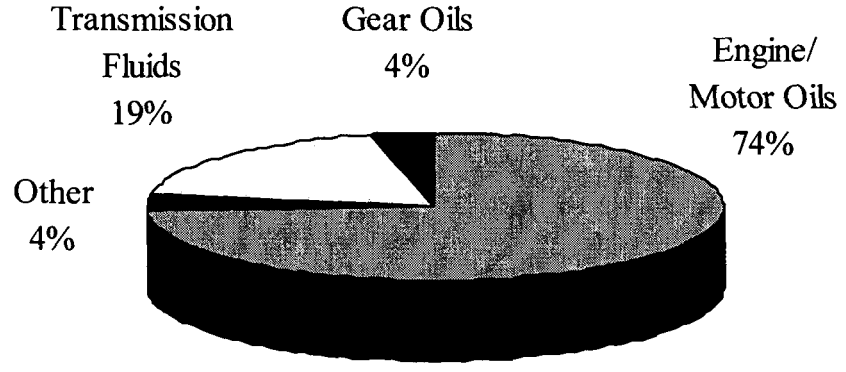
[36] Personal Communication: Klaus Fricke, Umweltbundesamt. Berlin, Germany. April 23, 1997

Figure 9
Domestic Sales of Motor Oil: 1993



Source: Fricke, Umweltbundesamt.

Figure 10
Total Sales of Passenger Automotive Oils: 1995



Source: CONCAWE, p. 84.

As Table 2 indicates, motor oil is purchased at a number of different locations. However, all of these vendors are subject to the same regulations concerning the sale and collection of the oil. Under the

current law, vendors of motor oil are required to indicate clearly, at the point of sale, the location of a collection site for waste oils.[37] In addition, vendors must have a used motor oil collection site either at, or in close proximity to, their point of sale. They are required to accept used oil, at no cost, in the same quantity as that which is being purchased, or if the consumer can provide documentation (e.g., a sales receipt) of a purchase of the same quantity at an earlier date.

Table 2—Sales Patterns for Passenger Car Oils and Lubricants: 1995

Sales Point	Quantity of Oil Sold (ktonnes)	Percent of Total
Garages, Workshops, Car Dealers	130.8	40%
Hyper/Supermarkets	89.3	27%
Service Stations	49.1	15%
Factory Fill	35.0	11%
Autocenters, Specialists	22.9	7%
Total	**327.1**	**100%**

Source: CONCAWE, p. 84.

Used Motor Oil Collection

All vendors of motor oil must provide a collection site for used motor oil either on, or in close proximity to, their premises. These vendors are also required to pay haulers to pick up and transport the used motor oil to appropriate collection facilities. On average, the owner/generator of the used oil pays the equivalent of approximately $90 per ton for the collection and transport of the used oil. The amount that recyclers will pay for used motor oil from transporters depends on how it is going to be recycled. Typically, oil is purchased for up to $70 per ton if it is to be disposed of by burning in a cement kiln or up to $55 per ton if the oil is to be re-refined.[38]

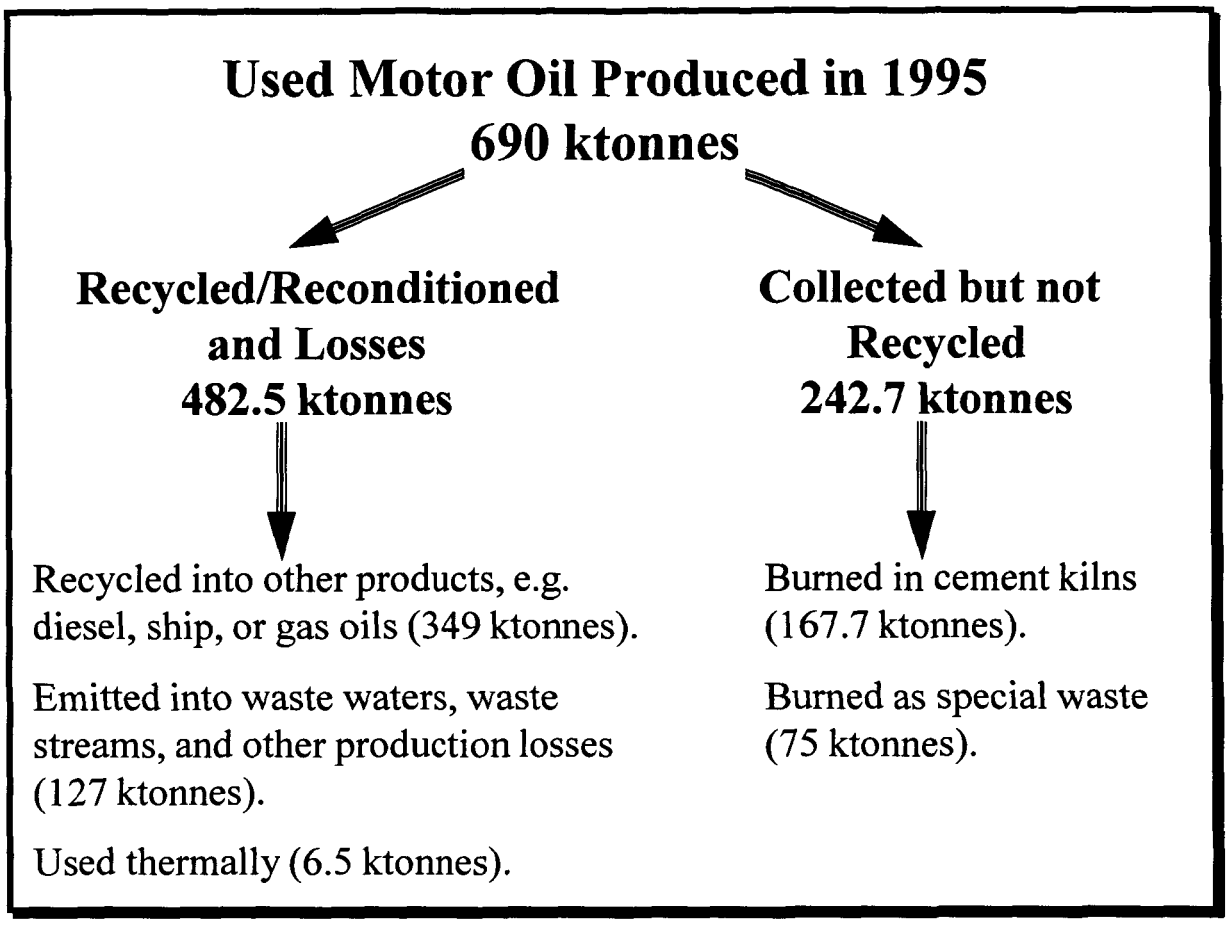
In 1995, the Umweltbundesamt estimated that approximately 690 ktonnes of used motor oil were produced.[39] Of this, 482.5 ktonnes were recycled or reconditioned into a number of different oil-based products, including such fuels as diesel, ship, and gas oils, and 133.5 ktonnes were discharged into waste water or other waste streams, lost during the production cycle, or used in other thermal processes. Approximately 242.7 ktonnes of the used oil collected were not recycled. This can be due to a number of different factors, including the contamination level of the oil, demand for used motor oil by the cement and other industries, and cost, relative to total purchases in both the recycling and burning industries. Of this volume, an average of 70 percent was burned in cement kilns and 30 percent was burned as special wastes (SAV) or disposed of in another manner (see Figure 11).

[37] In addition, engine and transmission oils may only be sold in conjunction with the following statement, printed either on the container itself, or clearly indicated at the point of sale: "This oil should be taken to a waste oil collection point after use. Improper disposal of waste oil harms the environment! Admixture of foreign substances such as solvents, brake fluids, and coolants is prohibited." Waste Oil Ordinance.

[38] CONCAWE, p. 84.

[39] Fricke, Umweltbundesamt.

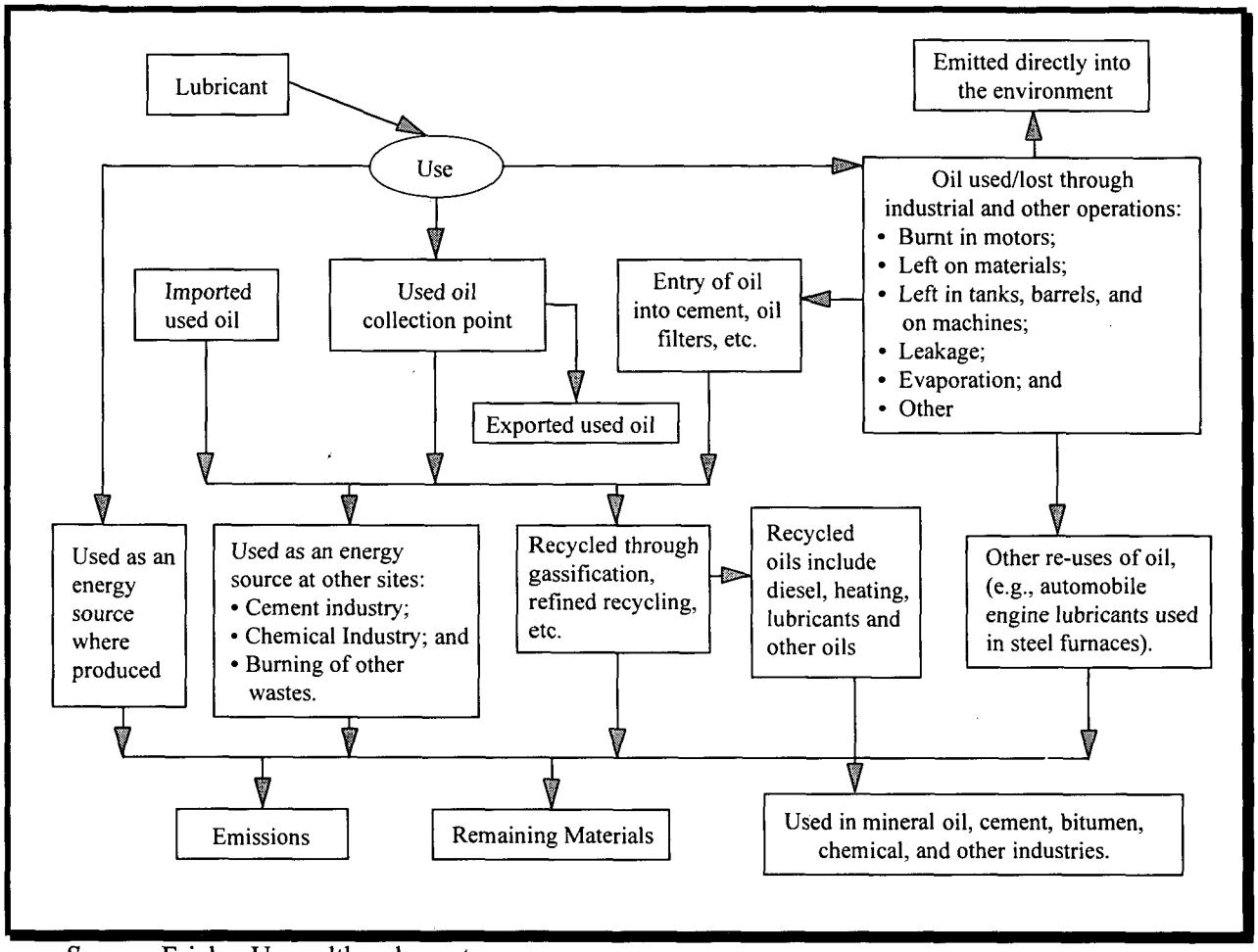
Figure 11—Schematic Diagram of Used Motor Oil Use



Used Motor Oil Reuse and Recycling

The German Federal Environmental Agency considers that after a lubricant is used, it may fall into one of three groups, depending on how and where it will be treated or disposed (see Figure 12 for a schematic illustration of the recycling end uses for used oils and lubricants). The first group includes all oils that are collected at used oil collection sites and are either recycled for reuse or burned for energy. The second group is made up of the volumes of oil that are "lost" through industry processes (e.g., burned, left on materials, evaporated, etc.), and are emitted directly into the environment. The third group is comprised of lubricants that are either recycled or used thermally at the same plant where they are produced, and those which are exported. Proportionally, this third group accounts for a very small portion of the total volume of used oil produced. Motor oils generally fall into the first two groups.

Figure 12[40]—Schematic Illustration of the Recycling and Disposal of Used Oils and Lubricants



Source: Fricke, Umweltbundesamt.

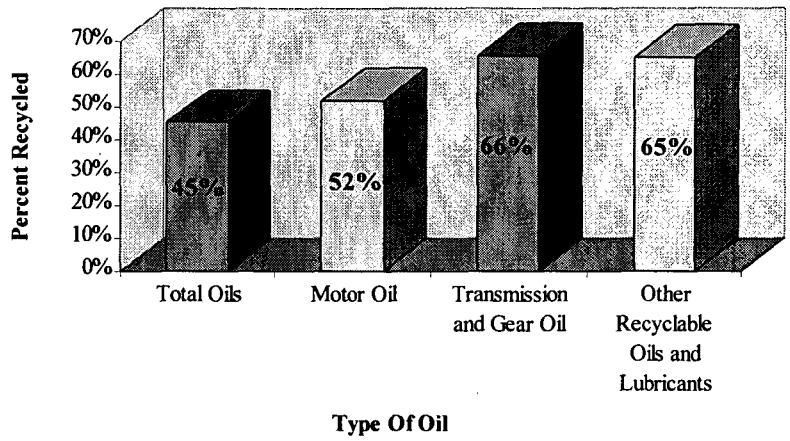
Recycled and Reworked Oils

The majority of the used oil collected in Germany is recycled for use as other oil products (see Figure 11). As Figure 13 indicates, approximately 50 percent of all used oils collected in 1993 were recycled, a proportion that was relatively consistent across oil types.[41] Of the 420.9 ktonnes of motor oil sold domestically in Germany in 1993, approximately 209 ktonnes were recycled in some manner (see Table 3 for a breakdown of how oil is recycled).

[40] This schematic diagram was developed through consultations with a number of persons in industries which are in some way, either directly or indirectly, related to the production, recycling, or burning of used motor oils or the consumption of the recycled oil products. Fricke, Umweltbundesamt.

[41] The total volume of oil recycled is lower than that of the individual oils because it does not include base oils, which are inherently included in the other categories. This discrepancy is unavoidable due to the nature of the information collected.

Figure 13
Percent of Used Oils Recycled or Reused: 1993



Source: Fricke, Umweltbundesamt.

Table 3[42]—Recycling and Reusing Methods for Used Oils (ktonnes): 1993

Method	Total	Motor Oil	Transmission and Gear Oil	Other Recyclable Oils and Lubricants
Preparation	254.2	122.8	30.7	92.7
Cement Industry	109.3	47.8	11.9	49.9
Gasification	47.0	16.4	4.1	25.2
Steel Industry	7.2	2.9	0.1	3.0
Special Waste	13.5	6.3	1.4	5.0
Other	27.5	12.9	3.2	9.2
Total	**459**	**209**	**51.8**	**185**

Source: Fricke, Umweltbundesamt.

[42] Other recyclable oils and lubricants include hydraulic oils, softening agents, metal working oils, lubricants, grease and other oil-based products. These individual totals have been summed and included as a reference point. The total volume of used motor oil which is recycled may differ slightly from the sum of the individual totals because the figures have been compiled from separate data sources. The total does not include base oils, which are inherently included in the other categories.

In 1996, a survey conducted by the German Environmental Ministry (*Bundesumweltministeriums*) found that approximately two thirds of the used oil collected is reprocessed or recycled, and one third is disposed of thermally, primarily through burning in cement kilns. Of the 650 ktonnes of oil that were reportedly collected in 1996, 480 ktonnes, or 74 percent of the total, were reconditioned and 170 ktonnes, or 26 percent, were burnt in cement kilns.[43] The government hopes that improvements in technology, which would make both larger volumes and more highly contaminated oils eligible for reprocessing, and increases in demand will lead to future shifts away from burning to larger volumes of oil being reprocessed. Currently, the five German used oil refineries have the capacity to recycle 570 ktonnes of oil per year. Table 4 lists selected used oil refineries, the amount of used oil that they receive per year, and the method used for oil recycling or disposal.

Table 4—Selected Used Oil Re-Refining Facilities

Facility	Amount	Method Used
Mineraloel-Rafinerie Dollbergen-Grasbrook	60 ktonnes/yr	TFE Refining Recycling DEA Process
Duisburg-RMV	40 ktonnes/yr	Acid/Clay Meinken Process (currently under modification to no-acid Meinken process)
Essling, Sud Oel	40 ktonnes/yr	Acid Clay Process
Other Facilities: Horst Fuhse, Banfeld Oel, Holfind.		

Source: CONCAWE

CONCAWE estimated the amount of used motor oil disposed through reprocessing, re-refining or burning in cement kilns in a 1996 report, which found that a slightly higher percentage of used oils is burned in cement kilns than the study done by the German Environmental Ministry found. These differences in numbers and ratios are primarily due to differences in the definition of used oil used by the two groups. The CONCAWE study included industrial substances such as transformer, hydraulic, turbine and other metal working oils in its analysis, the results of which are shown in Figure 14. The German Environmental Ministry study includes engine and mineral oils in its computation of the total volume of used oil disposed, but does not quantify the exact substances included in its calculation.

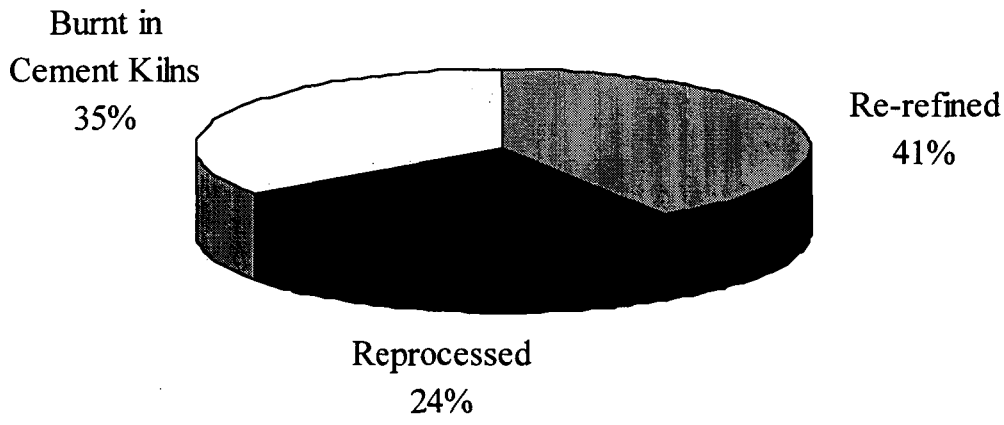
Losses

Due to the nature of some oils and their associated uses, they cannot be collected for recycling or disposal. Losses such as these account for almost half of the motor, gear and transmission oils (see Table 5[44]). These include:

[43] Press Release: "Altoelrecycling muss Vorrang vor Verbrennung erhalten." Dortmund, Germany. February, 1996.

[44] These totals differ from those in other tables because they do not include any quantities of oil which are expected or anticipated to be emitted into the environment on a regular basis. Fricke, Umweltbundesamt.

Figure 14
Estimated Distribution of Disposal Methods for Used Motor Oils in Germany: 1995



Source: CONCAWE, p. 84.

Table 5—Possible Lubricants Left in the Environment (ktonnes): 1993

Source of Loss	Transmission and Motor Oils	Total
Burned in Motors	165.2	165.0
Leakages	32.6	82.0
Left in Machines, on Material Surfaces, and in Containers	11.3	130.0
Total	197.8	247.0

Source: Fricke, Umweltbundesamt.

Burned in Motors: Ignition and diesel engines account for almost all of the oils which are burned in motors during normal operation.

Leakages from Filling and Emptying Containers: Improper handling of oils leads to numerous spillings of oils each year. Motor oils account for a large portion of these losses, in particular when people are refilling or changing the oil in automobiles or other machines. Most of the filling and emptying of oil containers is done at sites where such leakages can be properly regulated and cleaned up (e.g., gas stations, repair shops, industries); however, this is not the case when individuals change their oil or work on their cars at home or in other areas. In addition, leakages of oil into the environment can occur from older cars as part of their normal operation.

Left in Containers: This is especially an issue when dealing with motor oils. At least 1 percent of the oil will remain in a container after it has been emptied. The majority of the barrels that are used to store oil on a large scale are reused; therefore, the oil left in the containers is not emitted into the environment. Private households, which are permitted to dispose of empty oil canisters with regular household wastes, release small quantities of oil into the environment. This accounts for a large segment of these losses.

FUTURE TRENDS

The German government has been very successful in managing used motor oil collection and disposal. However, the government is currently working on updating the Waste Oil Ordinance to make the used oil collection, transportation, and disposal regulations more stringent. In February, 1996, a conference was held in Bonn to discuss the current used motor oil legislation and a number of area experts shared their concerns about inadequacies under the present regulations. The main concern of many of the participants was how used motor oil is disposed. The current rule calls for two thirds of the total amount of used motor oil collected to be recycled or reprocessed, and the remaining third is made available for burning. However, the recycling facilities have the capacity to reprocess 570 ktonnes of used oil per year, 90 more ktonnes than is currently being reprocessed.[45] Participants stressed that the ratio of used oil that is recycled should be increased in relation to the amount that is burned. In addition, only approximately 10 percent of mineral oil lubricants are currently being recycled. Critics stated that this is because recycled and reprocessed oil is subject to a mineral tax, while oil that is thermally disposed is tax free.[46] This, along with the higher price at which oil is purchased for thermal disposal, encourages people to burn oil rather than recycle it for reuse. It is unclear how this issue will be dealt with under the revised Waste Oil Ordinance. At this time, the federal government apparently is not planning further investment in used oil recycling facilities. New regulations affecting a broad range of recycling activities are coming into effect, and will be fully implemented in 1999.

[45] "Altoelrecycling muss Vorrang vor Verbrennung erhalten."

[46] "Altoelrecycling muss Vorrang vor Verbrennung erhalten."

SWEDEN

INTRODUCTION

General National Policy

Sweden currently has no national used motor oil recycling program. Used motor oil is classified and managed as hazardous waste.[47]

CURRENT USED OIL MANAGEMENT ACTIVITIES

Motor Oil Sales

In 1996, approximately 104 kilotons of lubricating oil were sold in Sweden, of which about half was automobile oil.[48] (See Figure 15) As Figure 16 demonstrates, of the different types of automotive oils sold, heavy duty diesel oil makes up the greatest percentage of automotive oil sold annually.[49] More than half of the motor oil sold is from garages and car dealers. The remainder of motor oil is sold at service stations, supermarkets, and specialist stores.[50] This indicates a modest percentage of DIYers. CONCAWE estimates that 5.7 kilotons of motor oil are sold to DIYers.

Used Motor Oil Collection

Approximately 23 kilotons of motor oil are collected annually in Sweden (see Figure 17). However, there exists no national collection system. A number of gas stations offer environmental services such as the collection of used oil and used batteries. Used motor oil is also collected for delivery to the cement industry, where it is used as fuel and incinerated effectively under controlled conditions.[51]

Approximately 70 percent of used motor oil in Sweden is available for collection.[52] This is a slightly higher recovery percentage than that estimated for Europe as a whole. Table 6 shows the potential for the collection of used motor oil in Sweden.

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[47] "Used Oil Management in Sweden," May 16, 1997, Memorandum to Alison Flanders, ICF Kaiser Incorporated, from Soren Olsson, Svenska Petroleum Institutet.

[48] CONCAWE. *Collection and Disposal of Used Lubricating Oil.* Brussels: November 1996, p. 98.

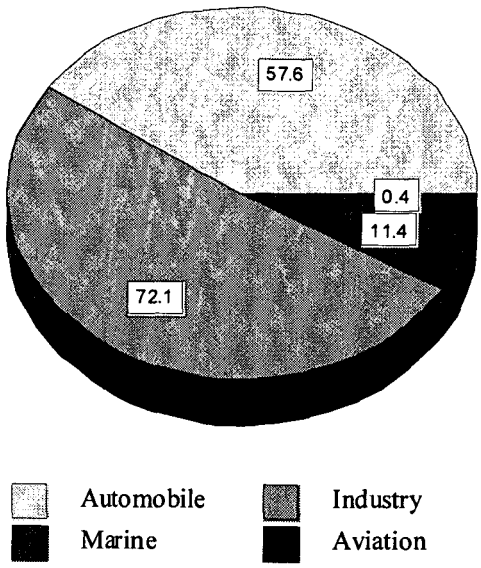
[49] Ibid.

[50] Ibid.

[51] "Used Oil Management in Sweden," May 16, 1997, Memorandum to Alison Flanders, ICF Kaiser Incorporated, from Soren Olsson, Svenska Petroleum Institutet.

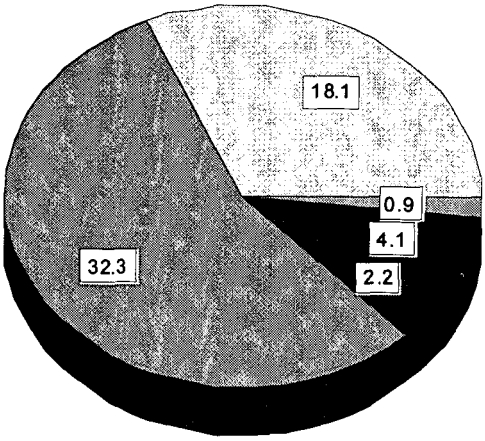
[52] Ibid.

Figure 15
1996 Total Oil Sales (KTONS)



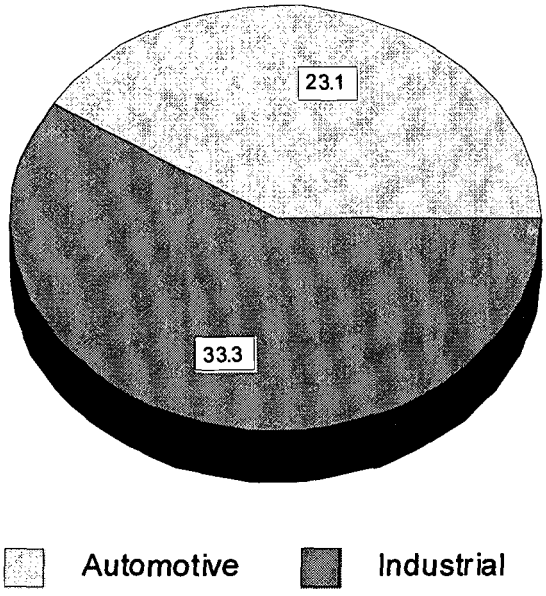
Source: CONCAWE Report.

Figure 16
1996 Motor Oil Sales (KTONS)



Source: CONCAWE Report.

Figure 17
1996 Total Used Oil Collections (KTONS)



Source: CONCAWE Report.

Table 6—Potential for Used Oil Collection

Vehicle Uses	Market (tons)	Assessed Potential Recovery (tons)	Assessed Potential Recovery (%)	Comments
Automobile	1103	717	65	balance is burned/leaks
Heavy Diesel	1007	655	65	balance is burned/leaks
Transmission	136	122	90	minor losses by leaks
Gear Oil	146	131	90	minor losses by leaks
Other	128	0	0	all burned or consumed in use

Source: CONCAWE Report.

FUTURE PROSPECTS

No information was obtained about any proposed or forthcoming changes to the current used motor oil management practices in Sweden.

SOUTH AFRICA

INTRODUCTION

General National Policy

There is currently no national used motor oil recycling program in South Africa. However, a program sponsored by the major producers and sellers of motor oil does collect used motor oil on a countrywide basis.

CURRENT USED OIL MANAGEMENT ACTIVITIES

There is no used motor oil recycling program in South Africa mandated by legislation or administered at the national level by a government agency. Instead, used motor oil collection and recycling activities in South Africa are sponsored by a private foundation, the Rose Foundation. The foundation collects one cent per liter on all oil sales from its members, who are the major oil companies as well as all major sellers of motor oil.[53] The foundation, in turn, has contracted with a private corporation, Oilkol, to collect used oil on behalf of the foundation on a countrywide basis. Oilkol sells the used oil to consumers for a negotiated price. The difference between the costs of collection to Oilkol and the selling price of the used oil, if any, plus a profit, is paid to Oilkol by the Rose Foundation. The program potentially involves all types of used oils, but motor oil constitutes the largest component.

Oilkol operates a centralized collection system. There are no curbside pickups. DIYers can take used oil to garages, from which it is collected by Oilkol. In addition, bulk facilities are provided to users of large amounts of motor oil. Oilkol collects about 90 percent of all used oil collected in the country, but there are some small companies that provide limited and local competition to Oilkol.

Oilkol does not collect used oil filters. The volume of recycled used filters is relatively small, and those that are recycled generally go to scrap metal dealers.

AMOUNTS OF USED OIL COLLECTED AND PRIMARY END USES

Approximately 45 million liters of used oil are collected for recycling annually in South Africa. Of that, about 90 percent is collected by Oilkol, according to Oilkol's estimates. In turn, 90 percent of the used oil collected is burned as fuel, 5 percent is recycled, and 5 percent is re-refined.

A high percentage of the used oil collected contains spent additives, wear metals, and carbon. Lead up to 3,000 ppm also is frequently present. Up to 70 percent of the used oil is treated before burning to remove these contaminants; the balance is burned with contaminants. The removed contaminants are disposed in Class A dumpsites.

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[53] "Used Oil Management in South Africa," May 15, 1997, Memorandum to Craig Dean, ICF Kaiser Incorporated, from the South African Ministry of Mineral and Energy Affairs.

KNOWLEDGE OF THE PROGRAM AMONG THE PUBLIC

Many consumers, particularly large users of motor oil, are aware of used oil collection as a financial opportunity. Oilkol estimates that 100 percent of large users are selling their used motor oil. Some DIYers, however, are uneducated about the program. In many cases, because of the very high average age of motor cars in South Africa, vehicles whose oil would otherwise be changed by DIYers use so much oil that they are seldom drained.[54] Only about 20 percent of DIYers recover used oil and bring it to the nearest garage for recycling.

FUTURE PROSPECTS

The current program is considered stable and very successful. Therefore, there are no current proposals to revise it significantly.

[54] Total passenger car registrations in South Africa between 1990 and 1994 increased only from about 3.4 million to about 3.7 million; total vehicle registrations in the same period increased from about 5.1 million to about 5.6 million.

MEXICO

INTRODUCTION

Mexico is currently pursuing the development of an active used oil management program. During the past decade, used oil policy efforts focused on the broader level of hazardous waste management regulations. Since 1988, used motor oil has been regulated as a hazardous waste in Mexico. Laws and decrees that support used oil recycling are in the process of being introduced into the legislation that mandates Mexico's current environmental program.

LAWS AND REGULATIONS

General National Policy

The Political Constitution of the United Mexican States mandates the preservation and the restoration of the environment through the General Law of Ecological Equilibrium and Environmental Protection (Ley General del Equilibrio Ecológico y la Protección Ambiental) of January 28, 1988. Thus, environmental issues are elevated to a constitutional status. Regulations to the General Law contain very important provisions that deal with the protection and control of air pollution, water pollution, and hazardous wastes.

Regulation to the General Law Related to Hazardous Wastes (November 25, 1988)

The specific regulation that governs environmental protection from hazardous wastes and that covers used motor oil is titled Reglamento de la Ley General del Equilibrio Ecológico y la Protección al Ambiente en Materia de Residuos Peligrosos, of November 25, 1988. This regulation requires the Secretariat of Social Development (Secretaría de Desarrollo Social—SEDESOL) to focus on the following goals:

- To promote the minimization of hazardous wastes and the risks associated with their management.
- To provide incentives for changes toward cleaner processes and technologies.
- To reduce environmental impacts attributed to hazardous wastes, especially the ones to aquifers, soils, health and trophic chains.
- To reduce the consumption of non-renewable resources by promoting the recuperation of secondary materials.
- To increase the supply of adequate hazardous waste management systems and infrastructure.
- To regulate and control all hazardous waste traffic across the Mexican border.
- To organize the hazardous waste regulatory system across the federal, state, and municipal levels.
- To coordinate and comply with international hazardous waste agreements.

In addition, this regulation specifically requires facilities that generate hazardous wastes to register with SEDESOL. The regulation also addresses in detail the transportation, storage, collection, and disposal of hazardous wastes. It provides safety control measures, monitoring systems, and an enforcement system that includes sanctions for violations. The import and export of hazardous waste substances are subject to prior authorization under an import/export manifest, referred to in the law as an Ecological Guide (Guía Ecológica). The control of hazardous waste is solely within federal jurisdiction; the only agency that has authority to regulate hazardous waste is SEDESOL. Neither Mexican states nor municipalities have authority to regulate hazardous waste. However, agreements have been established between SEDESOL and specific states relating to the performance of minor regulatory implementation duties and the surveillance of illegal hazardous waste disposal sites. The general provisions of this regulation served as a basis for the proposed rule for the management of used oil and lubricants.

Proposed Rule for the Management of Used Oils and Lubricants

A proposal for a rule for the management of used oils and lubricants has been presented to SEDESOL. This proposal took into consideration the national technological conditions, the existing infrastructure of the country, and the feasibility of technological conversions. Once the final version of the proposed rule has been approved by SEDESOL, it will have to go through a six month public comment period. Based on this timeline, the proposed rule could be finalized no earlier than the first half of 1998.

Based on the contents of the initial proposal, a rule on the management of used motor oil probably would include detailed provisions pertaining to the following topics: generation, management, storage, collection and recollection centers, transport, recycling, treatment, and incineration processes, and final disposition. At the same time, the rule is expected to establish a hierarchy for the treatment of used oils and lubricants. This hierarchy would prioritize treatment processes in the following order: (1) re-refining, (2) combustion, (3) incineration, and (4) confinement. The rule also could create economic incentives for used motor oil recycling.

CURRENT USED OIL MANAGEMENT ACTIVITIES

Motor Oil Sales

According to a report produced by the Secretariat of Energy, Mining, and Industry,[55] a total of 681,351m^3 of oil was sold in Mexico in 1992. More than half of this oil was consumed by automobiles and the rest was consumed by industries, processing plants, and other miscellaneous uses. Figure 18 demonstrates the distribution of Mexican base oil consumption within these categories. Motor oil consumed by automobiles constituted slightly less than half of the vehicle consumption. Figure 19 portrays the distribution of the consumption of motor oils.

[55] La Industria de los Lubricantes en México, Secretaría de Energía, Minas e Industria Paraestatal, Enero 1994.

Figure 18
1992 Base Oil Consumption

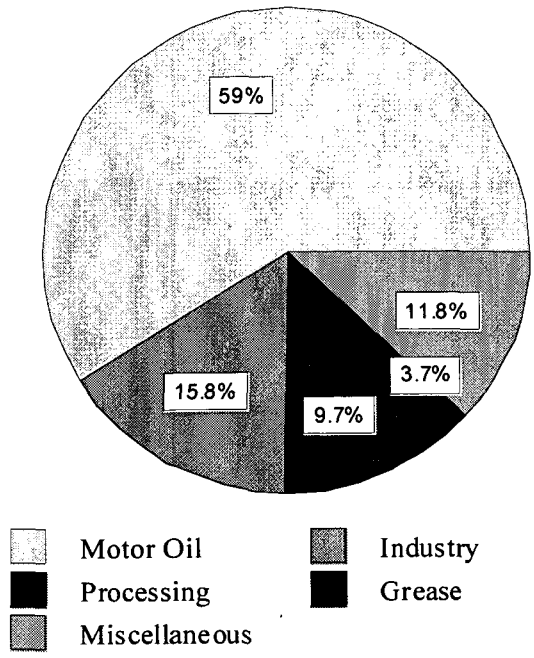
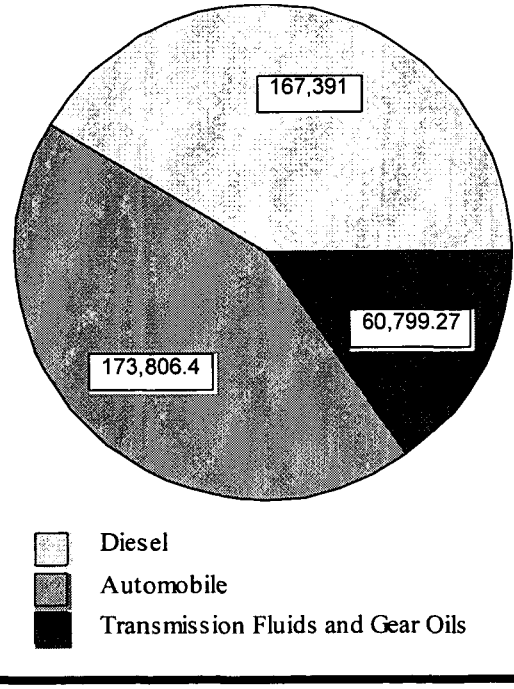


Figure 19
1992 Motor Oil Consumption



Used Motor Oil Collection

Most of the used motor oil that is collected is generated at firms that provide automobile lubrication services, automotive agencies, maintenance areas for freight and passenger vehicles, and automobile assembly areas. The proposed rule for the management of used oils and lubricants is expected to establish the concept of "small generators." Any person or establishment who produces or generates a volume less than or equal to 2,000 liters per month would be considered a small generator. Small companies that predominate in the Mexican automotive lubricants market form a large portion of this small generator group.

Currently, vehicle maintenance yards and areas and other small generators of used oils represent a large portion of hazardous waste generators and most of these do not comply with the regulations that deal with the proper management of hazardous wastes. Substantial amounts of used motor oil, collected from these generators as well as from DIYers, currently are "recycled" through small, homemade systems using acids and clay. These systems do not remove contaminants such as metals, although the oil may appear clean after such treatment. This oil is then sold cheaply through informal markets. Because this oil is quite destructive to vehicles, it has hurt the reputation of recycled oil in Mexico.

The proposed rule is expected to promote compliance from small generators by using several incentives. Some of the proposed incentives include loosening administrative burdens, differentiating between small generators and large generators by allowing small generators special exemptions from some of the storage requirements, and facilitating the used oil management process by establishing collection centers, allowing small generators to transport used oils to these centers as long as they use the authorized recipients with less than 1,000 liters of used oil. In order to verify compliance, the proposed rule recommends that all small generators should keep a Log of the Acquisition of New Lubricants and the Generation of Used Oils (Bitácora de Control de Adquisición de Lubricantes Nuevos y Generación de Aceites Usados).

In 1992, an estimated 239,570 m^3 of used motor oil was generated in Mexico from the automotive sector out of a total of 401,997.09 m^3 consumed.[56] By 1996, an estimated 300 million liters of automotive used oil was generated in Mexico.[57] Although there is information on the amount of used oil that is generated, information on the amount of used oil that is actually collected for end uses is very uncertain.

Motor Oil End Uses

At the end of 1996, 10 facilities in Mexico were licensed for the recycling of used oils, three were licensed for the preparation of alternate fuels, and two facilities were licensed for the incineration of alternate fuels. In addition to disposition at a licensed facility, used oil is burned as fuel for brick factories, cement kilns, and as industrial boiler fuel.

Statistics on the amount of used motor oil collected, the amount recycled by the small informal operators, and the amount dumped are very limited. The latter two categories may amount to 40–50 percent of the total used motor oils generated.

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[56] *Informe sobre el Anteproyecto de Norma Oficial Mexicana para el Manejo de Aceites y Grasas Lubricantes. ICF Kaiser Servicios Ambientales.* April 1994.

[57] Marchand, Federic. "A Slippery Proposition: Collecting and Recycling Oil is a Barrel of Potential." *Business Mexico.* v.6. July 1996. p. 20+.

FUTURE PROSPECTS

As discussed, Mexico is developing a new and expanded system of used motor oil collection and recycling that is expected to be enacted in 1998.

TRINIDAD AND TOBAGO

INTRODUCTION

Approximately four million gallons of used oil are generated annually in Trinidad and Tobago. Of this generated oil, less than five percent is recycled, while the remainder is inappropriately disposed of or used as fuel.[58]

LAWS AND REGULATIONS

General National Policy

No legislation currently mandates a used oil recycling program in Trinidad and Tobago. In the absence of such legislation, the private sector has established various programs for used oil collection and recycling. These programs have proved to be profitable, from both an economic and a public relations perspective.

On a national level, several initiatives are currently underway to create legislation outlawing the improper disposal of used oil. The International Development Bank (IDB) is conducting a study on Trinidad and Tobago's hazardous waste generation, including used oil. Upon completion, this study will be used to make recommendations on how to better handle these wastes on a national level. The Environmental Management Authority (EMA), a state environmental agency created in 1995, is also working to prevent the improper disposal of used oil. EMA is currently developing industrial discharge regulations that will limit the amount of oil or oily waste that can be discharged as effluent. In addition, other state agencies are helping EMA to prepare a national solid waste management strategy.[59]

CURRENT USED OIL MANAGEMENT ACTIVITIES

Used Motor Oil Collection

There are currently two programs for used motor oil collection in Trinidad and Tobago. The first is administrated by The Trinidad and Tobago National Petroleum Company Limited (NP), a state-owned company. NP is responsible for the manufacture and sale of lubricating oils, serving approximately 80 percent of the local market. NP began a used oil collection program in 1995 to bolster its public image and increase its market share. NP service stations participate in the program by collecting and storing used oil in 55-gallon drums. The used oil is collected from these drums on a weekly basis by the Trinidad and Tobago Solid Waste Management Company, Limited (SWMCOL) under contract with NP and disposed of at a NP refinery in South Trinidad. In 1996, the NP/SWMCOL program collected approximately 14,000 gallons of used oil,[60] but information about the total amount of used oil available for collection is not available.

Despite the initial successes of this program, a lack of public awareness, a lack of incentives, and inadequate storage capacity inhibit its future success. A low level of public awareness reduces the level

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[58] *Used Oil Recycling In Trinidad and Tobago.* April 29, 1997, Memorandum to Alison Flanders, ICF Kaiser Incorporated, from Ronald Roach, The Trinidad and Tobago Solid Waste Management Company Limited.

[59] Ibid.

[60] Ibid.

of participation and thus the amount of used oil collected. An education program to increase public awareness is needed to make this program even more successful in the future. The absence of monetary or legislative initiatives also prevents participation in the program. DIYers have little to no incentive to bring in their used oil for collection, so the majority of oil collected is from service stations. Finally, the country lacks adequate storage for the collected used oil, therefore limiting the program and making some collection routes uneconomical.[61]

The second used oil collection option in Trinidad and Tobago has been created by a number of private enterprises (NP and SWMCOL are state-owned enterprises). Transporters are available to pick up used oil and take it to an appropriate end-use facility. These transporters charge clients a fee for the collection and disposal of used oil. The fee includes transportation costs from the collection site to the oil refinery.[62]

GENERAL PROGRAM INFORMATION

Public Education Programs

As mentioned above, public education programs are needed in Trinidad and Tobago to increase public awareness about used oil recycling. Until the public is aware of the programs available for used oil recycling, the level of participation in programs will continue to be insufficient, and the quantity of used oil collected will not increase.

FUTURE PROSPECTS

The Trinidad and Tobago Environmental Management Authority has recently contacted the U.S. State Department to obtain information about used motor oil recycling in the United States. No information is available on government plans to revise current policies or implement new motor oil recycling programs.

[61] Ibid.

[62] Ibid.

ARGENTINA

INTRODUCTION

Argentina has not implemented a used motor oil recycling program at the national level. A review of environmental legislation as well as discussions with contacts in the Argentine Embassy to the U.S. and in the Department of Natural Resources in Argentina suggest that any used motor oil recycling programs that exist are limited to the local level.

LAWS AND REGULATIONS

A national used motor oil recycling program in Argentina probably has not yet been developed for three reasons:

1. The environmental program in Argentina is itself relatively new, and has traditionally only been active at a provincial level. Recently, the country has attempted to establish a more national program. However, the recently created Secretary of Natural Resources and Human Health, "Secretaria de Recursos Naturales y Ambiente Humano" (SNRAH) is still developing its institutional authority. Argentina has a strong tradition of emphasizing public administration at the provincial level, and policies established at the federal level, especially for environmental legislation and policy, may not be implemented at the provincial level.[63]

2. According to a contact at the SNRAH, Argentina's focus in creating national environmental legislation has been primarily on "Green Programs" such as soil conservation, instead of the regulation of industry or contaminants.

3. Although national regulations do exist that control the use and disposal of contaminants, used motor oil is not specifically defined as a contaminant in the legislation.

CURRENT USED OIL MANAGEMENT ACTIVITIES

Because there is no nationally-implemented used oil management program in Argentina, little information is currently available on management activities. The number of motor vehicles operated in Argentina has steadily increased. In 1993, approximately 6.5 million vehicles were registered in Argentina, 4.9 million or approximately 75 percent of which were passenger cars.[64] No information is available on the proportion of automobile owners who are DIY oil changers.

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[63] El Banco Interamericano de Desarollo: *Programa de Desarollo Institucinal Ambiental (AR-0065).* Resumen Ejecutivo, p. 3.

[64] Argentina—Total Registrations 1956–1994. Asociacion de Fabricas de Automotores.

FUTURE PROSPECTS

Any used motor oil recycling currently taking place in Argentina is done voluntarily by a few small private companies. However, there does not seem to be an established governmental system of used motor oil recycling. In addition, no information was obtained about any proposed or forthcoming changes to the current used motor oil management practices in Argentina.

BRAZIL

INTRODUCTION

National legislation was enacted in Brazil in 1993 that outlines requirements for used oil recycling in the country. However, this legislation is not specific about program requirements nor does it appear to be generally enforced/implemented across the country. Implementation of the used motor oil recycling program may be limited to a few local areas.

LAWS AND REGULATIONS

Resolution Number 9, of August 31, 1993 is the only national legislation on used motor oil recycling in Brazil. That resolution was issued by the Ministry of Environment.

The resolution consists of 16 articles. It first prohibits discarding lubricant oils into the environment and requires their collection and recycling. It defines "elemental lubricant oil" as the main component of lubricant oil. This can be either mineral (petroleum-based) or synthetic (of vegetable or chemical origin).

In the resolution, recycling is described as one of two processes: *recycling through regeneration* and *recycling through use*. Recycling through regeneration is defined as "the reprocessing of useful and valuable substances within the oil [that] allows its re-use as a raw material." This regeneration must be achieved through *re-refinement*, which is described as the "industrial process of removal of contaminants, degrading substances, and additives of the lubricant oil, giving it the same properties as base oils." Recycling through use "involves the use of the used lubricant as a substitute for a commercial product or use as a raw material in another industrial process."

All used or contaminated lubricant oil must be collected and stored in such a way as not to affect the environment. Discarding used oil is prohibited in soils, surface and ground waters, the ocean, or sewage or other drainage systems, and used oil may not be eliminated (§3). In addition, the disposal of residues derived from the treatment of used or contaminated lubricant oils into the environment without previous treatment is prohibited (§5).

The production and sale of unrecyclable new oil of both domestic and imported origin are prohibited. The IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) is required to conduct studies to identify substitutes for unrecyclable oils sold domestically (§4).

Section 6 of the 1993 resolution provides that new industries that regenerate used lubricant oils, as well as the expansion of existing ones, must be based on technologies that minimize the generation of residues which will be emitted into the air, water, soil, or sewage systems.

Sections 7 through 12 of the resolution provide the framework for a used oil recycling program. The law requires all used lubricant oil to be recycled. Recycling of regenerable oil must be done through re-refining; any other use of the oil will depend on the approval of the relevant environmental office. In cases in which the oil is not able to be recycled, the relevant environmental office may authorize the combustion of the oil for power generation or incineration.

Producers of motor oil are required to mark product packages to inform the buyer of the legal requirements for recycling used oil, and how to return used oil.

The law obligates consumers of oil to store the used oil in safe places that facilitate its collection, avoid contamination of the used oil by other chemicals, and provide the used oil for pickup and re-refinement or other means of recycling.

Receivers of used oils are required to provide places where the oil may be returned, and to package, store, and transport it in such a way as to prevent infiltration or spillage.

Potential Related Sources of Legislation

The Brazilian Departamento Nacional de Combust□veis (DNC) must accredit firms that carry out re-refining of used oils. However, no detailed information about this accreditation process was obtained.

CURRENT USED OIL MANAGEMENT ACTIVITIES

Motor Oil Sales and Collection

Information obtained from a contact at PetroBras, the Brazilian oil production and refining company, indicates that the current system of used motor oil recycling consists primarily of a relationship between the major auto fuel and lubricant companies doing business in Brazil (e.g., Exxon, Chevron, and BP) and specialized reprocessing companies that are certified to recycle used motor oil. The gas stations (marketers of the oil) sell their used motor oil to the reprocessing companies, who then recycle the oil and sell it back to the marketers.

The Brazilian government mandates that this cycle occur, with the responsibility placed on the gas stations to collect used oil and convey it to the reprocessing companies. The marketing companies must regularly sell at least a certain percentage (or ratio) of used oil to consumers. This ratio may vary on a state-by-state basis.

Do-it-yourself oil changes are discouraged. The average consumer may not change his/her used motor oil without the aid of a gas station. Although this may help ensure the majority of motor oil used in the country actually enters the reprocessing system, enforcement of the standards may vary depending on the requirements and enforcement capability of each Brazilian state environmental agency.

Retail firms that sell motor oil play a role in the collection of used oil. Under "Obligations of Those Who Receive Oil" the 1993 resolution provides that they must display prominently to consumers an indication that they are obligated to return used oils and indicate the places where they may be returned.

Obligations of Recyclers of Used Oil

Brazilian reprocessing companies do not have a responsibility or obligation to collect/manage used motor oil. However, when a reprocessing company receives the oil, it does have the obligation to meet state/nationally-designated waste management standards. These companies must be certified by the appropriate state environmental agency, and must have performed an environmental impact assessment in order to receive their license. Again, however, the specific certification requirements may vary by state.

End Uses

Used motor oil can be used as an input for recycling. In addition, Article 7 of the 1993 resolution states that when the oil cannot be recycled, it may be burned, either to provide electrical power or for incineration purposes, with authorization from the relevant environmental authorities. Burning for fuel is apparently especially common in the interior regions of the country, where states may not regulate or enforce their environmental programs as broadly.

Regulated Contaminants

The program regulates the contaminants the re-refined oil may contain. Re-refined oil may not contain toxic or dangerous residues and cannot contain PCBs in excess of 50 ppm (Article 13).

Regulatory Authority

The national resolution does not specify clearly where responsibility lies for used oil recycling. It says repeatedly that the "relevant environmental authority" should be consulted but never explicitly describes the division of jurisdictions. However, it is likely that the environmental authorities of each state will be involved in the majority of enforcement activities. Also, Article 6 requires companies involved in the regeneration of lubricants to present to their state's environmental authority a plan to reduce the emissions of residues from this process.

Enforcement seems to occur primarily only in those states with strong environmental programs (e.g., Sao Paolo, Rio, and Belo Horizonte). These states may enforce by performing occasional "spot checks." However, this does not seem to occur on a regular basis.

FUTURE PROSPECTS

Although Brazil has enacted a used motor oil recycling program that is nominally a national one, the program seems to be managed and enforced almost entirely by individual states. As a result, it is difficult to assess the strength or success of the program overall. Although the national used motor oil recycling legislation was only enacted four years ago, recycling on a limited basis apparently had been going on for several years previously. This may indicate that the Brazilian program may grow as a result of increased voluntary compliance on both the personal level and at the level of increasing participation by local jurisdictions.

JAPAN

INTRODUCTION

There currently is no national level recycling program for used motor oil in Japan, and no major legislation specifying requirements specifically for the management of used motor oil. However, at least half of all used motor oil in Japan is recycled, and a large proportion of the recycled oil is used as fuel.

LAWS AND REGULATIONS

Waste oil in Japan is subject to the Waste Disposal and Public Cleaning Act, which addresses both industrial wastes and other forms of wastes. The statute that is designed to encourage recycling ("Law Relating to the Promotion of the Use of Reclaimed Resources") does not specifically cover waste oil and plays a much smaller role in regulating used motor oil. Under the waste disposal law, persons must be designated who are responsible for control of wastes, and permits must be obtained from prefectures or other local self-governing bodies for collection, transportation, and disposal of wastes, including waste oil. A manifest system tracks covered wastes, and a system of fines and imprisonment encourages compliance.[65]

CURRENT USED OIL MANAGEMENT ACTIVITIES

Although there are more than 40 million passenger cars in Japan, almost no motor oil is changed by DIYers. Used oil from personal vehicles is collected at gas stations and auto shops, where the majority of oil changes take place.[66] There are, in addition, over 21 million trucks, buses, and special purpose vehicles, whose oil generally is changed in repair shops.

The Ministry of International Trade and Industry (MITI) estimates the domestic demand in Japan for lubricating oil at from 2.3 to 2.4 million kiloliters per year from 1992 through 1996. Of this amount, about 32 percent is used for motor vehicles. Table 7 provides a five-year summary of lubricating oil demand.

The Institute of Applied Energy has estimated, based on a survey, that out of a total domestic demand for lubricating oil of all types of about 2.47 million kiloliters, approximately 936 thousand kiloliters would be consumed and about 1.27 million kiloliters of waste oil would be generated. Of that amount, over 800 thousand kiloliters would be collected for reclaiming, as fuel oil or reclaimed lubricant, and over 400 thousand disposed by burning and other methods. The institute estimated that up to 93 thousand kiloliters (or about 7 percent of the collected waste oil) would become reclaimed lubricants.

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[65] Memorandum from Mr. Algnober Ogiwara, Japan Lubricating Oil Association, to ICF, June 1, 1997.

[66] Telephone interviews by Yoko Spalding with Mr. Kaoru Honjo, Director, Refining Division, Petroleum Department, Agency of Natural Resources and Energy, Ministry of International Trade and Industry (MITI), and with Mr. Akinobu Ogiwara, Senior Engineer, R&D Section, Japan Lubricant Oil Association.

Table 7—Breakdown of Demand for Lubricating Oil[a](1,000 kl)

Usage	Year				
	1992	1993	1994	1995	1996
Motor Vehicles	752	743	782	777	796
Ships	206	195	198	191	193
Other Industries	1,400	1,389	1,397	1,418	1,431
Total	2,358	2,347	2,377	2,386	2,420

[a] MITI data provided by Mr. Ogiwara, June 1, 1997.

Thus, used motor oil and other lubricating oils apparently are used most frequently as fuels, either before or following treatment.[67]

The Japan Lubricant Oil Association (JALOS), in conjunction with the Agency of Natural Resources and Energy of the Ministry of International Trade and Industry, surveyed over 20 industries during 1993–1994 to better understand the types and volumes of waste oil generated and the systems of collection, recycling, and treatment that are being used. Respondents from the land transportation sector included bus, freight trucking, and taxicab companies. These firms, like private vehicle owners, collect used motor oil at repair shops and service stations. Up to 90 percent of the used motor oil collected is then picked up or transferred to independent recyclers/reclaimers. However, the used motor oil apparently is not recycled and reused as motor oil; only 1 percent of the land transportation respondents reported using recycled motor oil as an engine lubricant.[68]

According to information provided by JALOS, sulfuric acid/clay treatment has been replaced almost entirely in Japan by centrifugal separation. Re-refining is "not being conducted." Following centrifugal separation, the light fraction is separated and the used oil end product is generally sold as heating oil.[69]

Much of the used motor oil collected from commercial/industrial transportation enterprises, such as trucking companies, taxi fleets, construction companies, bus companies, and other forms of public transportation, apparently is used by the cement industry as fuel. Used oil also is used for heating oil at electric power plants and shipyards. In some cases, commercial arrangements may exist between trucking, public transportation, and construction companies that generate substantial amounts of used motor oil and firms in the cement industry.

[67] "Report on Technical Research for Value-Added Use of Lubricating Oil Recycling" (In Japanese), March 3, 1995, pages 1–5, 78, and 79. Industries included paper and pulp, chemicals, iron and steel, non-ferrous metal, metal products, general machinery, electric machinery, transportation machinery, construction, foodstuffs, textiles, pottery, printing, rubber, precision machinery, electric and gas power, land transportation, water transportation, and government. The survey was begun in 1993 and data were collected over the next two years from approximately 5,000 respondents (out of about 10,000 questionnaires distributed). Respondents included firms in the industries of interest; firms carrying out used oil collection, recycling, and treatment; and specialized recycling companies.

[68] Ibid.

[69] Memorandum from Mr. A. Ogiwara, June 1, 1997.

Public Knowledge of Recycling Issues

Because of the absence of DIY motor oil changes in Japan, there is little public knowledge or concern about used motor oil issues. Information about contaminants in used motor oil is not reported publicly.

FUTURE PROSPECTS

The 1993–1995 survey conducted by JALOS identified a number of issues and areas for further investigation.

Main Problems

Problems in the collection and transportation of used oil included the following:

- Collection from inefficiently wide areas (the transportation distance exceeds 50 kilometers in most cases, and collection over such broad areas increases the cost for collecting waste oil).
- Types of waste oil are not identified. (For example, 60 percent of the waste oil collected from general plants cannot be identified.)
- Control of containers is not conducted properly, and the containers inadequately indicate the oil types they hold.
- There is insufficient information on contaminants in waste oil.

Problems in the disposal of waste oil included the following:

- Oil recycling/reclaiming facilities operate at an average of only 41 percent of capacity.
- Analytic techniques are inadequate.
- The technological level of reclaimers and recyclers is low and should be improved. Most reclaimers are small-scale enterprises.

A number of subjects were identified for future study. They include identifying ways to popularize and promote recycling of waste oil (e.g., by encouraging proper storage and disposal), collecting information on overseas programs for managing waste oil, additional studying of the properties of waste oil, studying optimum methods of disposing waste oil, establishing quality standards for reclaimed products, identifying simplified analytic methods, and studying programs for collecting and reclaiming used oil.

THE PHILIPPINES

INTRODUCTION

The Philippines has no national system of waste oil collection and recycling. However, there is a national policy to treat waste oil, which includes waste crankcase oils, as hazardous waste. A new waste oil collection and recycling program is currently under development for Luzon, the most heavily populated and urbanized part of the country.

LAWS AND REGULATIONS

The Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (R.A. 6969) categorizes waste oil as hazardous waste. Under "an act to further promote energy conservation and for other purposes,"[70] the Bureau of Product Standards of the Department of Trade and Industry was delegated authority to develop a standard for waste oil recycling.

In 1988, the Bureau of Product Standards, through its Technical Committee on Petroleum Products and Lubricants, developed the Philippine National Standard Specification for Re-refined Oils.[71] This standard was developed in consultation with other government agencies, the oil industry, and other private entities. Part II of this standard provides consumers, manufacturers, government agencies and all parties concerned in monitoring, inspecting, and testing re-refined oils with the requirements for automotive engine oils blended from re-refined basestocks. Definitions of additives, crankcase oils, straight mineral oils, and two-cycle motor oil, as well as requirements for engine oils and testing methods to sample the engine oil, are provided in the standard.

CURRENT USED OIL MANAGEMENT ACTIVITIES

Motor Vehicles and Oil Sales

As a result of industrial and commercial expansion there has been rapid urbanization of the Philippine countryside, which has increased demand for public and private transportation. The increase in vehicles has resulted in a growth in consumption of petroleum derivatives, such as automotive oils.

In 1996, 2.9 million motor vehicles were registered with the Department of Transportation and Communication.[72] Luzon had the highest number of registered motor vehicles at 2.17 million, representing 75 percent of the total population. The remaining 25 percent of motor vehicles were divided between the Visayas (14 percent) and Mindanao (11 percent) areas. The national motor vehicle fleet is growing at an annual rate of 9.17 percent.

Service stations consumed 465,672 barrels of automotive oils during 1996. Luzon accounted for 69 percent of the 1,607 service stations in the Philippines; Visayas had 16 percent, and Mindanao had the

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[70] Batas Pambanasa Blg. 73, as amended by Batas Pambansas Blg. 872.

[71] PNS 104: Part 1: 1988, "Specification for Re-Refined Oils; Part 1: Re-Refined Oil Basestocks," and PNS 104: Part 2: 1988 "Specification for Re-Refined Oils; Part 2: Automotive Engine Oils Blended from Re-Refined Basestocks."

[72] "Concept Paper: Formulation of a Waste Oil Collection and Recycling Program in Luzon," Philippine Department of Energy.

remaining 15 percent of service stations. During 1996, the land transportation sector, primarily public utility buses, used an additional 25,756 barrels of lubricating oils and greases.

Used Motor Oil Collection

Currently, there is no formal system of used motor oil collection and recycling among service stations and public utility fleets in the Philippines. Waste crankcase oils are usually drained and collected in steel drums. A minimum amount is collected by small collectors who sell it by the drumfulls to recyclers to produce fuel or lubricating oil. Table 8 shows the quantity of recycled oil over the past few years.

Table 8—Recycling Activity (mb/year)[a]

PRODUCT	1990	1991	1992	1993	1994	1995	1996	January 1997
RECYCLED OIL								
Production	9.5	2.9	8.14	4.6	18.42	5.86	3.61	0.714
Sales	2.1	0.4	1.14	3.2	12.57	3.41	2.62	0.466
BLENDED RECYCLED OIL								
Production	50.8	4.9	3.5	1.6	8.63	4.94	2.26	0.125
Sales	46.1	4.6	3.5	1.7	8.24	4.76	2.25	0.125
BLENDED FUEL OIL								
Production	18.87	10.05	12.00	0.365	24.61	—	34.27	—
Sales	17.87	9.90	12.10	0.365	24.61	—	34.27	—

[a] Information supplied by Office of the Secretary, Department of Energy, Republic of the Philippines, May 22, 1997.

Table 9 lists the capacity of the recyclers, and the status of each of the companies. As the table shows, considerable recycling capacity is currently not in use.

Table 9–Recycling Capacity[a]

Recyclers	Capacity (MB/YR)		Status 1997
	Slop Oil[b]	Used Motor Oil	
Bensan Industries	—	60	Active
Lubtech Corporation	—	0.76	Inactive
Oil Tech Resources	—	1.9	Inactive
Petroleum Technology & Research Corporation	139.6	—	Active
Regwill Industries, Inc.	—	4.5	Inactive
Sea Oil Petroleum Corporation	905.6	47.7	Inactive
Tidewater Association, Inc. (Federal Petroleum Corp.)	226.4	50	Inactive
Union Refinery Corp.	93.8	68.9	Inactive
Total	**1365.4**	**233.76**	

[a] Information supplied by Office of the Secretary, Department of Energy, Republic of the Philippines, May 13, 1997.
[b] Maritime waste oil.

Motor Oil End Uses

Much used motor oil is currently dumped into municipal drainage systems and waterways. As Table 9 indicates, capacity exists to recycle, but little used oil currently reaches the recyclers, most of whom are inactive.

FUTURE TRENDS

The government of the Philippines has recognized the need to formulate an effective waste oil collection and recycling program, and is currently embarking on such an effort. The bulk of motor vehicles and gasoline stations are based in Luzon. Thus, a 15 month waste oil collection and recycling program in Luzon is being implemented. Its objective is to identify a viable collection method and recycling technology for waste oil generated in service stations and public utility bus terminals. More specifically, this pilot project has the following aims:[73]

[73] "Formulation of a Waste Oil Collection and Recycling Program in Luzon," Department of Energy, Republic of the Philippines, May 1997.

Data gathered from the survey will be used to evaluate existing waste oil recycling technologies in the Philippines and to assess the economic and technical viability of implementing the collection and recycling systems, including the associated costs. An analysis will be undertaken for different systems to determine the most viable option, which will then be recommended for adoption. At the same time, the database generated from the survey will be the basis for the formulation of guidelines governing the collection, disposal and recycling of waste oil.

- To identify current practices of waste oil collection and disposal in service stations and public utility bus terminals.
- To identify and evaluate technologies currently used by local oil recyclers.
- To recommend a framework for an efficient waste oil collection and disposal system with due consideration to public health and environmental integrity.
- To identify appropriate recycling technologies for local adoption.

The 15 month schedule for this project includes data collection, technical and economic evaluation, and the formulation of a collection framework. Luzon's service stations will be surveyed by the German Agency for Technical Cooperation (GTZ). The Philippine DOE will be the implementing agency, assisting in preparing the survey questionnaire, conducting visits to local collection and recycling programs, assisting in the technical and economic evaluation, and helping to prepare the final report.

In the last stage of the project, the formulation of a collection framework, DOE will prepare a memorandum circular and an administrative order requiring service stations and public utility bus terminals to collect and dispose of used motor oil and other waste oil without harm to public health and the environment.

THAILAND

INTRODUCTION

Thailand currently does not have a national used motor oil recycling program. The National Energy Planning Office is currently developing a plan for integrated used oil management, in collaboration with other government agencies and lubricating oil companies.[74]

LAWS AND REGULATIONS

There is currently no Thai government legislation pertaining to used motor oil recycling, but there is an initiative for such legislation in progress. Currently the only pertinent requirements are regulations and standards for the management of municipal waste and industrial waste.

CURRENT USED OIL MANAGEMENT ACTIVITIES

Motor Vehicles and Oil Sales

As a result of industrial and commercial expansion there has been rapid urbanization of Thailand. The growth of Bangkok, in particular, has increased demand for public and private transportation. The increase in vehicles has resulted in a growth in consumption of petroleum derivatives, such as automotive motor oils. The National Energy Policy Office (NEPO) estimates that in 1993 about 487 million liters of lubricating oil were used in Thailand.[75] This is somewhat higher than the estimate for the amount of motor oil sold in 1996, according to the Thai Department of Commercial Registration, which is described in Table 10, and totals about 336 million liters. NEPA estimates consumption has been growing recently at about 10 percent per year.

Used Motor Oil Collection

According to NEPO, enforcement of the existing environmental standards with respect to used motor oil is hampered by a number of factors, including limited public support and participation, lack of resources, and inadequate coordination of the responsible organizations. NEPA estimates that about a third of the motor oil sold annually is lost through combustion in vehicles. About 80 million liters are collected for reuse or recycling (16 percent), while up to 247 million liters are disposed without control (50 percent). A small amount of used motor oil is used for motorcycle engines and agriculture engines. Recycled used motor oil currently is not popular in Thailand because of prevalent doubts about the quality of the used motor oil.[76]

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[74] Letter from Dr. Piyasuasti Amranand, Secretary General, National Energy Policy Council, National Energy Policy office, Office of the Prime Minister, to Wasima Rahman, ICF Incorporated, May 22, 1997.

[75] "Status on Used Lubricating Oil in Thailand," National Energy Policy Office, p. 2.

[76] Telephone interview between Wasima Rahman, ICF Kaiser and Dr. Prasert Tapaneeyangkul, Industrial Environment Division of the Thai Department of Industrial Works, April 1997.

Table 10—Motor Oil Sold in 1996[a]

Type of Oil	Amount Sold (liters)
Motor Oil for Gasoline Engines	51,000,000
Motor Oil for Diesel Engines	155,000,000
Lubricating Oil for Aircraft Engines	300,000
Other Lubricating Oil	122,000,000
Grease	8,000,000

[a] Department of Commercial Registration, Thailand.

Do-It-Yourself Oil Changers

There are no national statistics for do-it-yourself oil changers. However, based on a recent survey, 21 percent of motorcar owners and 46 percent of motorcycle owners are do-it-yourself oil changers.

Current Used Motor Oil End Uses

Used motor oil in Thailand currently is used in saw mill engines. Used motor oil is used as a lubricant since a high quality oil is not required. Used motor oil is also mixed with local house paint. Another end use is to lubricate the "form work" used in construction of concrete structures. Substantial amounts are burned or discarded.

In the future, NEPO expects commercially collected used oil to go through either re-refining or reprocessing. The re-refined products, through blending with base oil and additive, will yield final products in the forms of lubricating oil, grease, gear oil, hydraulic oil, dropping oil, and mixing oil for paint. The reprocessing products will be used as fuel oil and as black oil for metal casting industries and concrete casting.

FUTURE TRENDS

There is currently no Thai government legislation for used motor oil recycling programs. An initiative for such legislation is in progress, however.[77] A cabinet resolution of August 30, 1994, established the following policy guidelines:[78]

- The Thai Industrial Standards Institute (TISI) is to develop standards for re-refining used oils to produce basic lubricating oil.
- The Department of Industrial Works is to issue Ministerial Orders defining and classifying used oil as hazardous waste and requiring the handling, storage, transport, and disposal of used oil to conform to hazardous waste management standards and regulations. Operators of such facilities will be required to register for permits and licenses.
- Investment incentives may be provided to used oil recycling operators under environmental protection and environmental enhancement promotion.
- Lubricating oil manufacturers and marketers are to be encouraged to buy back lubricating oil containers in order to reduce counterfeiting and to encourage disposal of unused containers.

[77] Telephone interview between Wasima Rahman, ICF Kaiser and Dr. Chaiyod Bunyagidj, Director of the Business and Environment Program, Thailand Environment Institute, April 1997.

[78] "Status on Used Lubricating Oil in Thailand."

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