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## **CENTRAL AMERICA: MANAGEMENT OF USED LUBRICANTS IN CENTRAL AMERICA**



*Final Report*

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This document was prepared by the consultant Tayeb Benchaita, within the framework of the project “Sustainable way of use of hydrocarbons in Central America”, financed by the German Government (GTZ). The opinions expressed herein are those of the author and do not necessarily reflect the views of the Organization. The document has not undergone formal editing.

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## **Glossary & Acronyms**

**ACEA**- Association des Constructeurs Europeens d' Automobile

**API** – American Petroleum Institute

**ASTM** – American Society for Testing of Materials

**CAM** – Central American countries

**CFR** – Code of Federal Regulations

**CIWMB** - California Integrated Waste Management Board

**EPA** – Environmental Protection Agency

**DEO** – Diesel Engine Oils

**DGH** – Directores Generales de Hidrocarburos (General Directors of Hydrocarbon agencies)

**DIFM** – Do it For Me

**DIY** – Do it yourself

**ISO** – International Standards Organization

**Mezclas Oleosas** – Oily mixtures

**MM** – Million

**MSDS** – Material Data Safety Data Sheets

**NFPA** – National Fire Protection Association

**PCB**- Polychlorinated biphenyls

**PCMO** – Passenger car Motor Oils

**SAE** – Society of Automotive Engineers

**Used Oil** - any oil that has been refined from crude oil or any synthetic oil that has been used, and as a result of such use is contaminated by physical or chemical impurities

**WTO** – World Trade Organization

## **1. Introduction**

Each year, over 100 million barrels of used lubricating oils (billions of Liters of waste oil) are dumped onto the global world environment. In 1995, it was estimated that only 44% of available waste lubricants was collected worldwide (Reference 1). Therefore, 56% of used oils are NOT collected and, thus, they are either misused or discarded by the end user into the world environment. Considering that the worldwide lubricant yearly demand is ca. 40 billion Liters (~10.5 Billion Gallons), this implies that over 22 billion Liters of used oils are being disposed of in garbage cans, sewers, rivers, and backyards – harmful practices that will likely contaminate our drinking water, river streams, lakes, etc. For example, only one pint of oil can produce a one-acre slick on surface water, harming fish, aquatic animals, waterfowl, insects, and the base of the aquatic food web: floating plankton and algae.

The above highlights the importance of sound, comprehensive, and proactive environmental laws and regulations for collecting, handling, transporting, storing, and recycling used oils. An effective Used Oil Management and Recycling Program is needed in all countries to protect, conserve, and save our environment. Accordingly, the current CAM project's goals were:

- a) Review the current environmental laws and regulations for used lubricants
- b) Evaluate the current market, business, and consumption of lubricants
- c) Survey the current practices of used lubricants handling
- d) Compare vs. used oil handling and recycling programs in leading western countries
- e) Provide business recommendations for follow up work and future studies

## **2. Environmental Regulations and Legislation**

### **2.1 Environmental, Safety, and Health (ESH) Legislation and regulations for chemical products and lubricating oils**

The Central American countries have many common features. These include “small countries” with high proportions of urban populations, high ethnic diversity, rapidly expanding economies with increasing potential for the private sector. In CAM, environmental legislation and/or regulations recommendations have been derived and published. In most cases, however, the Environmental Regulations & Legislation have not been followed by practical applications with rigorous compliance laws. This is combined with the lack of awareness from the end user of the harmful effects of used oil, lack of training programs for fleet owners and operators, and lack of economic/business incentives for proper handling, collection, transport, storage, and recycling.

## **2.2 Legislation, regulatory, and environment audits to assess possible pollution of soil, water, groundwater, streams, and rivers**

Before this report was prepared, a Questionnaire was provided to CAM countries to supply the most relevant information on Used Oils and their potential Recycling. The Questionnaire is provided in [Appendix 1](#). The list of Environmental Agencies in CAM countries is given in [Appendix 2](#).

As stated in Section 1.1 (above), there are some environmental laws and/or proposals for assessing the possible pollution of soil, groundwater, streams, and rivers. These are typical legislation and/or regulations recommendations for protecting, conserving, and saving the environmental resources (References 2, 3). The legislation encourages the public municipalities, the private sector, and the consumers to properly handle used oils. However, the lack of proactive and comprehensive compliance laws makes it very difficult to ensure proper disposal of used oils. The compliance audits can be set up to by the government agencies and local entities to follow up with used oil generators and users.

Here below is a summary of current legislation and regulations for hydrocarbon mixtures and used oils in CAM: (with main feedback and review by Dr. Hilmar Zeissig).

### **2.2.1 Costa Rica**

The new *Reglamento para la Regulación del Sistema de Almacenamiento y Comercialización de Hidrocarburos* (Decreto No. 28624-MiNAE del 18 de mayo de 2000), which replaces several older regulations, covers “*grasas y aceites lubricantes*” according to the definitions in Art. 4 and provides for the general authority of the *Ministerio del Ambiente y Energía* to establish technical norms for the safe operations of all distribution activities FOR hydrocarbon derivatives. Art. 19 defines the “*servicio de lubricación y engrase*” as a “*servicio complementario*” (Art. 19) which requires authorization under the general provisions for service stations. Art. 37 only mentions the “*recolección de grasas y aceites*” and refers for its control to the general waste water regulations (see below). It does not contain any provisions for the handling of used lubricants.

The *Reglamento para la Regulación del Transporte y Acarreo de lo Derivados del Petróleo* (Decreto No. 24812-MAE) also covers “*lubricantes, grasas y aceites lubricantes*” according to the definitions in Art. 5, but does not establish any specific rules.

Because used lubricants generally contain hazardous at various concentrations, they are considered dangerous substances under the legislation for most CAM countries. However, this is contrary to the US API definition of used oils. In Costa Rica, the *Reglamento para el Transporte Terrestre de Productos Peligrosos* (Decreto No. 2415-MOPT-MEIC-S del 1 de noviembre de 1995) covers used lubricants under its general definition of dangerous substances, but it does not mention them specifically and rather refers to norms to issued by the respective national authority in accordance with the international standards established by the WTO and the United Nations.

The *Reglamento de Reuso y Vertido de Aguas Residuales* (Decreto Ejecutivo No. 26042-S-MINAE del 19 de junio de 1997) establishes general framework for control and treatment of

waste water and defines “*grasas y aceites*” as one of the parameters for the obligatory water analysis (Art. 14) for which frequencies of testing and maximum concentrations are defined in the Anexo.

The *Manual de Instrumentos Técnicos del Proceso de Evaluación del Impacto Ambiental (Resolución No. 588-97-SETENA del 28 de agosto de 1997)* lists the “*Lubricentos*” under the installations which are subjects to obligatory EIAs, but does not contain any provisions for the handling of used lubricants.

## 2.2.2 El Salvador

As far as we could establish, El Salvador is the only of the six countries, which has a technical standard for “*Productos de Petróleo. Aceites Lubricantes para Motores a Gasolina y Diesel. Especificaciones. Norma Salvadoreña NSO 75.04.09.99*”, issued by the *Consejo Nacional de Ciencia y Tecnología, CONACYT*, in 1999. It is an adaptation of the Official Mexican Norm NOM-L-21-1990, which in turn is based on international standards issued by ASTM, API, IEC, ISO and SAE of 1996 and before, many of which are not the latest versions. Therefore, the Norma Salvadoreña needs to be updated with current standards in practice in the USA and elsewhere.

Also, El Salvador is in the process of drafting a technical standard for used lubricants, the “*Anteproyecto de Norma de Aceites Usados*”. It contains detailed provisions concerning the generation, collection, transport, incineration, processing and re-refining, mainly based on Subpart F- Standards for Used Oil Processors and Re-refiners, 279.50-279 of the US EPA 40 CFR 260-299 of 1996 and subsequent revisions. The draft seems to be partially based on recommendations made by consultants Swiss Contact that has a project concerning used lubricants in Latin America. Likewise, the processes and procedures described in the above need to be updated according to standards used in the USA and Germany but customized to local applications.

Last year, El Salvador issued a series of general technical regulations, based on the *Ley de Medio Ambiente*, which also cover lubricants, such as:

The *Reglamento Especial de Aguas Residuales (Decreto No. 39 del 1 de junio de 2000)*, establishes general framework for control and treatment of waste water and defines “*grasas y aceites*” as one of the parameters for the obligatory water analysis (Art. 15) for which frequencies and parameters for the testing are established in this regulation.

The *Reglamento Especial de Normas Técnicas de Calidad Ambiental (Decreto No. 40 del 1 de junio de 2000)* defines, among others, general quality parameters for waste water which do, however, not refer to substances contained in used lubricants (Art.24). It also states without any further details that the handling and disposition of residues of dangerous substances shall be performed in accordance with the *Ley de Medio Ambiente* and other applicable laws and special regulations.

The *Reglamento Especial en Materia de Sustancias Residuos y Desechos Peligrosos (Decreto No. 41 del 1 de junio de 2000)* sets a modern framework for the registration, labeling, transport, handling, treatment and control of dangerous substances under very general definitions which



include a reference to “mezclas y emulsiones de desechos de aceites y agua o de hidrocarburos y agua.” (Art. 22). For more specific definitions reference is made to various international treaties, which El Salvador ratified.

El Salvador does not yet have a modern downstream petroleum law, but a bill has been pending for several years in the legislature. The latest draft would cover lubricants under the general safety and environmental provisions, but does not contain any provisions for the handling of used lubricants.

### **2.2.3 Guatemala**

Lubricants are included in the definition of petroleum products governed by the new *Ley de Comercialización de Hidrocarburos* and its *Reglamento* (Decreto No. 522-99 del 22 de julio de 1999) and its general safety and environmental provisions, which, however, do not contain specific reference to, used lubricants.

On the other hand, the Ley de Protección y Mejoramiento del Medio Ambiente (Decreto No. 68-86) provides for service stations to have appropriate receptacles for the recollection of used lubricants and engine oils originating from private consumers or from lubrication or oil change services for their subsequent treatment, recycling or incineration (Art. 51). The same provisions apply for petroleum storage facilities.

The Ministerio de Energía y Minas has drafted a Reglamento para el Manejo de Mezclas Oleosas y Aceites Lubricantes Usados, which is in the process of legislative approval and contains provisions concerning the generation, collection, transport, incineration, processing and re-refining of used lubricants. Its technical specifications are mainly based in API, SAE, ASTM, and NFPA standards. However, the aforementioned document addresses the hydrocarbon mixtures (such as fuels) and used lubricants in the same category. This needs to be rectified as fuels and used lubricants are two important but different product categories in application, handling, storage, transport, recycling, etc.

At the same time, the Energy and Environmental Ministries, in cooperation with other authorities and private industry, have initiated since 1998 the *Programa Voluntario de Recolección de Aceites Usados*. In its first phase which started 1999, the program establishes the commitment of the oil companies to recollect 40 % used lubricant and engine oils which are imported and distributed to the mayor industrial and commercial consumers for incineration in Cementos Progreso plants. During the second phase starting in 2000, medium size consumers are to participate in the program, and the third phase will include all consumer groups. The central government and local municipalities are to provide centralized storage facilities for those consumers which do not have their own installations. However, it does not seem like much progress has been made based on the information collected from the DGH. This issue needs to be revisited and followed according to the major recommendations of this project. (See end of this report).

### **2.2.4 Honduras**

General provisions concerning hydrocarbon qualities are contained in the *Reglamento para Ejercer Control de Calidad y Cantidad de los Combustibles Derivados del Petróleo* (Acuerdo

*Ejecutivo* No. 697-86 del 26 de septiembre de 1986 y *Acuerdo Ejecutivo* No. 216-95 del 20 de diciembre de 1995).

A draft *Reglamento Técnico de los Aceites Lubricantes para Motor a Gasolina y Diesel* (no date, received 7/2001) was prepared by the Secretaría de Industria y Comercio, Comisión Interinstitucional de Normalización, prepared by a Technical Committee with public and private sector participation. It establishes lubricant specifications according to international norms and outlaws use of obsolete qualities (SA, SB, SC, SD, SE, CA, CB, y CC).

The draft of a new *Ley de Comercialización de Hidrocarburos*, which has been discussed in Honduras for several years, would cover lubricants under general licensing, quality control, safety, environmental and other provisions for all hydrocarbons.

### **2.2.5 Nicaragua**

The *Ley de Suministro de Hidrocarburos, Ley No. 277 del 6 de Febrero de 1998* and the *Reglamento de la Ley de Suministro de Hidrocarburos, Decreto No. 38-98 del 6 de Mayo de 1999* cover lubricants under the detailed and modern licensing, quality control, safety, environmental and other provisions for all hydrocarbon products. But it is understood that those provisions have so far not been enforced for lubricants and no technical regulations or norms have been issued for used lubricants by INE as the regulatory authority under the before mentioned law.

The *Disposiciones para el Control de la contaminación provenientes de las descargas de aguas residuales domésticas, industriales y agropecuarias (Decreto Ejecutivo No. 33-95 del 26 de junio de 1995)* establishes the general framework for control and treatment of waste water which also cover contaminations by lubricants.

### **2.2.6 Panamá**

As far as we could establish, no recent general legislation for the hydrocarbon sector exist and no specific regulations that cover lubricants were issued.

## **2.3 Rules and regulations for product formulations, packaging, labeling, packaging, hazard identification, transportation, and storage**

Currently, a large proportion of lubricants sold in CAM is imported from the USA, especially the branded and packaged motor oils. Some products are also imported in bulk from US toll blenders and packagers. The US branded and packaged products are generally compliant with US laws and regulations for packaging, labeling, hazard identification, etc. Therefore, as long as exported products to CAM from the USA are made of the same US formulations (same additive and base oil components), there are compliant with US laws that are generally very adequate.

However, there are other products that come from other Latin American countries that do not have sound and comprehensive regulations for product formulations, packaging, labeling, packaging, hazard identification, transportation, and storage. These are the imported products

that need to be evaluated, tested, and regulated via imports legislation and compliance procedures.

Currently, there are no regulations in most CAM countries for product formulations, packaging, labeling, packaging, hazard identification, transportation, and storage. The existence of such laws would protect the environment for both locally made products as well as imported products.

#### **2.4 Regulations for monitoring unwanted substances in used lubricating oils such as trace metals, chlorinated solvents, gasoline, diesel, aromatic hydrocarbons, glycols, and PCBs**

Likewise, there are no local CAM regulations for unwanted substances such as described above. The regulations for monitoring trace metals (lead coming from fuel), chlorinated solvents, and PCB's are overwhelmingly important. These are very harmful to the environment.

#### **2.5 Material Safety Data Sheets (MSDS) for products and products components for locally-made and imported lubricants**

The MSDS for products describe the major components contained in the products formulations. Often, these products components are noted in a generic manner to protect the trade secrets and proprietary information. For practical purposes, the MSDS are a good indicator for assessing the relative safety of handling the finished product, its potential health impacts, and environmental considerations.

In general, imported US lubricants do come with MSDS along with other product documentation such as product data sheets, ISO 9002 certification of the plant that manufactures the products. However, products made locally or imported from other Latin American countries do not necessarily meet or have all the MSDS needed.

#### **2.6 Regulation, compliance procedures, and certification processes for design, construction, operation and restoration of lube manufacturing, distribution centers, and other properties and facilities to ensure excellence**

Based on the information we received from the CAM countries, there are no regulation, compliance procedures, and certification processes for design, construction, operation and restoration of lube manufacturing plants and distribution centers. Compliance procedures and certification processes currently utilized in the USA can be adapted to local CAM conditions and used effectively.

### **3. Used Oil Definition, Issues, and Recycling Considerations**

#### **3.1 Definition of Used Oil**

In this project we will focus on used lubricants; other hydrocarbon mixtures ("Mezclas Oleosas") will not be discussed in detail in this report.

The US Environmental Protection Agency's (EPA) regulatory definition of used oil is as follows

*Used oil is any oil that has been refined from crude oil or any synthetic oil that has been used and as a result of such use is contaminated by physical or chemical impurities.*

Therefore, used lubricant is any petroleum-based or synthetic oil that has been used during normal lubrication application. Impurities such as dirt, wear metals, condensed water, "blow-by" unburned fuel, combustion products, or chemicals can get mixed in with the oil, so that in time the oil no longer lubricates well. Eventually, this used oil must be replaced with new oil (based on either virgin oil or re-refined base oil). There are various types of Used Oils. The following is a major list

- Synthetic oils, which are usually derived from coal, shale, or polymer-based starting material.
- Engine oils, which include gasoline and diesel engine crankcase oils, and piston-engine oils for automobiles, trucks, boats, airplanes, locomotives, and heavy equipment.
- Transmission fluids.
- Refrigeration oils.
- Compressor oils.
- Metalworking fluids and oils.
- Mining oils
- Laminating oils.
- Industrial hydraulic fluids.
- Copper and aluminum wire drawing solution oils
- Electrical insulating oil.
- Industrial process oils.
- Oils used as buoyants.

This list does not include all types of used oil.

Based on the US EPA's regulatory definition, Used Oil does not include any of the following:

- Waste oil that is bottom clean-out waste from virgin fuel storage tanks, virgin fuel oil spill cleanups, or other oil wastes that have not actually been used.
- Products such as antifreeze and kerosene.
- Vegetable and animal oil, even when used as a lubricant.
- Petroleum distillates used as solvents.

Oils that do not meet the US EPA's definition of used oil can still pollute the environment when not adequately disposed of and could be subject to typical regulations for hazardous waste management.

### **3.2 Types of businesses that handle used oil**

There are various types of businesses that handle used oil. The following are the typical and most important participants in the used oil handling, collection, transport, storage, recycling:

Lubricant Producers, which are the lubricant marketers, oil companies that produce base oil at their refineries and blend it with additives to make finished lubricants, and Toll Blenders/Packagers (lubricant manufacturers)

Generators, which are businesses that handle, used oil through commercial or industrial operations or from the maintenance of vehicles and equipment. Generators are the largest segment of the used oil industry. They include car repair shops, service stations, quick lube shops, mass merchandisers, grocery stores, metalworking and mining industries.

Collection Centers, which are facilities that accept small amounts of used oil and store it until enough is collected to ship it elsewhere for recycling. Collection centers typically accept used oil from multiple sources that include both businesses and individuals.

Transporters, which are companies that pick up used oil from various sources and deliver it to re-refiners, processors, recyclers, etc.

Burners, which burn used oil for energy recovery in commercial boilers, industrial furnaces, or in hazardous waste incinerators.

Re-refiners and Processors, who re-refine or reprocess used oil so that it can be reused in a new product such as a lubricant and recycled again and again.

### **3.3 Recycling Methods, processes, and procedures**

Once oil has been used and drained from the lubricated equipment, it can be collected, recycled, and used again. It can be reprocessed and re-refined for use as new oil or used as an energy source. For example, used motor oil can be re-refined and sold at the store as motor oil or processed for furnace fuel oil. Aluminum rolling oils also can be filtered on site and used over again. Used oil can be recycled via the following processes:

On site reconditioning, which involves removing impurities (dirt, heavy deposits, etc.) from the used oil and using it again.

Reprocessing, which involves introducing used oil into a petroleum refinery as a feedstock and produce gasoline and coke.

Re-refining, which involves removing impurities so that it can be used as base oil for new lubricating oil. Re-refining prolongs the life of the oil resource indefinitely via this

"regeneration" process. This form of recycling is generally the preferred option because it closes the recycling loop by reusing the oil to make the same original product.

Burning for energy recovery, which involves removing water and particulates so that used oil can be burned as fuel to generate heat or to power industrial operations.

### **3.4 Environmental advantages and benefits for Used Oil Recycling**

There are many benefits for recycling used oils. These important and very tangible benefits can be demonstrated depending upon the method of recycling used oils. All the recycling methods have the following advantages:

- Protecting, conserving, and saving the environmental resources such as river streams, land soil, underground water, green forests, etc.
- Conserving and utilizing more effectively the countries' energy resources
- Reducing energy imports and utilizing better the countries financial resources
- Creating additional employment thru government agencies and private sector
- Recover and utilize more used oil, filters and containers.

There are many ways we can quantify the above benefits. The following examples illustrate the importance of recycling used motor oils (Reference 4)

- One gallon of used motor oil can provide enough electricity to run the average household for about a day.
- Two gallons of recycled oil can:
  1. Cook 48 meals in a microwave oven
  2. Blow dry your hair 216 times
  3. Vacuum your house for 15 months
  4. Watch television for 180 hours
- Only one gallon of re-refined used oil is needed to produce 2.5 quarts of motor oil, while 42 gallons of crude oil is needed to produce the same amount.
- Recycling the motor oil from one oil change protects a million gallons of drinking water – or a year's supply for 50 people.

#### **4. Engine Oil Changes by market segment (DIFM vs. DIYers)**

##### **4.1 Volume of Oil Changes by market segment in 2000**

In the author's past experience (Reference 5); the Do-It-For-Me (DIFM) market in terms of oil changes dominates the Latin American market (including CAM). In other words, the business generators of used oils such as car dealerships, car garages, "lubricentros", and service stations do a very high proportion of motor oil changes. Only a small percentage of motor oil changes are done directly by consumers themselves, Do-It-Yourselfers (DIY). In Latin America, it is generally estimated that up to 75% of motor oil changes are carried out by the DIFM sector.

##### **4.2 Passenger Car Motor Oil Demand**

In the data reported by the Honduras government agencies, over 85% of motor oil changes are performed by the DIFM sector. This data is in line with the observation made above for Latin American markets. More importantly, the fact that oil changes are done by the various automotive businesses (DIFM) rather than by the consumers themselves (DIY) is a great step in the right direction in terms of the potential opportunities for creating, organizing, and encouraging used oil collection and recycling companies. In other words, it is a lot easier to organize and set up collection/recycling companies that work directly with oil change centers than with consumers, who are generally unaware and/or not trained about the handling of used oils.

**Table1:** Honduras- Passenger Car Motor Oils Demand by Trade Channel in 2000

Service Stations	30.00%
Garages & Workshops	20.00%
"Special care"	1.00%
Lubricentros Type A	13.00%
Lubricentros Type B	13.00%
Dealers (including supermarkets)	23.00%

Source: Mobil Honduras

#### **5. Recycled Oils By Channel of Trade**

##### **5.1 Some programs of recycled used oils**

As discussed earlier, there are no large-scale collection and recycling programs of used oils in CAM. They are however some small opportunity-driven companies that collect used oils and sell them to cement and banana factories, which utilize used oils as fuel. For example, in Honduras three small companies that recycle used oil as heating/burning fuel are indicated below.

**Table 2:** Honduras - Companies that recycle used oils

Industrial Companies	Number of Collection Outlets	Gallons/month
Standard Fruit Company (Bananera).	1	1,200.00
American Pacific (Compañía Minera).	1	1,000.00
Minerales de Copan (Comp. Minera).	1	850.00
		3,050.00

Source: TEXACO CARIBBEAN INC, HONDURAS.

## **5.2 Potential for re-refining of used oils into base oils to be blended with additives and make new lubricants for various uses**

Used oil motor oil can be collected and turned over to re-refiners who return used oil to its original virgin oil state via re-refining processes, which clean oils from their impurities and contaminants -- such as dirt, water, fuel, wear metals, and additives -- through vacuum distillation, solvent extraction, hydro treating, and hydro finishing to remove any remaining chemicals. Finally, the re-refined base oil is blended with new additives (with various functions and properties) to make the finished and new lubricating oil.

Used oil can be re-refined as many times as needed. The final blended product is subject to the same stringent refining, compounding, and performance standards as virgin oil. Re-refined base oils are no commonly used to make finished motor oils, which pass the highest API (North America), ACEA (Europe), or JASO (Japan) motor oil performance requirements.

It should be recalled that only one gallon of re-refined used oil is needed to produce 2.5 quarts of motor oil, while 42 gallons of crude oil is needed to produce the same amount. This point demonstrates the importance and relevance of re-refining from energy conservation, protection, and saving point of view. Of course, there is a need for some significant initial investments to design, build, and run a re-refinery with a safe, sound, and comprehensive used oil collection program to provide the necessary feedstock needed.



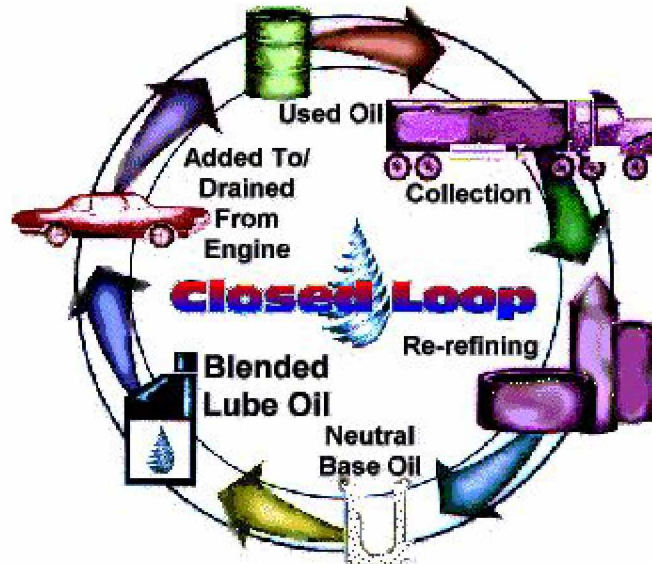


Figure 1: Typical Closed Loop for Re-refining Base Oils

## 6. Lubricant Demand & Product Types

### 6.1 Lubricant demand by product type

In Latin America, most lubricant markets showed that gasoline motor oils (GMO) amount to about 25%, diesel oils (both cars and heavy duty commercial) amount to ca. 35%, and industrial/other lubricants make the balance (i.e. 40%). These are benchmark numbers, which may change depending upon the specific car park and commercial fleets in the country of interest.

The reported data in Table 3 below for Guatemala shows that 65% of lubricants are of the automotive type, that is, engine oils for passenger car motor oils and diesel oils. Transmission oils, marine oils, industrial oils, and greases make up the balance, namely, 35%.

On the other hand, reported data for automotive lubricants in Honduras shows 48% passenger car motor oils (PCMO), and 52% for commercial (trucks, buses), marine oils, and industrial oils. The author believes that the PCMO proportion is on the high side (overestimated number).

**Table 3:** 2000 Relative lubricant consumption (%) by product type in Guatemala

Type of lubricant	% in Guatemala
Automotive	65
Transmission	7
Marine	14
Industrial	7
Grease	7

Source: Texaco Inc.

**Table 4:** Relative lubricant consumption (%) by product type in Honduras (Year 2000)

Type of lubricant	% in Honduras
Passenger Car Motor Oils	48
Commercial Lubricants	13
Marine Oils	2
Industrial Lubricants	35

Source: Mobil Corp.

## 6.2 Lubricant volume sold by importing companies

The main importers of lubricants into El Salvador together with product brand names, source of import, lubricant quality levels, and volume of lubricant imported are described in ([Reference 6](#)).

The name of the importing lubricant company, the lubricant volume sold, and the major type of lubricant imported in Honduras are described in Table 5 below. Only those companies that imported more than 500,000 Kg are listed.

**Table 5:** Honduras - Imported Lubricants & Major Importers in 2000  
(Ranked in decreasing volume)

Importer <sup>1</sup>	Lubricants Imports, Kilograms.	Type of Lubricant
TEXACO CARIBBEAN INC	6,980,514	Automotriz, Industrial.
DISTRIBUIDORA DE PRODC.T.PETROL	2,233,392	Automotriz, Industrial.
SHELL HONDURAS S.A	1,995,389	Automotriz, Industrial.
ESSO STANDARD OIL S.A.	1,856,254	Automotriz, Industrial.
LUBRICATES MOBIL DE CENTROAMERICA	1,446,820	Automotriz, Industrial.
TECNICA Y MOTORES S A DE C V	907,116	Automotriz.
LLANTEX	785,318	Automotriz.
CONFECCIONES ALKA S.A.	555,356	Industria textil.
TOYOPARTES,S.A.	503,183	Automotriz.
CASA COMERCIAL MATHEWS S A	502,064	Equipo pesado, agrícola.
Other	4,684,580	
<b>TOTAL 2000</b>	<b>22,449,986</b>	

Costa Rica reported the data for imported lubricants in the years 1999, 2000, and Jan-April 2001 ([Reference 7](#)). For the year 2000, total imported lubricant volume is estimated

at 6.2 MM US Gallons (23.5 MM Liters). A list of the lubricant importers and local distributors was also provided (Reference 8).

## **7. Lubricant Quality, Performance Specifications, and Certification**

### **7.1 Lubricant quality and performance**

There are two most widely used engine oil quality levels and performance specifications:

- a) American Petroleum Institute (API), which is applicable for North American and
- b) ACEA (Association des Constructeurs Europeens des Automobiles), which is applicable for European applications

However, most oil marketers do utilize both types to better promote their products as meeting all quality and performance standards. This is especially the case in Europe, where lubricants companies utilize API and ACEA as well as car manufacturers' approvals. In North America and Japan, API is by far the most prevalent.

In CAM, the most prevalent quality specifications used are those of API. However, most lubricants are of lower quality than the latest API licensed quality level. Only about 30% of passenger car motor oils are of the highest quality levels, currently API SJ (soon to be superseded by API SL). For lower quality levels than API SJ, the indicated quality on the packaging label is based on the oil marketer's recommendation and "read-across" assessment based on historical data. Likewise for diesel engine oils, less than 25% of diesel engine oils are of API CH-4 quality level, highest for API standards. Those products lower than API CH-4 quality levels are also based on the oil marketer's historical data.

### **7.2 API Service Symbol and Certification Mark**

There are two types of marks (Reference 9):

- a) The API service symbol, also known as Donut



The top half describes the oil's performance level. The center identifies the oil's viscosity. The bottom half tells whether the oil has demonstrated energy-conserving properties in a standard test in comparison to reference oil.

b) The API Certification Mark, also known as the “starburst”



The API Certification Mark "starburst" is designed and recommended for a specific engine oil application (such as gasoline service). Oil may be licensed to display the starburst only if the oil satisfies the most current requirements of the International Lubricant Standardization and Approval Committee (ILSAC) minimum performance standard for this application (currently GF-2 for passenger cars).

### 7.3 API Service Categories

The current and previous API Service Categories are shown below in Table 6 and 7 ([Reference 10](#)). Vehicle owners should consult their owner's manuals before referring to these charts. Engine oils are categorized based on their performance characteristics and the type of service for which they are intended: **S** category oils are suitable for gasoline engines and **C** category oils are suitable for diesel engines. Oils may have more than one performance level.

**Table 6;** API Service Categories for Gasoline Engines

Category	Status	Service
<b>SJ</b>	<b>Current</b>	For all automotive engines presently in use. Introduced in the API Service Symbol in 1996.
<b>SH</b>	Obsolete	For model year 1996 and older engines. Valid when preceded by certain C categories.
<b>SG</b>	Obsolete	For model year 1993 and older engines.
<b>SF</b>	Obsolete	For 1988 and older engines.
<b>SE</b>	Obsolete	For 1979 and older engines.
<b>SD</b>	Obsolete	For 1971 and older engines.
<b>SC</b>	Obsolete	For 1967 and older engines.
<b>SB</b>	Obsolete	For older engines. Use only when specifically recommended by the manufacturer.
<b>SA</b>	Obsolete	For older engines; no performance requirement. Use only when specifically recommended by the manufacturer.

**Table 7;** API Service Categories for Diesel Engines

Category	Status	Service
<b>CH-4</b>	<b>Current</b>	Introduced December 1, 1998. For high-speed, four-stroke engines designed to meet 1998 exhaust emission standards. CH-4 oils are specifically compounded for use with diesel fuels ranging in sulfur content up to 0.5% weight. Can be used in place of CD, CE, CF-4, and CG-4 oils.
<b>CG-4</b>	<b>Current</b>	Introduced in 1995. For severe duty, high-speed, four-stroke engines using fuel with less than 0.5% weight sulfur. CG-4 oils are required for engines meeting 1994 emission standards. Can be used in place of CD, CE, and CF-4 oils.
<b>CF-4</b>	<b>Current</b>	Introduced in 1990. For high-speed, four-stroke, naturally aspirated and turbocharged engines. Can be used in place of CE oils.
<b>CF-2</b>	<b>Current</b>	Introduced in 1994. For severe duty, two-stroke-cycle engines. Can be used in place of CD-II oils.
<b>CF</b>	<b>Current</b>	Introduced in 1994. For off-road, indirect-injected and other diesel engines including those using fuel with over 0.5% weight sulfur. Can be used in place of CD oils.
<b>CE</b>	Obsolete	Introduced in 1987. For high-speed, four-stroke, naturally aspirated and turbocharged engines. Can be used in place of CC and CD oils.
<b>CD-II</b>	Obsolete	Introduced in 1987. For two-stroke-cycle engines.
<b>CD</b>	Obsolete	Introduced in 1955. For certain naturally aspirated and turbocharged engines.
<b>CC</b>	Obsolete	For engines introduced in 1961.
<b>CB</b>	Obsolete	For moderate duty engines from 1949 to 1960.
<b>CA</b>	Obsolete	For light duty engines (1940's and 1950's).

For automotive gasoline engines, the latest engine oil service category includes the performance properties of each earlier category. If an automotive owner's manual calls for an API SG or SH oil, API SJ oil will provide full protection. For diesel engines, the latest performance category usually - but not always - includes the performance properties of an earlier performance category.

El Salvador reported the current lubricant specifications and definition of quality levels used ([Reference 11](#)). This document, adapted from the Mexican specifications (which were adapted from the US API/SAE/ASTM Specifications and Standards), is a very adequate document that



can be used by other countries as well. However, it needs to be updated with the latest specifications (API SL for gasoline motor oils and API CH-4 for diesel engine oils).

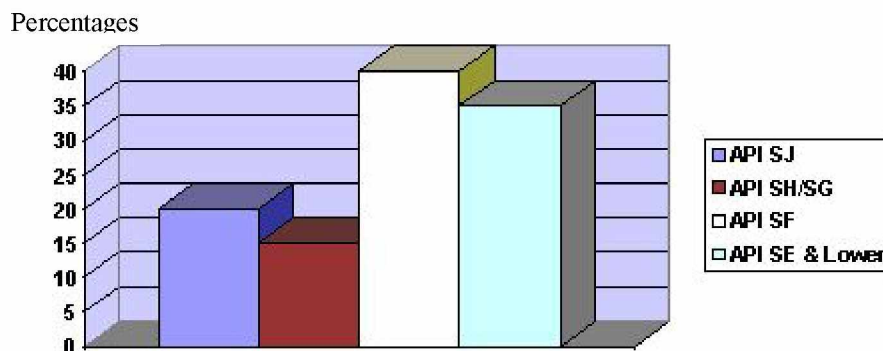
#### 7.4 Existence and use of ISO 9000 Series certification and control of imported lubricants

Based on the data reported, it does not appear that ISO certification of imported products is part of a rigorous process that ensures the manufacturing quality of the lubricants. However, this practice of requiring ISO 9002 certification is now a standard one in most countries. Since all products imported from the USA are coming from ISO 9002 certified plants, requiring the ISO 9002 documentation for imports should be a formality.

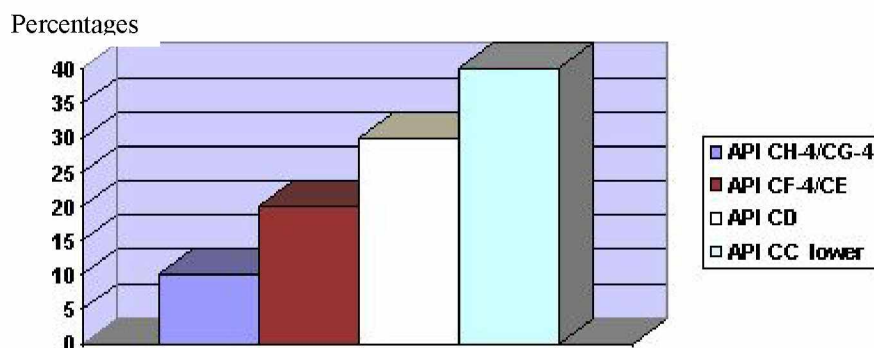
#### 7.5 Passenger car motor oils (PCMO) by performance level

No lubricant data was reported from the local agencies regarding the segmentation by quality levels in the market. However, reported data in the past ([Reference 12](#)) shows the following approximate percentages by quality levels:

##### a) Passenger car motor oils (Figure 2):



##### b) Diesel engine oils (Figure 3):



In the USA, more than 90% of passenger car motor oils (PCMO) are of API SJ quality and more than 80% of diesel oils (DEO) are of API CH-4/CG-4 quality levels. It should be noted, however, that lubricant quality in the USA generally follows the latest quality levels for both the PCMO's

and DEO's. This is because of competitive forces as well as the lack of valid API licensing for lower quality levels.

## **8. Oil Drain Intervals, Fuel Properties, Car Park**

### **8.1 Oil Drain Intervals for passenger cars**

Oil drain intervals have been increasing in light of significant improvement in lubricant technology – both in the additive components used and the base oil carrier. In the USA, the commonly OEM recommended drain intervals are 3,000 miles for mild driving service (highway regime) and 5,000 miles in severe driving conditions (City “Stop & Go” regime). These drain intervals are based on the highest API quality level, namely API SJ for passenger cars. In Europe and Japan, the oil drain intervals are longer for most OEM's. Drain intervals of up to 10,000 miles are already used in certain European countries such as Germany.

For the current report, local OEM recommendations were not available. However, local lubricant marketers recommendations for oil drain intervals were reported. These are depicted in Table 8 below.

**Table 8:** 2000 Recommended Drain Intervals by Lubricant Marketers in Honduras

	<b>Brand of Motor Oil</b>	<b>Rec. Interval (months)</b>
1	Abonier	3
2	Aceite de barril*	1
3	Castrol	3
4	Chevron	3
5	Delo	3
6	Dippsa	3
7	Esso	3
8	Havoline	3
9	Mobil	5
10	Pennzoil	3
12	Quaker State	4
13	Rimula X	3
14	Shell	3
15	Sunnoco	3
16	Texaco	5
17	Venoco	3

From the above Table, it is seen that most oil marketers recommend three (3) months for oil drains. This is comparable to the 3,000 Miles OEM recommended drain intervals for severe service in the USA. It is generally accepted practice in the USA that the average motorist drives ca. 12 miles/year. It should be noted that the three months rule is not endorsed by a couple of

oil marketers in the Table above, two of which recommend 5 months and one recommends 1 month (?).

## 8.2 Fuels properties and characteristics

From a lubricant point of view, fuel quality is important as it impacts engine operating conditions, which in turn affect the amount of unburned fuel and combustion gases going to the crankcase. The lower the fuel quality, the more challenging the crankcase oil's job becomes to lubricate the engine.

### 8.2.1 Gasoline fuel quality

In Table 9 below, the fuel quality data for Honduras are reported. There are two widely used grades of gasoline, MOGAS 87 (87 Octane) and MOGAS 95 (Octane 95). It is seen that MOGAS 87 has low quality (fighting grade) whereas MOGAS 95 has a good quality and considered a premium gasoline.

**Table 9.** Gasoline fuel quality in Honduras

GASOLINE 87 OCTANE  (MOGAS 87)		CURRENT STANDARDS IN HONDURAS	TYPICAL TEXACO FUEL	TYPICAL SHELL FUEL	FUTURE STANDARDS IN HONDURAS
	ASTM Method	Value	Value	Value	Value
Specific Gravity @ 60 °F	D-1298	-	0.7354	-	-
API Gravity @ 60 °F	D-1298	Report	60.9	Report	Report
Density @ 15 °C, Kg/L	D-1298	-	0.7352	-	-
Research Method, RON	D-2699	87 mín	89.75	89	87 mín
Motor Method, MON	D-2700	-	80.68	-	-
GASOLINE 95 Octane  (MOGAS 95)		CURRENT STANDARDS IN HONDURAS	TYPICAL TEXACO FUEL	TYPICAL SHELL FUEL	FUTURE STANDARDS IN HONDURAS
	ASTM Method	Value	Value	Value	Value
Specific Gravity @ 60 °F	D-1298	-	0.7586	-	-
API Gravity @ 60 °F	D-1298	Report	55.05	Report	Report
Density @ 15 °C, Kg/L	D-1298	-	0.7583	-	-
Research Method, RON	D-2699	92 mín	95.67	95.4	95 mín.
Motor Method, MON	D-2700	-	83.5	-	-

Likewise, the same type of gasoline quality levels can be found in El Salvador, namely a premium product at 95 Octane rating and a lower quality product at 87 Octane rating. The move to non-leaded gasoline is also very encouraging from an environmental point of view.



### 8.2.2 Diesel fuel quality

Diesel fuel data was reported from Honduras. This is shown in Table 10. The Cetane number is fair in quality when compared to diesel fuels found in the USA and Western Europe. On the other hand, the fuel sulfur (ca. 0.5% by mass) is very high when compared to fuel sulfurs currently available in North America, that is, less than 0.1% by mass. Note that the new US legislation for fuel sulfur for diesel trucks and buses is 0.025% by mass (maximum). It should be recalled that higher fuel sulfur levels translate into higher acidic combustion gases going into the crankcase via “blow-by” (between the piston ring pack and the cylinder liner) as well as going into the atmosphere, thus creating a higher level of pollution.

**Table 10:** Diesel fuel quality in Honduras

DIESEL		CURRENT STANDARDS IN HONDURAS	TYPICAL TEXACO FUEL	TYPICAL SHELL FUEL	FUTURE STANDARDS IN HONDURAS
	ASTM Method	Value	Value	Value	Value
Cetane Index	D-976	45.0 mín.	48.85	46.3	45.0 mín.
Cetane Number	D-673	45.0 mín.	-	-	-
Sulfur, % mass	D-2622 / D-1266	0.5 max.	0.459	0.46	0.5 max.

### 8.3 Car Park

The total number of vehicles registered in El-Salvador from 1966 to 1996 is 367,297, which comprises 261,978 gasoline powered-cars, 95,219 diesel powered vehicles, and 10,100 for vehicles powered by other alternative fuels. It should be pointed that these numbers are higher than the number of vehicles on the road in 1996 because of cars scrap page, etc.

The total number of vehicles registered in Honduras from 1940 through 2000 is 452,000, which comprises 418,000 automobiles and the balance trucks and buses. (Likewise, these are higher than actual vehicles on the road because of car scrap page, etc.). About 85% of these are Japanese vehicle makes/models, 10% are US vehicle brands, and the balance made of European vehicles and other Asian makes.

## **9. Used Oil Recycling Programs in Other Countries**

### **9.1 USA Legislation Laws and Recycling Programs**

All of the regulations for managing, collecting, and recycling used oil are developed, promulgated, and promoted by the Environmental Protection Agency (EPA). This includes the following documentation and related publications (References 13 to 17):

- Environmental Regulations and Technology Report - *Managing Used Oil*
- Managing Used Oil: *Advice for Small Businesses*
- Used Oil Management Program
- How to Set Up A Local Program to Recycle Used Oil

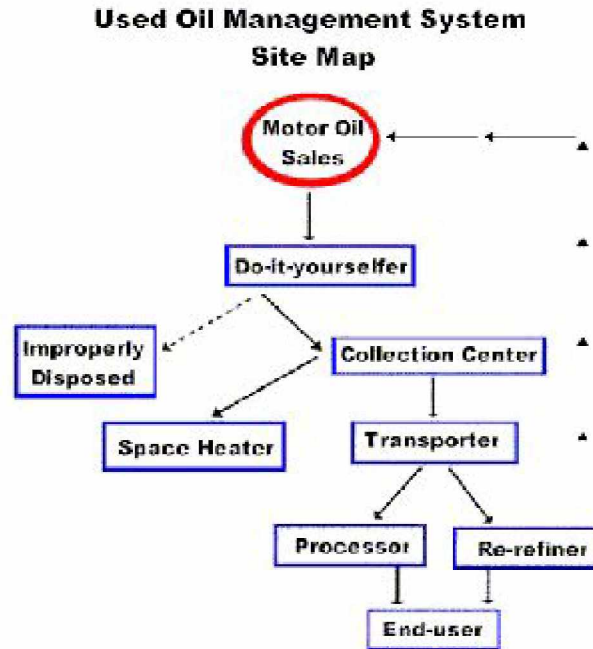
In 1992, the EPA announced its decision not to list used oils destined for recycling as a hazardous waste. In addition, American Petroleum Institute (API) has developed programs to encourage, support, and implement business procedures for used oil recycling. The most widely used documentation is “Used Motor Oil- *Collection & Recycling*” contained in API Website (Reference 4), which can be summarized as follows:

- Benefits of recycling - Find out why it is important to recycle
- Collection Center Sites - Find state info & a collection site nearest you
- Preparing Used Oil for Recycling - Prepare and properly dispose your used motor oil
- Starting a Collection Program – API Model Bill, Legislative Info, Publications
- Used Oil Management System -What happens to used motor oil?

A typical Used Oil Management System is shown in Figure 4 below (Reference 4). Various businesses and processes are involved in a sound Used Oil Management Program (UOMP).

In 1997, API members and their independent dealers operated nearly 12,200 drop-off centers, collecting over 100 million gallons of used motor oil. In addition, there are about 26,021 public and private collection centers being operated by states, municipalities, automotive and oil-change service centers.

According to a recent API study, more than 50% of motorists change their own oil. In 1997, 43 to 62 million gallons of used oil was collected and recycled by do-it-yourselfers. In the same year, the local service station and automotive service facilities recycled 194 million gallons of oil.



**Figure 4:** Used Oil Management System

The following 17 states have adopted programs based on API's model legislation:

California	Maine	South Carolina
Delaware	Maryland	Tennessee
Florida	Minnesota	Texas
Kansas	Missouri	Utah
Kentucky	New Hampshire	Virginia
Louisiana	Rhode Island	

About 80 percent of the used oil collected in the United States is blended with virgin stock to be used as industrial heating oil. The rest is re-refined or burned for energy recovery. The USA's approximately 75,000 space heaters use about 113 million gallons of used oil per year. However, reprocessing is the most common method of recycling used oil in the U.S. Each year processors treat approximately 750 million gallons of used oil. Seventy-five percent of used oil is being reprocessed and marketed to:

- 43% asphalt plants;
- 14% industrial boilers (factories);
- 12% utility boilers (electric power plants for schools, homes, etc.);
- 12% steel mills;

- 5% cement/lime kilns;
- 5 % marine boilers (tankers or bunker fuel);
- 4% pulp and paper mills;
- >1% commercial boilers (generating heat for school, offices, etc.);
- 5% other.

In spite of the great efforts mentioned above, millions of gallons of used motor oil are still being disposed of in garbage cans, sewers and backyards - practices that can contaminate soil and have the potential to contaminate the drinking water. The U.S. Environmental Protection Agency believes that the largest single source of oil pollution found in the USA's waters come from do-it-yourselfers. It's important that Dyers take their used motor oil to a recycling center and ask that the oil be recycled when they get their oil changed.

## **9.2 The California Model**

California has the most prevalent and successful program for protecting the environment in the USA. Used Oil Recycling is one of those environmental protection programs that get the unending attention and support from the California Integrated Waste Management Board (CIWMB), (Reference 15). The California Oil Recycling Enhancement Act provides guidance for Used Oil Recycling via a website where the user/consumer can select the city of interest, the type of user, and the material to be recycled (Reference 18).

The California Oil Recycling Enhancement Act is designed to discourage the illegal disposal of used oil. This law requires oil manufacturers to pay to the Board \$0.16 for each gallon of lubricating oil sold in California. Registered industrial generators, curbside collection programs, and certified collection centers are eligible to receive \$0.16 for each gallon of used lubricating oil recycled.

In Californian, lubricating oil sales and oil recycling have remained fairly stable since the Used Oil recycling Program began. However, industrial oil sales have nearly doubled. This trend follows California's economic recovery; however, California exports a large amount of oil products.

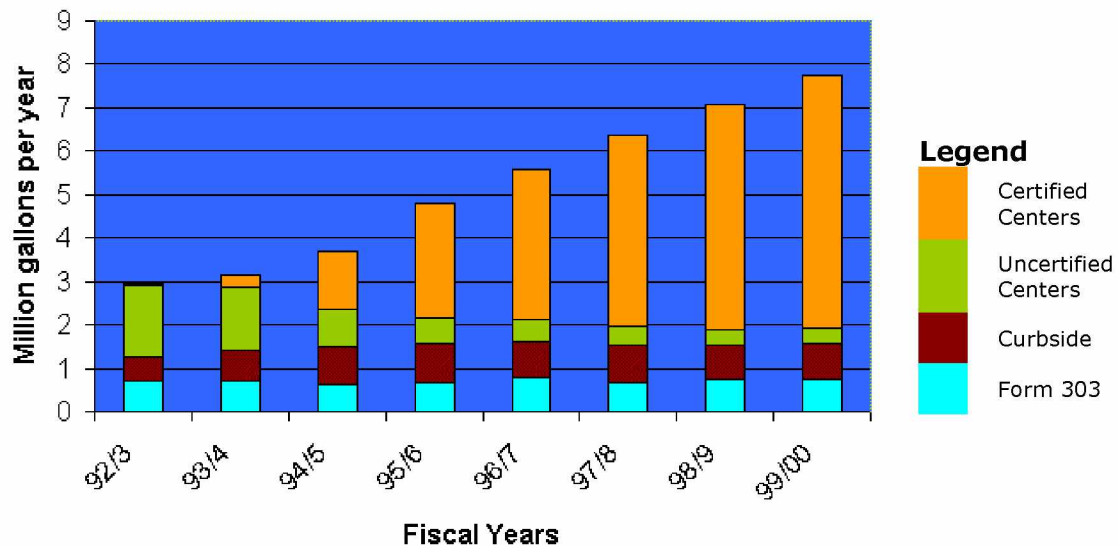
Lubricating oil sales together with recycled oils volumes are reported in Figure 5 (Reference 18). This data shows that since 1993, about a third of lubricating and industrial oils sales were recycled. However, close to 50% of lubricating oils were recycled over the last 8 years.

Of the 150 million gallons of lubricating oil sold per year, about 78 percent was installed into automobiles and heavy-duty equipment (trucks, trains, etc.) by service businesses. From national data, the California "do-it-yourself" public purchased an estimated 33 million gallons of lubricating oil in 2000. Because of losses during driving (about 35 percent for automobiles and light duty trucks), the public sector generated an estimated 22 million gallons of used oil in 2000.

**Fig. 5: Annual Oil Sales and Used Oil Recycling Rates (in MM of gallons)**

	1993	1994	1995	1996	1997	1998	1999	2000
<b>Lubricating Oil Sales</b>	139.4	141.2	140.8	136.2	137.5	142.1	150.3	149.2
<b>Industrial Oil Sales</b>	86.4	78.0	117.3	140.9	141.6	152.4	176.3	155.6
<b>Total Oil Sales</b>	<b>225.8</b>	<b>219.2</b>	<b>258.1</b>	<b>277.1</b>	<b>279.6</b>	<b>294.5</b>	<b>326.6</b>	<b>304.8</b>
<b>Lubricating Oil Recycled*</b>	61.0	59.9	54.6	56.8	60.9	64.5	69.2	70.1
<b>Industrial Oil Recycled*</b>	13.8	16.7	19.5	20.8	19.3	20.9	19.2	18.4
<b>Total Oil Recycled</b>	<b>74.8</b>	<b>76.6</b>	<b>74.1</b>	<b>77.6</b>	<b>80.2</b>	<b>85.4</b>	<b>88.4</b>	<b>88.5</b>

- Figures include California used oil recycled both in and out of California.

**Figure 6; "Do-it-Yourself" Used Oil Recycling Rate**

In 1992, the amount of used oil collected from the do-it-yourself public was about 3 million gallons per year (ca. 10 percent of the used oil generated by the public). In 2000 about 8 million gallons were collected, comprising over 35 percent of the publicly generated used oil volume. Figure 6 below displays the great impact the CIWMB program has had on the used oil collected

from the public ([Reference 19](#)). It is seen that collection/recycling growth trend follows closely the growth in the total number of State-certified collection centers. The later growth is reflective of the increasing proportion of auto parts stores participating as certified centers, as well as the increasing used oil volumes collected by the auto parts store sector.

### **9.3 Canadian Used Oil Collection & Recycling Programs**

Three Canadian provinces have developed, set, and applied Used Oil Management and Recycling programs. These are Alberta, Saskatchewan and Manitoba. Current industry recycling programs in these three provinces recover about 70% (87 million Liters) of the used oil available.

The Alberta Used Oil Management Association (AUOMA); The Saskatchewan Association for Resource Recovery Corp. (SARRC); and, The Manitoba Association for Resource Recovery Corp. (MARRC) are working diligently to inform and motivate do-it-yourselfers across western Canada to recycle used oil, used oil filters and plastic oil containers.

The Western Canadian Used Oil recycling Program works as follows ([Reference 20](#)):

1. Collect the used oil from your vehicle, lawnmower, farm equipment or other machinery and place it in its original container.
2. Do not contaminate the oil with other liquids. Solvents, paint thinner, bleaches, antifreeze, gasoline, PCBs, household chemicals, insecticides, herbicides, pesticides, grease or water are not accepted. EcoCentre staff has information on where to take contaminated oil.
3. Collect your used oil filters and containers and place the filters in a clean container.
4. Return your used oil materials to the nearest EcoCentre or Collection depot during operating hours.
5. Tell others about this service.

Public Collection Centers – Eco-Centers: These collection centers of used oil materials serve small volume oil consumers such as individual motorists, farmers and small commercial operators who service their own vehicles and equipment. Consumers can transport their recyclable used oil materials to the nearest EcoCentre. Each EcoCentre contains a specially designed 4,500 Liter oil storage tank and disposal bins for filters and containers. Used oil materials are gathered by registered collectors and transported to registered processors for recycling and reuse. No materials are disposed of in municipal landfills. Policies, operations manuals and training programs for the Eccentric have been established, tested and proven. EcoCentre staff is responsible for ensuring the materials are acceptable for recycling and informing consumers of how to properly dispose of unacceptable products.

Other Collection Depots - If there is no purpose-built EcoCentre in a specific area, there are over 1,000-registered collection depots across western Canada equipped to accept the used

oil materials for recycling. Many rural municipalities, individuals and businesses operate used oil materials collection depots or collect used oil materials from businesses and the public.

Working cooperatively, the three provincial associations have overseen the development of a network of over 1,000 facilities that accept used oil materials for recycling. This has been achieved by building on the strengths of existing private sector suppliers and recyclers for maximum results and efficiency.

#### 9.4 German Legislation and Used Oil Recycling Programs

Germany probably has the most elaborate, comprehensive, and sound Waste Oil Management Programs (References 21- 24). The corresponding legislation was the Waste Disposal Act (*Abfall-Beseitigungsgesetz, AbfG*) promulgated in June 10, 1972. Its purpose was to reorganize and clean up waste disposal all over Germany. An essential theme of the Act, which was based on existing state waste laws, was a fundamental reorganization and clean up of waste disposal. In its contents, the regulations describe who, what, how, and where waste needs to be disposed of. (Reference 21 & 22).

The Waste disposal sector provides 240,000 jobs with an annual turnover of DM 80 billion (\$36 Billion). Now, CAM countries have an economic output of \$67 billion, which accounts for about 0.2% of world economic activity. Comparing the two figures implies that the German waste disposal turnover corresponds to more than 50% of CAM economic output. The waste disposal sector in Germany has become an important economic and employment factor. Based on a corresponding ordinance to the Closed Substance Cycle and Waste Management Act, the creation of the "specialized waste management company" has produced a quality concept combining competitiveness with deregulation. Since then, 180 specialized waste management companies have been certified, with a further 1,700 companies currently awaiting certification, proving that the sector has risen to the challenge of quality competition. The certificates ensure that an expert, reliable company ensures the environmental compatibility of recycling and disposal

In 1993, the federal government decided to reformulate waste law into a Waste Avoidance, Recycling and Disposal Act. The aim was to realize the economically viable recycling of materials within an environmental and social market economy. The new Act came into force on 7/10/96. With it, a new, preventive concept of waste has been created. According to this concept, waste is no longer simply something that the owner wishes to get rid of, but also includes those substances, surpluses and residues, which are neither deliberately produced nor used for any purpose. These include, for example, harmful industrial substances as much as scrap cars or waste paper. The new waste concept, taken from European law, is now also applied at a national level.

The main goal of the new Act is to develop waste law and waste management towards a recycling economy. The cornerstones of the new legislation are:

- Consistent application of the Polluter Pays Principle
- The creation of a prevention-oriented hierarchy of obligations (avoidance before thermal or material recycling)

- The equal status of thermal and material recycling, with the possibility of determining a priority in the case of specific waste forms by statutory order
- Producers' responsibility for their products (to be verified in each case by statutory order)
- Extending the opportunities for the privatization of waste disposal

Through integrated recycling of solvents and oils, waste is to be avoided as far as possible even at the production stage, and on the other hand, the producers' responsibility for their products which is now embodied in law should see to it that products are so structured that waste is avoided in their manufacture and use, and that an environmentally sound recycling and disposal is ensured after their use. Thus products should be usable a number of times, long-lived, easily repairable and low in pollutants.

The following directives supplement the new Act:

- The waste certification directive (Abfall-Nachweisverordnung)
- The directive introducing the European waste catalogue (Verordnung zur Einführung des Europäischen Abfallkatalogs)
- The directive on designating waste requiring special supervision (Verordnung zur Bestimmung von besonders überwachungsbedürftigen Abfällen)
- The directive on recycling waste requiring special supervision (*Verordnung zur Bestimmung überwachungsbedürftiger Abfälle zur Verwertung*)
- The transport authorization directive (*Verordnung zur Transportgenehmigung*)
- The directive on waste management plans and waste audits (*Verordnung über Abfallwirtschaftskonzepte und Abfallbilanzen*)
- The directive on waste disposal firms and the guidelines for the activities and recognition of waste disposal firms (*Verordnung über Entsorgungsfachbetriebe und die Richtlinie für die Tätigkeit und Anerkennung von Entsorgungsgemeinschaften*)

Since 1/11/86, the disposal of used oil is carried out according to the regulations contained in the Waste Avoidance and Waste Management Act (*Abfallgesetz*) of 2/8/86 (BGBl. I p. 1410, amended p.1501). The legislature was assuming that waste oils of any kind could cause considerable harm to the environment. This broad definition of waste oil includes in principle all fluid or semi-fluid substances derived from crude oil. This includes substances coming from particular uses, like lubrication, propulsion, cooling or insulation, from processes such as drilling, cutting, grinding and polishing, dressing leather, or as solvents or hydraulic fluids. The definition also involves synthetic hydrocarbons, but equally other oil-like substances, e.g. synthetic PCB-based oils and substitutes containing halogens, as may be found in transformers, condensers



and hydraulic equipment. Finally, a series of solvents, in particular white spirit, turpentine and petroleum spirits-based cleaning fluids, come under this new definition of waste oil.

According to the Waste Avoidance and Waste Management Act, all provisions apply to waste oil disposal, unless waste oils are returned to a facility licensed according to the Federal Emission Control Act (*Bundesimmissionsschutzgesetz*) for recycling or reuse as fuel. The waste oils included within the definition of Act can be divided into the following three groups:

- Waste oils which can be considered for reprocessing. These are used internal combustion engine oil, transmission oil and mineral motor and transmission oils conforming to the limits on PCBs and total halogen content
- Waste oils which are used as a fuel supply in licensed facilities
- Waste oils which are dealt with in hazardous waste disposal facilities because reprocessing or use as fuel cannot be considered, e.g. hydraulic fluids from mining, metalworking oils with a high content of additives and small quantities of oil of unknown origin, where analysis of pollutants contained is not carried out in every case at the site of disposal or collection.

Some highlights of the German Used Oil Recycling Program:

- a) Anyone selling unused oil must accept without charge a quantity of used engine or transmission oil equal to any quantity of unused oil they deliver themselves
- b) The above obligation applies when the buyer purchases unused oil in at least the same quantity as the used oil to be accepted by the supplier, or can provide evidence of having purchased the same quantity at an earlier date.
- c) Sellers of lubricants must display notice of the requirements for proper disposal of used engine or transmission oil, either on the packaging of the product delivered, at the point of sale or otherwise.
- d) If delivery is to private end users, the location of the collection point must be legibly indicated on easily recognizable signs at the point where the product is actually offered for sale.
- e) If there is no collection point at the point of sale, the presence of a collection point in the vicinity must be shown. If the retailer (e.g. a department store, self-service or other retail outlet) does not set up a collection point itself, it may make use of third parties to fulfill its obligations

**Figure 7: German Environmental Label ("Blue Eco Angel")**  
(Last Update: February 18, 1999)

<ul style="list-style-type: none"> <li>◆ <u>Eco friendly consumption: a viable proposition?</u></li> <li>◆ <u>So what is the Environmental Label Campaign all about?</u></li> <li>◆ <u>The Environmental Label: in DIY for example</u></li> <li>◆ <u>The Environmental Label: in water conservation for example</u></li> </ul>	 <p><b>The German Environmental Label - an important step towards eco friendly consumption!</b></p>	<ul style="list-style-type: none"> <li>◆ <u>The "Blue Eco Angel"</u></li> <li>◆ <u>The Environmental Label: in the office for example</u></li> <li>◆ <u>The Environmental Label: in waste avoidance for example</u></li> <li>◆ <u>Products with the Environmental Label (selection: as of June 1997)</u></li> <li>◆ <u>Acknowledgements</u></li> </ul>
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## 9.5 Mexican Laws and Regulations for Waste Disposal

In Mexico, laws for hazardous waste handling have been promulgated (Reference 25). These describe the regulations and legislations for protecting the environment. They seem to be very similar to the original laws written in the US by the EPA. However, there are two main differences with US laws, regulations, and compliance procedures:

- a) There are mostly laws for protecting the environment from hazardous waste - no comprehensive and specific regulations dealing directly with Used Oil Handling and Recycling seem to exist – same as in CAM countries
- b) Used oil is comprised in the list of hazardous waste among "*las Características de los Residuos Peligrosos*" (Reference 22) – this is contrary to the American Petroleum Institute's decision made in 1992, which lists "Used Oils" as non-hazardous

There was a Pilot Project labeled "Metropolitan Environmental Commission" for the lubricating oil handling used in Metropolitan Zone of the Valley of Mexico (ZMVM), which was proposed by the State of Mexico (July 13, 2000). The program's goal was to review, analyze, and report on the negative environmental impact of Used Oils.

### BREM Study: (Reference 26):

Business Research Emerging Markets (BREM), a London-based marketing consulting firm, conducted a Used Oil Study in 1996. They interviewed 535 fleet and trade companies, 1,000 private motorists, and 309 commercial owner-drivers (taxi-owners, micro-buses, buses and trucks) in four key regions of Mexico: Central, West, North, and Southeast.

A majority of fleet and trade companies reported existing arrangements for collecting used oils. Of the 300 Million liters of automotive lubricants (high number in the author's view), 25 to 40 % were not accounted for via collection means. The study estimated that 30 to 45 million of used oil "disappears" onto the environment.

The challenge is even exacerbated by Dyers, who contribute relatively more to dumping the oil rather than bringing it to a service center as is generally done in the USA. Note that the Mexican Dyer market is only 18% when compared to 50% in the USA. On the other hand, large commercial fleets are identified by the Attorney General for Environment Protection (Procuraduría Federal de la Protección Ambiental, PROFEPA). In addition, people's awareness and attitude towards used oil impacts on the environment is increasing especially in the large metro areas. These are very positive signs for the future.

## **10. Design, Development, Implementation, and Application of a Used Oil Management Program & Systems**

### **10.1 Target Market Segment**

As we discussed earlier, the Used Oil Management Program & System will focus on Do-It-For-Me sector of used oils, namely, businesses that change oils such as service stations, dealerships, lubricentros, garages, fleet owners/operators, transport companies, etc. The DIYer market, consumers changing their own oil, may not be ready for a successful application of a UOMP in the short term. The Dyer market segment will be evaluated and considered later. This proposal is very proactive and realistic for the following reasons:

- 10.1.1: Consumers in CAM countries make less than 25% of PCMO changes. Considering that PCMO is ca. 25% of Total used oils, the % of oils changed by consumers amount to no more than 7% of total used oil (PCMO, DEO, Industrial)
- 10.1.2: The deep consumers' unawareness of the used oil issue in CAM countries, the lack of supportive infrastructure, and the financial funds needed make a proposal for a DIYer UOMP impractical (at least in the short term).
- 10.1.3: The proposed regulating laws for dealing with used oils generated by businesses are an excellent step in the right direction for addressing this important issue of used oils handling

### **10.2 Basic Elements of a Recycling Program**

The local recycling program is a cooperative effort that may involve the local governments, environmental groups, private businesses, and service organizations. Local governments can regulate the handling of used oils through collection centers and/or directly from oil hangers, service stations, dealerships, and lubricentros. They may also offer incentives (lower tax rates, "land donations", loans at low financing rates, etc.) to the private sector, which will see this as a profitable business opportunity in collecting and recycling used oils. Private businesses and environmental agencies can help design and organize the programs. These participants will

decide how the program will run — who will pickup the used oil, who will transport it, who will recycle it, how the program will be publicized, etc

### **10.3 Organization of the Used Oil Recycling Program – Need for a Program sponsor**

Local recycling programs can be operated by various groups working together (preferably). Participants can include an environmental group (to monitor compliance procedures), a service organization (to handle logistics), an agency of the local government (for regulating laws), and a private business to implement the recycling program. The program sponsor should research local used oil recycling problems, potential new collection sites, haulers and recyclers, and sources of financial support. The program sponsor should help design the program itself, choosing likely central collection points, enlisting the cooperation of service stations, quick lubes, Lubricentros, fleet owners. Sponsors should create news coverage in local media, design and distribute signs and bumper stickers, and publicize the program.

### **10.4 Roles and Relationships of Participants**

Local governments can design and lead used oil recycling programs entirely on their own. However, the programs will be more successful, and more affordable, if local business groups carry much of the responsibility, including taking the lead as the primary sponsor. A common role of local government is to publicize the program and to provide incentives to the private business and other participants to handle research, program setup, and promotion. Governments can also play a leadership role by procuring products made with recycled used oil.

### **10.5 Local Industry or Business Groups**

Local businesses can provide and manage collection centers, contribute money and resources to promote the program, conduct their own promotions, and help organize other groups. In soliciting participation from businesses, we need to focus on those who have a special interest in used oil sales and/or recycling — major lubricants users, oil changers, haulers, transporters, and recyclers. Local business associations, such as those serving bus fleet operators, truck fleet operators, car service stations, and car dealerships, can be invaluable in promoting the program overall and in coordinating participation among their memberships.

### **10.6 Setting Program Goals**

To guide the actual design of the program, it is important to lay out its goals and objectives as clearly as possible. If specific local environmental problems need attention, focus on solving them first. Problems might include the dumping of oil into sewers, people and/or businesses changing oil in parks or other public areas, poor performance of local used oil haulers or recyclers, or lack of segregation of household hazardous wastes (such as pesticides, antifreeze, paint thinners, household cleaners, and contaminated rags) from used oil prior to recycling.

### 10.7 Deciding on Collection Methods

The collection system is the cornerstone of the entire program. The more convenient and accessible the collection, the more used oil will be returned for recycling. To encourage potential collection stations to participate, we need to stress the following selling points:

- Participation should increase consumer traffic at the establishment and can therefore boost business.
- Participation can increase customer good will.
- Participation helps fight pollution and conserves a valuable natural re-source.
- Participation may contribute a small source of revenue from the sale of used oil. (This depends entirely on local economics).
- Be sure to clearly explain the responsibilities of managing a collection station.

### 10.8 Finding a Hauler

The used oil must be picked up in a timely manner by responsible, authorized used oil haulers and sent to reputable recyclers. Insure that the hauler/recycler should be in compliance with all applicable state laws. The program must ensure that haulers:

Have valid licenses and operate in a safe and environmentally sound fashion.

Maintain regular records of quantities of used oil collected, delivered, and handled.

Deliver used oil to approved and reputable recycling facilities

### 10.9 Identifying a Recycler and the Recycling Systems

The recycling methods and processes were described in Section 3.3. Let us evaluate each one of those four options for CAM countries.

**On-site reconditioning** extends the useful life of the oil by using it longer after the deposits and impurities are removed. This application is attractive especially for industrial (e.g., hydraulic/turbine oils) and commercial oils.

**Burning used oils as fuel** is also an attractive method for CAM countries. It is inexpensive, easier to implement, beneficial to CAM countries in reducing their dependence on foreign oil, etc. It is very encouraging to note that this recycling method is already used in some cement and banana factories in Honduras.

**The reprocessing**, which involves introducing used oil into a petroleum refinery as a feedstock to produce gasoline and coke, is a possible option if used oils are not contaminated with chemical waste.

The **re-refining process** involves a rather large first hand investment in designing and building a “state of the art” re-refinery (minimum cost of \$75 MM). In addition, the used oil amount generated in each one of the CAM countries may not be large enough to provide enough feedstock for a re-refinery. An efficient and productive re-refinery should process at least 5 MM Gallons of used oils a year (ca. 50% of all used oils in Guatemala). Therefore, because of lack of “operation scale” in CAM countries and relatively high capital investment, the re-refinery option is not attractive.

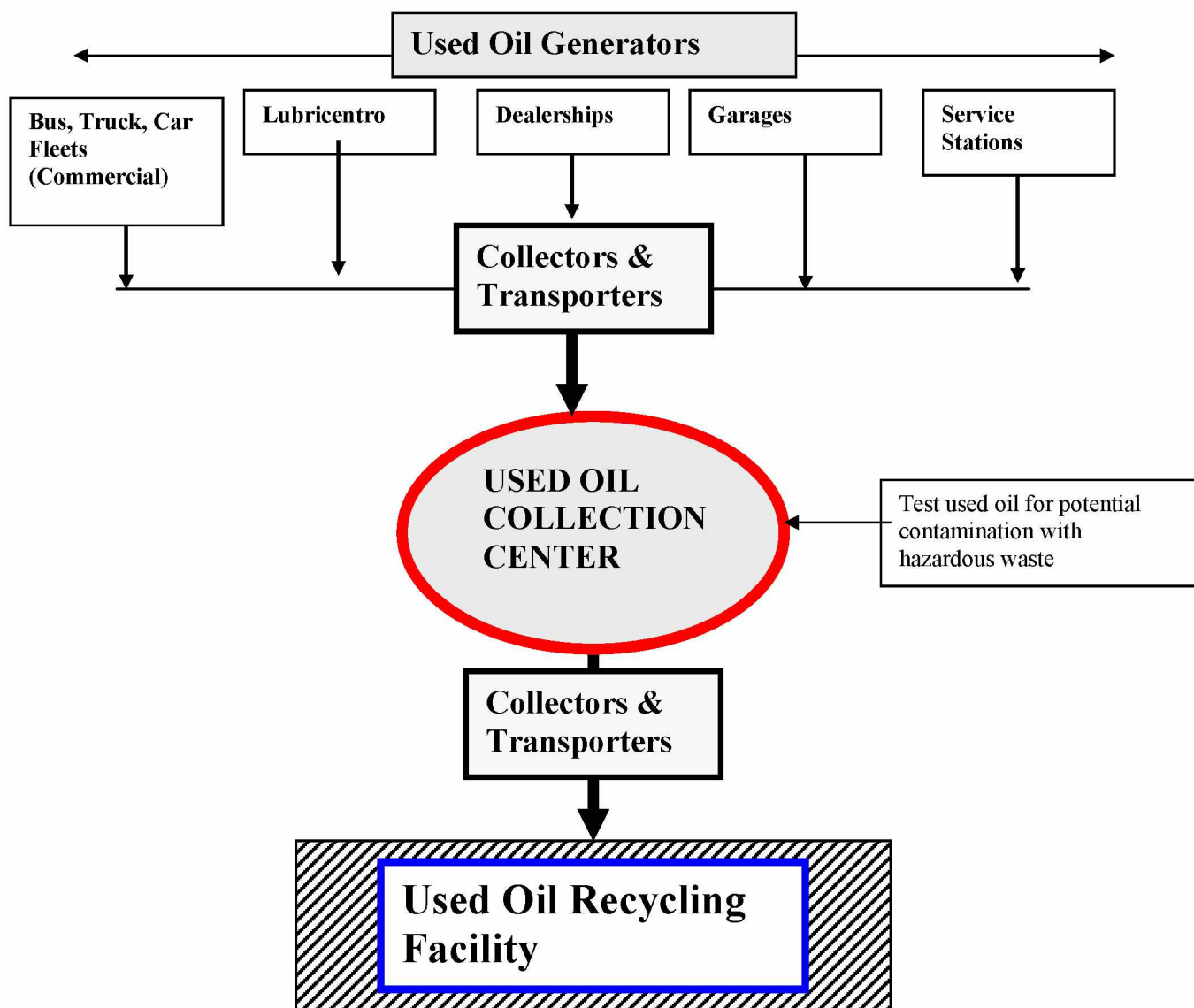
The recycler must have a tank farm adequate to receive, store, and handle used oils according to regulating laws. The storage tanks should be designed and built with the applicable environmental safeguards including min. distance of holding tanks to tank farm wall, containment area for truck unloading, anchored tanks to slab (which is tied to ground rods). Reprocessing or burning use oils as fuel should be done in accordance with environmental safeguards to prevent the de-deposit of hazardous, incompatible, or other materials that could contaminate the used oil; prevent fire hazards; and control and respond to spillage. Proper preparation of all prospective recycling stations will ensure smooth operation of the program.

#### **10.10 Ideas for Promoting a Used Oil Program**

As mentioned earlier, the state and governmental agencies should offer incentives to the private sector to make the UOMP is a rewarding experience as well as a profitable operation. We do not believe that the government entities can carry out all the tasks associated with developing and implementing a successful UOMP.

We should raise awareness of the damage used oil can do, its value as a resource, and how to change auto oil in an environmentally sound manner. Promoting a used oil program involves taking advantage of all possible opportunities to bring your message to the public (especially oil changers), educating them about the importance of the used oil issue and how to manage their oil properly, and telling them how to take advantage of the program’s services. Offering special prizes to the three largest recyclers can help in this process.

The Proposed Used Oil Management Program & System is depicted in Figure 8.

**Figure 8: Proposed Used Oil Management Program & System**

## **11. Comments and Recommendations**

In this report, we have evaluated the current Used Oil situation in CAM countries. This includes a survey of the environmental regulations dealing with used oils, the lubricant oils demand, the used oil market size, and the preliminary practices for handling used oils. It is encouraging to notice that good progress had been accomplished over the last few years in terms of

environmental awareness as well as more protection measures being put in place. However, recommendations for future work are necessary as follows:

### **11.1 Need for Better Used Oil Nomenclature and Technical Terminology**

The US definition of “Used Oil”, recognized in most Western countries, was given in Section 3.1. However, there is currently a lack of a consistent and well-accepted definition of Used Oils in most CAM countries. In some countries, “Used Oils” seems to include used oil/hydrocarbon mixtures and/or solvents. Therefore, one needs to apply “tighter” and precise definitions for “Used Oils” and related topics such as: a) what is a “Hazardous” Used Oil? b) What is a non-hazardous Used Oil? c) What are the hazardous substances generally found in Used Oils? d) What are the hazardous substances generally found in hydrocarbons/fuel mixtures? Etc.

The topic of Used Oils, meant as “Used Lubricating Oils”, should be treated separately from other hydrocarbon mixtures (“Mezclas Oleosas” in Spanish) – at least in the final analysis. This is because chemical contents, applications, and “residual contents” of used lubricating oils are different from hydrocarbon mixtures (a.k.a fuel mixtures). Therefore, environmental regulations that refer to “Mezclas Oleosas y/o Aceites Lubricantes Usados” should address the specific regulations for one or the other – not both. In this fashion, one can distinguish the regulations and handling of:

- “Non-hazardous” Used Oils containing no or only traces of hazardous substances according to the USA ‘s Title 40 of Federal Regulations Part 261 (40 CFR 261).
- “Hazardous” Used Oils with toxic contents higher than threshold according to the US regulation above
- Other hydrocarbons and “fuel mixtures”

The above is well addressed in the document provided by El-Salvador ([Reference 27](#)), which refers to the above US Regulation (40 CFR). Therefore, the Used Oil handling procedures described in the El-Salvador preliminary project can be utilized in all CAM countries with necessary updates of the regulations.

### **11.2 Need for Updating Laws and Regulations**

We noticed that certain CAM regulating laws are not updated over the last few years. Some of the regulations are adapted from North American (Mexican, US) documentation but in their earlier versions. Therefore, the environmental regulations dealing with Used Oils need to be updated in light of corresponding laws applicable in advanced countries such as Germany and the USA. Some of the Used Oil Handling Models used in these two countries can be “locally – customized” to CAM countries and utilized accordingly. In addition, some of the CAM regulation contain technical details, which are either no longer valid or outdated. The regulating laws should be precise and not “open-ended” as we noticed in some documents. In this respect, the regulations in place should always use the “State of the Art” international standards and specifications in place (ASTM, API, IEC, ISO and SAE, NFPA, etc.)



### **11.3 Need for Development and Use of Compliance Regulations**

There is a critical, need for developing and promulgating compliance regulations together with detailed processes and procedures. These will ensure that Used Oil handling regulations are complied with in the market place by the various businesses and entities dealing with used oils. The compliance regulations will address the rules and procedures for all the businesses involved such as generators, collectors, handlers, transporters, recyclers, processors, etc. The compliance regulations should be based on enforceable rules, detailed procedures, and precise processes but not principles, which can be provided as guiding mission statements.

### **11.4 Need for a Used Oil Management and Recycling Program (UOMRP)**

The development and application of a preliminary Used Oil Management and Recycling Program (UOMRP) in CAM countries is necessary. This program should be led by the Environmental agencies, which can highlight the benefits and advantages of such as program for the public, communities, state entities, and private-sector organizations. The effective development and utilization of such a program will necessitate the effective organization and participation of the businesses involved (See Section 3.2)

The participating businesses should follow the regulations to be put in place via the corresponding rules and procedures. It should be pointed out that government agencies should take the lead in this major undertaking as well as provide incentives (tax breaks, grants, land donations, etc.) to non-profit organizations or small businesses in the private sector, which will participate in this major endeavor.

The goals of the Used Oil Management & Recycling Program are:

- Provide training and demonstration programs to government agencies, schools, used oil generators', etc
- Encourage the effective participation of the private sector, the government agencies, and non-profit organizations in the used oil recycling
- Help organize and develop the various businesses that handle and recycle used oils (See List in Section 3.2)
- Grow the markets for processing and recycling used oils

### **11.5 Recommendations from the Managua Symposium (September 6/7, 2001)**

The Managua Symposium's objective was to review and discuss the research, findings, and recommendations of the preliminary report. An excellent attendance and participation from the DGH's of CAM countries were noted. Major progress was made in evaluating and applying in the future a Pan-Central American approach to regulating the handling, management, and recycling of used oils.

The participants' comments and recommendations are provided in Appendix 3.

## APPENDIX 1

### Questionnaire on Used Lubricants<sup>1</sup> Project for Central America

***Please provide answers, data, documentation, and comments, if available, regarding the following issues and topics***

#### 1. Environmental Regulations and Legislation:

- 1.1. Existence and effective use of Environmental, Safety, and Health (ESH) Legislation and regulations for chemical products and lubricating oils
- 1.2. Each year, billions of liters of waste oil are dumped onto the global world environment. In 1995, it was estimated that only 44% of available waste was collected worldwide. Therefore, 56% of used oils are not collected and, thus, they are either misused or discarded by the end user into the world environment.
- 1.3. In Central America, legislation proposals and/or regulations recommendations have been derived in certain countries. However their practical applications with rigorous compliance laws from the government agencies have not materialized either because of the
- 1.4. Existence and effective use of legislation, regulatory, and environment audits to assess possible pollution of soil, water, groundwater, streams, and rivers
- 1.5. Existence of rules and regulations for product formulations, packaging, labeling, packaging, hazard identification, transportation, and storage
- 1.6. Regulations for monitoring unwanted substances in used lubricating oils such as trace metals, chlorinated solvents, gasoline, diesel, aromatic hydrocarbons, glycols, and PCBs.
- 1.7. Material Safety Data Sheets (MSDS) for products and products components for locally-made and imported lubricants
- 1.8. Existence of regulation, compliance procedures, and certification processes for design, construction, operation and restoration of lube manufacturing, distribution centers, and other properties and facilities to ensure excellence

#### 2. Used Oil Recycling Issues and Considerations

- 2.1 Existence and use of any used oil recycling laws and regulations:
  - Laws in the collection, preparation, transport, storage, and distribution
  - Enforcement processes and compliance procedures
  - Compliance and involvement of institutions marketing and selling the oils
  - Compliance and involvement of oil changers (as depicted in Section 3.1 below)
  - Compliance and involvement of consumers (as depicted in Section 3.2 below) for disposing of used oils from cars, trucks, buses, lawnmowers, and farm equipment
  - Development and effective use of a "Used Oil Management Program" (UOMP)
  - Environmental advantages and benefits for such a program
  - Set up and development of convenient collection locations of used oils
  - Methods and procedures to motivate the public to recycle their used oils
  - Grants and incentives provided by local governments to nonprofit organizations and research for demonstration projects.
  - Government regulations and incentives for such a program
  - Training of users for such a UOMP

<sup>1</sup> Definition and type of lubricants (=oils in this document) are given in Section 8.

- Rules and procedures for compliance by users
- Insurance that recyclable-used oils are not contaminated with other fluids such as antifreeze, solvents, gasoline, or water.
- 2.2 Regulations and laws for Used Oil Collection Centers (UOCC)
  - Registered collection centers
  - Service station drop-off
  - Curbside pick up and recycling operation
  - Shopping centers
  - Recycling centers
- 2.3 Opportunities for local government to provide incentives to the private sector for designing, building, developing, and utilizing re-refineries that will transform used oils into new lubricants
  - Government incentives and grants
  - Effective participation of private sector
  - Educational and training programs to users about “misconceptions” of re-re-refined oils
  - Effective use of re-refined oils in new finished lubricants at same quality level as virgin oils
- 3. Engine Oil Changes by market segment (DIFM vs. Dyers): <sup>2</sup>
  - 3.1 Volume (Liters) of Oil Changes by market segment in 2000. (This is generally called DIFM or “Do It for Me” network)
    - Quick Lube Shops and “Changaros”
    - Car dealers
    - Gas/Fuel stations
    - Car repair garages
    - Other outlets
  - 3.2 Volume (Liters) of oil changes made by consumers themselves in 2000. This is generally called “Do It Yourself” (DIY) network:
    - Motor oils purchased in auto parts stores
    - Motor oils purchased in grocery stores
    - Motor Oils purchased in “mass merchandisers”
    - Other
- 4. Recycled Oils by Channel of Trade: <sup>3</sup>
  - 4.1 Volume (Liters) of used oil recycled by market segment in 2000
    - Quick Lube Shops and “Changaros”
    - Car dealers
    - Gas/Fuel stations
    - Car repair garages
    - Other outlets
  - 4.2 Volume (Liters) of used oil recycled made by consumers themselves in 2000
    - Motor oils purchased in auto parts stores
    - Motor oils purchased in grocery stores
    - Motor Oils purchased in “mass merchandisers”
    - Other
  - 4.3 Mode of used oil recycling after oil changes in 2000
    - Volume of used motor oil collected and utilized in space burners, boilers, etc.
    - Volume of used motor oil collected and utilized by processors
    - Volume of used motor oil collected and utilized in other forms (different from 4.3.1 and 4.3.2)

<sup>2</sup> If specific volumes are not known, please rank market segments in order of importance

<sup>3</sup> If specific volumes are not known, please rank channels in order of importance

Potential for re-refining of used oils into base oils to be blended with additives and make new lubricants for various uses

5. Motor Oil Market Data: Motor oil demand by trade channel: <sup>4</sup>

Motor oil sold in 1995, 1997, 2000 by market channel:

Car dealers  
Car repair garages  
Grocery stores  
Auto parts stores  
Mass merchandisers  
Quick lubes  
Other

6. Lubricant Suppliers, Oil Companies, and Motor Oil Marketers: <sup>5</sup>

6.1 Lubricant market share by trade channel and product type in 2000:

Lubricant volume sold (Liters) and market (%) share by oil company for passenger car motor oils including automotive transmission and gear oils

Lubricant volume sold (Liters) and market share (%) by company for truck and bus diesel oils including related transmission and gear oils

Lubricant volume sold (Liters) and market share (%) by company for "industrial" diesel oils (marine, railroad, and industrial generators only)

Lubricant volume sold (Liters) and market share (%) by company for industrial oils (hydraulics, metal processing, treating fluids, etc.)

Lubricant volume sold (Liters) and market share (%) by company for greases

6.2 Locally-Made lubricants vs. imported lubricants in 2000:

For the above marketing and oil companies (items 6.1.1 to 6.1.5), specify locally-made volume of lubricants vs. imported volume for each one of the four lubricant applications mentioned above

6.3 Local Manufacturing plants of lubricants and corresponding raw materials in 2000:

List of all blending and packaging plants for additives, base oils, and finished lubricants

Name of plant, physical location, name of plant owner, lubricant capacity, and lubricants production in 2000 (by product type as described in section 6.1)

Existence of environmental, safety, health, and ISO certifications of local lubricant manufacturing plants

Existence of environmental regulations for waste disposal (water, oil, solvents, plastics, packaging, paper, metal, etc.)

4Compliance procedures for waste disposal (water, oil, solvents, plastics, packaging, paper, metal, etc.)

7. Lubricant Quality & Certification

7.1 Any monitoring of quality compliance with applicable local laws & regulations (those in existence)

7.2 Existence and effective use of ISO 9000 series certification for local lube plants, distribution centers, and research facilities

7.3 Existence and effective use of ISO 9000 series certification and control of imported lubricants

7.4 Any monitoring of lube quality (API, ACEA, NMMA, JASO credentials) for both locally-made products and imported products

7.5 Any quality audits of products sold in the market place

<sup>4</sup>: If specific volumes are not known, please rank trade channels in order of importance

<sup>5</sup>: If specific volumes are not known, please rank market segments in order of importance

8. Lubricant Types, Performance, and Market data in 1995, 1997, 2000: <sup>6</sup>
- 8.1 Passenger car motor oils by performance level
    - API SJ/CD/CF
    - Synthetic-based
    - All mineral-based
    - API SH/SG/CD
    - API SF/CD
    - API SE and lower
    - Multigrade oils vs. monograde oils for the above performance levels
  - 8.2 Motorcycle oils
    - 4-stroke
    - API SH/SG
    - API SF and lower
    - 2-stroke
    - JASO FC (low smoke)
    - API TC
    - Other
  - 8.3 Truck and bus diesel oils
    - API CH-4/SG-4
    - API CF-4
    - API CF/CF-II/CD-II/CD
    - API CC and lower
  - 8.4 Automotive gear oils
    - API GL-5
    - API- GL4 to GL-2
    - API GL-1 and lower
  - 8.5 Automotive Transmission oils
    - Dexron III/Mercon
    - Mercon
    - ATF+3/ATF+2
    - Other
  - 8.6 Marine, railroad, and generator diesel oils
    - API CF
    - API CD
    - Lower than API CD
  - 8.7 Outboard marine
    - TC-W3
    - TCW-2/TCW
    - Other
  - 8.8 Hydraulic oils
    - Non fire resistant fluids
    - Fire resistant fluids
  - 8.9 Industrial gear and transmission oils
  - 8.10 Metal processing, treating, and specialty fluids
  - 8.11 Greases
    - Calcium-based
    - Lithium-based
    - Sodium-based
    - Polyurea
    - Other

<sup>6</sup>: If exact volumes are not known, please provide estimates

9. Vehicle market data and related lubricant issues: <sup>7</sup>
  - 9.1 Vehicle population by make/model and origin in 1995, 1997, 2000
    - Car population
      - US-made and/or "US transplant" for local assembly
      - European-made and/or "European transplant" for local assembly
      - Japanese-made and/or "Japanese transplant" for local assembly
      - Other
  - 9.2 Motorcycle population
    - US-made and/or "US transplant" for local assembly
    - European-made and/or "European transplant" for local assembly
    - Japanese-made and/or "Japanese transplant" for local assembly
    - Other
  - 9.3 Truck population
    - US-made and/or "US transplant" for local assembly
    - European-made and/or "European transplant" for local assembly
    - Japanese-made and/or "Japanese transplant" for local assembly
    - Other
  - 9.4 Bus population
    - US-made and/or "US transplant" for local assembly
    - European-made and/or "European transplant" for local assembly
    - Japanese-made and/or "Japanese transplant" for local assembly
    - Other
  - 9.5 Recommended lubricant drain intervals by vehicle manufacturers
    - Cars
    - Motorcycles
    - Trucks
    - Buses
    - Railroad
    - Marine outboard
    - Ships
  - 9.6 Typical lubricant drain intervals used by consumers
    - Cars
    - Motorcycles
    - Trucks
    - Buses
    - Railroad
    - Marine outboard
    - Ships
  - 9.7 Fuels properties and characteristics
    - Typical octane rating for gasoline
    - Diesel
      - Typical Cetane rating for diesel
      - Typical sulfur level in diesel
  - 9.8 Population of vehicles powered by "environmentally-friendly" fuels
    - Methanol
    - Compressed natural gas
    - Liquefied natural gas
  - 9.10 Other

<sup>7</sup>: If exact volumes are not known, please provide estimates

## APPENDIX 2

### List of Environmental Agencies in Central America

**COSTA RICA - Ministerio de Recursos Naturales, Energía y Minas (MIRENEM)**

**Ministry of Natural Resources, Energy and Mines**

Apartado 10104, 1000 San José

(506) 233-4533; (506) 257-0697 fax

[root@ns.minae.go.cr](mailto:root@ns.minae.go.cr) and <http://www.minae.go.cr/>

**EL SALVADOR - Ministerio de Medio Ambiente y Recursos Naturales (MARN)/**

**Ministry of Environment and Natural Resources**

Edificio IPSFA, Avenue Roosevelt, San Salvador

(503) 260-8900, 260-8901; fax (503) 260-3117

[medioambiente@marn.gob.sv](mailto:medioambiente@marn.gob.sv) and <http://www.marn.gob.sv/>

**GUATEMALA -Comision Nacional del Medio Ambiente**

**National Environment Commission**

Presidencia de la República, 5a. Avenida 8-07, Zone 10, Guatemala

(502 2) 312723; (502 2) 341708 fax

**HONDURAS - Ministerio de Recursos Naturales**

**Ministry of Natural Resources**

Tegucigalpa

(504) 32-8817

**NICARAGUA- Ministerio del Ambiente y Recursos Naturales**

**Ministry of Environment and Natural Resources**

Apartado 5123, Managua

(505 2) 31110; (505 2) 31274 fax

**PANAMA -Instituto de Recursos Naturales Renovables (INRENARE)**

**Institute of Renewable Natural Resources**

Apartado 2016, Paraíso, Ancon

(507) 32-6601; (507) 32-6612 fax

<http://www2.usma.ac.pa/~eco1>

## **APPENDIX 3**

### **SEMINARIO DE LUBRICANTES USADOS**

#### **COMENTARIOS, ACTIVIDADES PENDIENTES Y RECOMENDACIONES DE LOS DELEGADOS DE LOS PAISES**

Proyecto de Uso Sustentable de Hidrocarburos en América Central (CEPAL/República Federal de Alemania)

Managua, Nicaragua 6-7 de septiembre de 2001

#### **I. COMENTARIOS**

El estudio preparado por el consultor T. Benchaita, así como las discusiones sostenidas durante el Seminario, ayudaron a las delegaciones de los países a identificar los principales aspectos del manejo, la reutilización y disposición de lubricantes usados (LU), especialmente aquellos que requerirán particular atención para un futuro programa sobre lubricantes usados (PLU). Un resumen de estos temas se presenta a continuación:

1. Los países centroamericanos no tienen estadísticas completas y confiables referentes al mercado de lubricantes (importaciones, oferta y consumo). El consultor proporcionó varios indicadores que permiten realizar estimaciones sobre el consumo de lubricantes. Así mismo, presentó argumentos muy convincentes en cuanto a los segmentos que requieren lubricantes y generan los grandes volúmenes de lubricantes (en el caso del transporte automotor, corresponde a los centros de lubricación, estaciones de servicios y talleres mecánicos, identificados como DIFM en el estudio del consultor).
2. Es preocupante que gran parte de los LU son desechados inadecuadamente, produciendo contaminación de suelos, aire y agua (por ejemplo: la quema a temperaturas que no permiten eliminar los contaminantes, o como aplacador de polvo). Solo una porción de estos aceites es recolectada y manejada de acuerdo a prácticas que reducen el impacto ambiental.
3. En cuanto a la demanda de LU, se identificó como el principal destino la utilización como energético, especialmente en los hornos de alta temperatura ( $>1200^{\circ}\text{C}$ ) de la industria del cemento y en algunas plantas industriales que utilizan calderas. Las características de los procesos en las cementeras permiten quemar los componentes peligrosos de los LU, reduciendo a la vez los impactos en el ambiente. Adicionalmente, se han reconocido otra serie de demandantes usos de LU, como la mezcla con asfaltos, sin embargo no se tiene una buena aproximación sobre el perfil de estos usuarios.



4. Se discutieron algunas características del mercado de LU en los países de la región, el cual incluye: el sector industrial (además de la cementera, en la industria de fundición del plomo y posterior fabricación de baterías, en algunos procesos de la industria de vidrio, en los aserraderos y en general, como combustible en algunas calderas de media o baja temperatura, generalmente mezclado con otro combustible); la industria de la construcción; las carreteras, y en algunos casos, usos sanitarios para el control de plagas de mosquitos (práctica no recomendable y ya casi abandonada).

5. Se identificaron las siguientes nueve grandes cementeras de la región (por país, de norte a sur): Progreso (Guatemala); CESSA (El Salvador); Industria Cementera de Comayagua y Cementos del Norte (Honduras); Cemex (Nicaragua); Industria Nacional de Cemento (INCSA) y Cemex (Costa Rica), y Bayano y Panamá (Panamá). Todas esas industrias son grandes usuarios de búnker. Sin embargo, recientemente algunas de ellas han empezado a utilizar carbón, lo cual reduce la posibilidad de usar LU en vez del bunker.

6. Sobre el mercado, manejo y uso de los LU, se mencionaron los siguientes hechos: a) el uso en las cementeras y otras industrias; b) los programas de recolección y disposición iniciados por algunas empresas petroleras; c) la remoción doméstica de algunas impurezas y reventa para el sector transporte (en varios países se observa un mercado informal de lubricantes reconstruidos, generalmente sin etiqueta, también podría darse el caso de adulteración de productos), y d) la disposición de LU por parte de los empleados de las estaciones de servicio (lo cual en uno de los países constituye un derecho de los trabajadores, establecido por acuerdo con los sindicatos) . De esa forma, los LU tienen algún valor comercial, mencionándose como referencia 4.00 dólares/barril, que paga una de las cementeras de Costa Rica. Como valor máximo de referencia, se estima que en algunas circunstancias, los LU podrían equipararse al búnker C de alto contenido de azufre. Al mismo tiempo, se reconocen los riesgos y posibles daños causados por el manejo de LU y su “reciclaje” (reutilización ilegal de LU en motores de combustión que causa serios daños mecánicos y contaminación del aire) por personas particulares o empleados de gasolineras. Ninguno de los países tiene suficiente conocimiento del uso y la destinación final de la gran mayoría de los LU.

7. Referente a los programas iniciados por algunas empresas petroleras, los principales corresponden a los liderados por Castrol en Costa Rica, y los de Texaco en Guatemala y Nicaragua (este último próximo a iniciar). En estos programas participan otras petroleras, además de la empresa líder y se caracterizan por: la identificación del mercado base (recolectores y consumidores); el diseño de la logística de recolección y transporte; el soporte técnico a las agentes involucrados; los acuerdos comerciales y compensaciones económicas entre los agentes y los usuarios (principalmente las cementeras), y la disposición final de los desechos. Ha sido fundamental para estos programas la participación de los agentes a partir de los Comités Nacionales de Seguridad de la Industria Petrolera (CNSIP), y la cooperación horizontal que se ha empezado a dar dentro de los comités de la región. Los delegados de Texaco ofrecieron informar a las Direcciones u Oficinas a cargo del subsector hidrocarburos (DGH) de los países, sobre la conformación y logística de los respectivos CNSIP. Los resultados obtenidos a la fecha han sido

muy benéficos, sin embargo, dichos programas alcanzan solamente una pequeña parte de los LU (se estima un 6% en Costa Rica).

8. Existe conciencia sobre la magnitud e implicaciones del problema de contaminación por mal manejo y disposición de LU, sin embargo el tema no ha sido abordado directamente por las DGH. Entre las justificaciones para buscar un mayor involucramiento de las DGH se mencionan los siguientes:

- a) La importación y comercialización de los lubricantes es llevada a cabo por las compañías petroleras y empresas especializadas. Las DGHs son responsables de expedir las licencias a dichas empresas, y de efectuar inspecciones técnicas a las instalaciones involucradas, tareas que, hasta la fecha, no se han cumplido en la gran mayoría de los casos.
- b) Los LU forman parte de los desechos o residuos de la industria petrolera. Su principal usos debe ser es como energético, lo cual sustituye hidrocarburos.

9. Por las razones anteriores, las DGH deben involucrarse en el control del mercado de lubricantes y en los programas de manejo de LU, y trabajar conjuntamente con los agentes relacionados directa o indirectamente en el tema (el sector privado, otras instituciones del sector público y la sociedad civil). Las autoridades ambientales deben tener una especial participación. Se considera importante la conformación de Comités Interinstitucionales (CI), los que podrían incluir la participación de:

<b><u>Sector Público</u></b>	<b><u>Sector Privado</u></b>	<b><u>Otros</u></b>
DGH u oficina a cargo de Hidrocarburos	Petroleras (representadas por el CNSIP)	Organizaciones No Gubernamentales (ONG)
Autoridad Ambiental (Ministerio o Comisión)	Importadores de lubricantes	Otros sectores sociedad civil (Universidades)
Municipalidades	Industria (consumidora y productora de LU)	
Misterios de Transporte	Transportistas	
Oficinas de Protección al Consumidor	Importadores de Automóviles	

10. Referente al anteproyecto de una Norma Técnica para LU que se discute en El Salvador, se mencionó que la clasificación de los LU dentro de las “sustancias, materias y residuos peligrosos” no constituye un obstáculo para poner en práctica los programas nacionales de manejo de LU. En el caso de programas regionales existe una limitación, ya que no podrían ingresar al país LU procedentes de otros países. Este tema deberá ser retomado en fases posteriores, cuando se aborde el tema de la armonización de normas y reglamentos para LU.

11. Otros temas tratados durante el seminario fueron los siguientes: a) La carencia, en la mayor parte de los países, de normas, reglamentos generales y normas técnicas para la disposición y tratamiento de desechos peligrosos; b) en el caso de la industria petrolera, la problemática de la disposición final de los residuos últimos de dicha industria (especialmente

aquellos considerado “residuos peligrosos”); y c) la falta de directrices de reglamentos especiales y normas técnicas para el manejo, reciclaje y disposición final de LU; d) algunos países que cuentan con legislación para la cadena de suministro de hidrocarburos, todavía no han aprobado los reglamentos y los procedimientos para la fiscalizar la importación, distribución y manejo de lubricantes, sobre dicho tema, y e) el seguimiento nacional de Acuerdos signados por los países en materia de los residuos peligrosos (Basilea).

## II. RECOMENDACIONES

Los asistentes al Seminario acordaron presentar, por conducto de sus respectivas autoridades, las siguientes recomendaciones al Comité de Cooperación de Hidrocarburos de América Central (CCHAC):

1. Proponer la creación de un Comité de Trabajo “virtual” sobre el tema de LU, el cual tendrá el propósito de dar seguimiento al tema. El coordinador de dicho comité, recibirá periódicamente la información de cada país y preparará un reporte regional. El consultor internacional del proyecto CEPAL/GTZ ofreció asesorar al referido Comité. Temporalmente, hasta su ratificación por el CCHAC, el comité queda conformado por las siguientes personas:

<u>Nombre</u>	<u>Institución</u>
Alba Lila Bermúdez (coordinadora)	DGH, INE, Nicaragua
Alan Chín	DSE, MINAE, Costa Rica
Alirio Herrera	DHM, Ministerio de Economía, El Salvador
Mario Godínez	DGH, MEM, Guatemala
Fernando Lobo	UTP, SERNA, Honduras
Pendiente	DGH, MICI, Panamá

2. Discutir mecanismos para asignación de responsabilidades institucionales, así como el marco regulatorio existente y futuro para el manejo de LU y los pasos para su implementación. Una propuesta es la de ampliar el sistema de licencias para hidrocarburos e incluir la importación de lubricantes (lo cual ya está contemplado en algunos países). En las licencias para estos agentes se establecería el compromiso de reciclar un porcentaje del volumen importado. Las DGH u oficinas equivalentes, deben analizar la viabilidad de este mecanismo.

3. Preparar Planes de Acción (nacionales y regional) y programas de manejo de LU de mayor alcance, considerando la participación de los principales agentes. Estos planes se podrían estudiar dentro de los proyectos de cooperación al subsector de hidrocarburos y deberán incluir: a) análisis detallado del mercado de LU y de las particularidades de cada país; b) características y viabilidad de los programas de recolección y manejo de LU (aspectos legales, ambientales, beneficios, costos, involucramiento de los agentes, etc.); c) elaboración (armonizada entre los países) de reglamentos y normas técnicas para el manejo de LU; d) los aspectos de educación y divulgación, y e) propuesta para iniciar la ejecución del programa.

4. Trasladar al CCHAC la preocupación de las empresas petroleras, referente a la necesidad de contar con una solución al problema de la disposición de los desechos peligrosos originados de las actividades de la industria petrolera.

### **III. ACTIVIDADES PENDIENTES**

1. Se fijó el 17 de septiembre del año en curso como fecha límite para presentar observaciones al documento del Dr. Benchaita. Estas deberán ser canalizadas por conducto de las respectivas Direcciones de Hidrocarburos (u oficinas equivalentes) y enviadas por correo electrónico ó fax a la Unidad de Energía de CEPAL. El consultor preparará la versión final de su informe, el cual será enviado oportunamente a los países.
2. El representante de CEPAL enviará a todos los asistentes al Seminario, por correo electrónico, copia de las presentaciones del Seminario.
3. El Sr. Alan Chin (de la Dirección Sectorial de Energía de Costa Rica y Secretario del Panel de Discusión del Seminario), conjuntamente con los Sres. Hilmar Zeissig (consultor principal del proyecto) y Hugo Ventura (representante de CEPAL) elaborarán un resumen conteniendo las principales discusiones, recomendaciones y actividades pendientes y la enviarán a los asistentes al Seminario.
4. El Sr. Fernando Lobo (de la Unidad Técnica del Petróleo de Honduras), enviará información sobre la operación y funcionamiento de la laguna para depósito y estabilización de desechos, que maneja la empresa Texaco en Puerto Cortés.

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