

# Disposal of Automotive Oils - Evaluation of Environmental Management made by Public Transport Companies in the City of Manaus

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**Abstract**— The present work describes in detail the pattern adopted regarding the management model that are currently used by the collective transport companies of the city of Manaus-AM and reports what in fact these enterprises, has made important regarding the disposal of used/contaminated lubricating oil, residue generated during its exchange that according to the regulatory standard ABNT-NBR 10004/2004, are classified as dangerous class I. At first it was necessary to carry out a review bibliographic regarding the subject and after, field research (on-site visits) was carried out, which was designated in the application of a questionnaire to employees in the respective workplace. In view of this context it was found that the companies visited are always updating and improving this model that is considered extremely important to the environment.

**Keywords**— Lubricating oils; correct disposal; Environment.

## I. INTRODUCTION

Over the past 50 years, the exponential growth of cities accompanied by their urban expansion has been one of our society's main concerns about issues equated to the environment. Such growth has as a consequence the increase of its area of occupation by its respective inhabitants and, with this, a means of transport is necessary as a way of fast displacement and at the same time of comfort, starting from their respective zones residential for shopping, industrial, rural, etc.

As urban development of cities occurs rapidly, their area of forest deforestation in large concentrations increases in frantic rhythms leading to consequences the disappearance of species of flora and fauna, and due to urban pollution and generating the depletion of natural resources mainly affecting water resources such as rivers, lakes, seas, etc. Such anthropic actions are directly linked to the intensive consumption of non-renewable energy resources, which over the years have been adopted all over the world as a form of rampant economic model, which nowadays is already considered as Unsustainable.

Second Giucci (2004), the automobile was invented in Europe at the end of the 19th century and conquered several parts of the world invading cities which made it a protagonist of people's everyday life, becoming a dream of consumption since 1910. (BOZZA, 2016), reports

that around 1930, with the emergence of vehicle manufacturers, we saw the need to standardize the employability of lubricating oils as well as fuels (gasoline, alcohol, etc.) universally and from the first oil-based lubricating oils, there were great changes until it reached the present day, going through processes with greater sophistication and improving the attributes of this product, following the environmental standards in force in the country.

Currently, one of the biggest challenges encountered by society and environmental experts is precisely to find solutions and practices regarding the correct disposal of municipal and industrial waste contained in the National Solid Waste Policy (PNRS) Law No. 12.305/2010), within this context, however, arises the management of the disposal of used/contaminated lubricating oils known by the acronym (OLUC). These procedures are adopted by companies in the area of road, urban transport and by workshops and large or small commercial establishments allocated in cities. (NEGROMONTE, 2010), points out that incorrect management of this waste can lead to several environmental, sanitary, economic and social problems.

This project aims to research, the analysis on the management of the disposal of used/contaminated lubricating oils done correctly within the scope of current Brazilian environmental standards. Activities performed by

companies in the public transport sector that are currently allocated in several areas of the city of Manaus, capital of the State of Amazonas and explore this type of activity through concessions that are granted to it, operating their respective public transport lines with conventional buses and articulated vehicles, which after achieving mileage targets rounds, the exchange service lubricated oils of these respective vehicles is done.

Data collection was obtained through on-site visits in the premises of the companies, to which they were consulted through the permission of their managers and directors, accompanied by a questionnaire that was prepared through bibliographic research, observing since the exchange, handling, storage and the final destination of this waste considered as dangerous class I, according to standards of ABNT-NBR, no. 1.0004/2004.

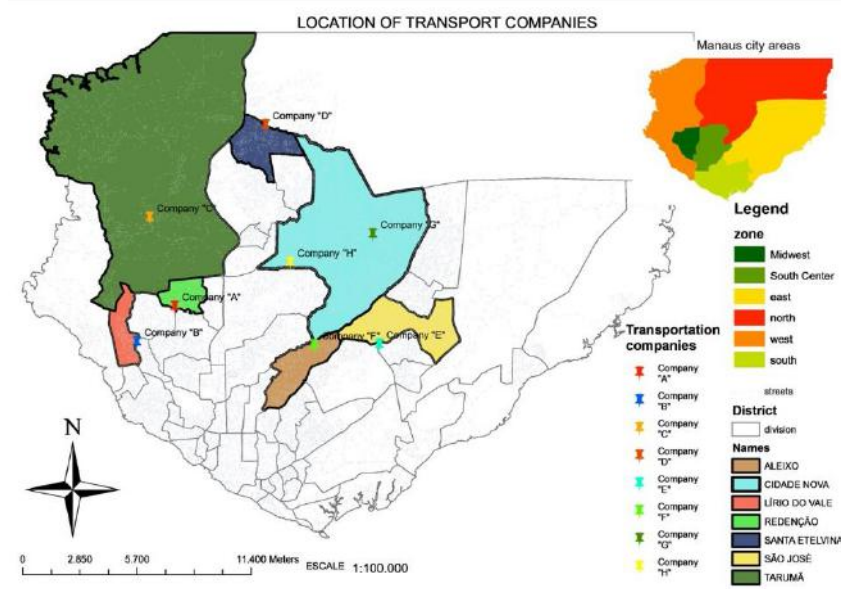


Fig.1: Location of transport companies used in the study.

## II. METHODOLOGY

In the present work, qualitative approaches were applied, which Richardson (2008), shows that this approach is the attempt to understand the nature of the problem to be studied, understanding the observation and description without having to use the experimental procedures and statistics of this subject. The object of study was selected as the object of study, the public transport companies that are currently allocated in the Metropolitan region of Manaus/AM, in areas different from that city. The aim of the study was to understand the way in which the management of the disposal of lubricating oils is performed after the exchange. The location of the companies is shown in Figure 1.

During the development of this work, seven large companies were visited, which have a fleet of at least around one hundred vehicles. Therefore, a very significant sampling if we take into account that the city presents a total of nine companies that run the public transport service (collective) in the capital and are in full activity, operating 24 hours a day. companies, five samples were selected to obtain satisfactory results for this research.

It is important to highlight that all analysis happened through the interview method and were carried

out in the environment and working hours of each local enterprise to which a responsible employee (in charge) was made available by the exchange sector of oil so that, in fact, the application of the questionnaire containing questions related to the theme in question.

## III. RESULTS

The results of the collections occurred during august and september 2019. It was verified that all the companies studied are intended for waste correctly, complying with the standards of ABNT-NBR No. 12,235/1992. In addition, they hire the services of outsourced companies or legal entities, licensed by the National Petroleum Agency according to their resolution No. 20/2009, for the collection of oil waste generated by exchanges in automotive vehicles (Table 1).

At the same time, it was noticed that waste is stored for disposal differently, i.e. companies 2, 3 and 5 collect in metal-protected resistant plastic tanks with the ability to store up to five hundred liters, while companies 1 and 4 they store in metal Toneis that are able to store up to a thousand liters of that residue where no other form of storage such as drums, containers, etc. has been found. Although oil residues are disposed of correctly, the material

to which the Tanks that store the residue until their respective collection are not adequate, as these are made plastic material. This material may deteriorate in the future and leaks may occur, which would directly affect the environment.

In addition, the questionnaires applied during the visit helped in understanding the dynamics of operation of each company (Table 1). Although the five companies analyzed have a contract for the disposal of the product periodicity is not the same, with companies 2, 3 and 5 fortnightly and weekly in the other.

Table 1: Data obtained contained in this tab.

Activities	Company 1	Company 2	Company 3	Company 4	Company 5
Storage	Vat	Tank	Tank	Vat	Tank
Correct destination	Yes	Yes	Yes	Yes	Yes
Authorized Collection Company	Yes	Yes	Yes	Yes	Yes
Collection Frequency	Biweekly	Weekly	Weekly	Biweekly	Weekly
Supervision of environmental agencies	Yes	Yes	Yes	Yes	Yes
Understanding of the final destination	Yes	Yes	Yes	Yes	Yes
Use of PPE's during handling	Yes	No	Yes	Yes	No

Given the results presented in the table above, it is possible to understand that companies adopt safety procedures, and over time improve and adapt when regarding the handling, storage and final destination of OLUC. In order not to occur any non-compliance and in the future, that companies will not suffer penalties in the face of inspections by specialized environmental bodies.

When companies are questioned whether they adopt safety procedures both at the time of oil exchange and in their handling, 2/5 of the sample answered that they do not perform in their entirety, that is, it can happen from the absence of some type of PPE, such as glove, face mask among others.

Moreover, the results collected showed that all companies have already undergone supervision by environmental agencies and that none of them have been fined or fined for such non-compliance, these actions are frequent and are used as a form of prevention avoiding thus damage to the environment.

Another part of the results collected show that companies are aware of the importance of correct disposal of waste generated in their dependencies, thus avoiding any kind of friction by environmental management bodies both at the state level and Municipal.

The volume of oil used/contaminated in enterprise dependencies consists of the exchange and storage process, as shown in the table below:

Figure 1 shows that companies 1 and 4 generate a larger amount of used/contaminated lubricating oil, while companies 2, 3 and 5 on the other hand, a smaller volume. Nevertheless, this quantity is still significant when annual averages are extracted. Compared to the work of Mendonça (2015), the results showed a volume of waste generated by motor vehicle concessionaires in the city of Caruaru-PE very high and evident. In addition, the author mentions that there is an impact in the face of the dynamics applied at national levels and making it an even bigger problem when there is no control over the disposal of the used oil.

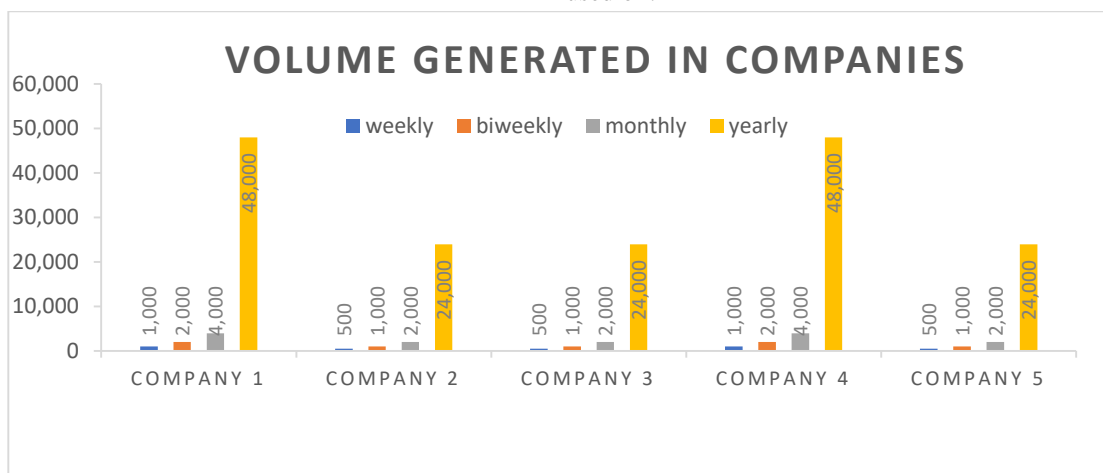


Fig.2: Volume of used oil generated, in the premises of each company.

The information in Table 2 shows that companies 1, 4 and 5 have a fleet of vehicles higher than companies 2 and 3, which generates an even larger volume of used oil, which generates an even more significant

volume of used oil. However, all analyzed companies perform oil exchange through channels, and separator boxes. The latter is used after the end of the service, when cleaning the work environment is carried out.

Table 2: Information acquired and included in this tab

Activities	Company 1	Company 2	Company 3	Company 4	Company 5
<b>Fleet/vehicles</b>	465	160	120	354	210
<b>Correct disposal of packaging</b>	Yes	Yes	Yes	Yes	Yes
<b>Correct disposal of filters</b>	No	No	No	No	No
<b>Environmental cleaning material</b>	Wash	Tow	Tow	Wash	Wash
<b>Channels for exchange</b>	Yes	Yes	Yes	Yes	Yes
<b>Separator boxes</b>	Yes	Yes	Yes	Yes	Yes

Table 2 above shows that companies 2 and 3 use the stopper as a cleaning method, while companies 1, 4 and 5 that have the largest fleets use washing as hygiene in the exchange sector. All of them discard plastic packaging for recycling companies.

The filters used from vehicles is still a problem to be discussed, as they have no forms of reverse logistics for it and are still discarded normally in the controlled landfill of the city, after going through the drying process.

#### IV. FINAL CONSIDERATIONS

During the research carried out in the premises of oil exchange companies, the evolution of the procedures adopted regarding the handling, storage and final destination of used/contaminated lubricating oil and the importance of applying these daily procedures for the proper functioning of activities during its course was notorious.

Thus, it was possible to further study the oil exchange processes used, from its handling to its final destination. In addition, some risk points were identified that still persist during the process, such as missing some items of ppe as appropriate gloves. The correct destination of the filters used are not disposed of correctly and/or have a destination, being posted to the local controlled landfill. Unlike plastic packaging, which are intended for plastic recycling companies.

Finally, it was found that the public transport companies of the city of Manaus-AM, allocate their waste from oil exchanges properly. It is worth mentioning the lack of incentive programs for waste collection in various establishments such as small workshops. Furthermore, the lack of supervision by environmental-oriented bodies more effectively.

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