

"Adequate Management System Of Waste Of Workshops Of Engineering Degree In Automotive Maintenance Of North Technical University"

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EXECUTIVE SUMMARY

The research aims to find an alternative to minimize environmental pollution and give the proper management to the wastes generated in the workshops of the engineering degree in automotive maintenance of the North Technical University. For this, a proper waste management system will be implemented to reduce the environmental impact caused by not receiving the appropriate treatment. In order to carry out this project, we have taken into account the ordinances and environmental laws in force in the municipality of Ibarra, we have taken into account important articles on the subject of automobile waste management and have been included in the theoretical basis. Security aspects are reflected through images, tables, symbolic examples where you can see everything an automotive workshop should have. Finally, a proposal has been made that allows the automotive workshops of the race to handle the waste generated in a responsible way according to the political regulations, standards for storage and treatment in a correct way. With this work, a precedent is set where the career of engineering in automotive maintenance in its eagerness to comply with the environmental norms and the established regulations for automotive workshops makes the proper handling of its wastes, whether these contaminants or not pollutants. The oil and sludge separating tanks, or better known as grease traps installed in the university workshops, are made of stainless steel SS 304 of 1 mm, are traps of three levels of filtration, welded with MIG welding and TIG with contribution Of tungsten (w).

INTRODUCTION

The research carried out deals with the proper management of the wastes generated by the workshops of the Engineering in Automotive

Maintenance of the Technical University of the North. The research is focused on determining the most appropriate system for the management of the wastes, which are generated in the workshop of the race; Making reference to theoretical, scientific and field bases.

The system of proper management of pollutant wastes is clearly visible so that students and teachers can carry out their practices in a correct way and complying with current environmental standards and above all without causing major damage to the environment, allowing us to understand how important it is This system for the care of the environment and the health of human beings.

This research aims to provide teachers and students with the correct management of the waste that they will generate when they are doing their practices in the workshops, the most commonly used pollutants are hydrocarbon derivatives, brake fluids, radiator additives and Degreasers among others, the same ones that will be used in the day-to-day of the practices carried out, in this way the course of Engineering in Automotive Maintenance together with the Universidad Técnica Del Norte becomes part of the institutions that are concerned about the environmental impact That cause the Automotive workshops.

The environmental quality standards and discharges of tributaries to the sewerage network "Book IV, Annex 1" established by the "Ministry of Environment" of Ecuador where it indicates that this environmental technical standard is dictated under the protection of the Management Law Environmental and Regulation to the Environmental Management Law for the Prevention and Control of Environmental Pollution and is subject to the provisions of these, is mandatory and applies throughout the national territory.

The present technical standard determines or establishes:

(A) Permissible limits, provisions and prohibitions for discharges into bodies of water or sewage systems;

B) The water quality criteria for its different uses; Y,

(C) Methods and procedures for determining the presence of contaminants in water.

Where in 5.2.3 indicates that the environmental quality standards and discharges of tributaries to the sewerage network says, it is prohibited to discharge untreated waste to the public sewer system from the washing and / or maintenance of vehicles Air and land. (Environment), 2015)

The Automotive Maintenance Engineering degree at the Technical University of North has had laboratories for its students to carry out their practices and to complement theoretical knowledge with practical knowledge, without a solid waste management plan And liquids.

In the engineering career in automotive maintenance of the Universidad Técnica Del Norte there is no waste management system for the workshops. For this reason, it is necessary to create a system that allows adequate management of the wastes that are Generate during activities that are carried out, in addition will be of aid for the students who are taking the race mentioned above.

For this reason we have carried out the present project taking into account the current management that was given to the waste of the workshops, so that this way both students and teachers contribute to the correct management of the wastes generated by workshops of the race, between the different types Of waste we have; Residues of hydraulic oils, waste oils of motor, transmission, differential and lubricants in general, additives and coolant liquids for the radiator and oily substances, residues of liquid fuels, residues of oils not otherwise specified and different chemicals, Used daily by students.

It is considered necessary to implement a proper waste management system for the Engineering Degree in Automotive Maintenance at Universidad Técnica Del Norte, in order to comply with the norms and environmental laws required by the MINISTRY OF THE ENVIRONMENT for the operation of automotive workshops and Industries that work

with contaminating products such as oils, fuels, fats and additives.

The implementation of this project aims to maintain a much cleaner and tidier environment, encouraging students to develop innovations to reduce pollution, comply with current environmental standards and thus minimize the impacts generated by garbage from workshops.

CONTAMINANT RESIDUES

They are substances introduced into the environment that cause an effect on living beings and the environment, or that do not cause a direct effect but have the potential to cause it.

Hazardous waste:

These are solid, liquid or gaseous wastes resulting from a production process, which represent a risk to human health, natural resources and the environment.

All such wastes should be deposited at special sites and their management should be regulated by hazardous waste regulations and environmental protection laws as well as handling, treatment and recycling or containment should be controlled.

Hazardous waste used in an automotive workshop

OIL:

The used oil is quite recyclable, recovering about 2/3 in volume. The rest can be recovered as lees to lubricate brakes.

Health Hazards: Continued contact with used oil may cause skin cancer, asphyxiation, and lung cancer.

Contaminant effects: Used oil is a contaminant of soils and water, in addition to slowly biodegradation. One liter of used oil contaminates one million liters of water and can form a 4000 m² stain on the floor. The oil thrown to the ground eliminates the productivity of the earth, can produce carcinogens.

REFRIGERANT

The refrigerant is poisonous when ingested, in addition presents danger by its sweet flavor, which can be confused with a common drink. Symptoms of poisoning include dizziness,

vomiting, diarrhea, thirst, seizures, cyanosis, and increased heart rate. Its ultimate consequences are fatal damage to the kidneys.

Contaminant effects: They vary according to the metals contained in the refrigerant, for which it must be demonstrated by laboratory tests. If ethylene glycol degrades in large amounts it can reduce dissolved oxygen levels in surface water, affecting aquatic organisms.

Brake fluid

Brake fluid can not be disposed of in a home or industrial way in sewer systems or landfills. These products contain contaminants as solvents, and can leak into soil and waterways, causing environmental damage and health risks. The good news is that, with proper testing, these liquids can be safely reused or disposed of.

BATTERY

Health Hazards: Contact with the acid solution causes irritation and burns to the tissues, which is more common when splashing the electrolyte. Contact with lead may cause irritation and inhalation of vapors causes headache, nausea and vomiting. Prolonged exposure to lead can cause damage to the central nervous system, anemia, gout, and damage to the kidneys.

Contaminants: Lead is a dangerous contaminant because it is poisonous, bioaccumulating in humans, animals and plants. Electrolyte containing sulfuric acid can cause soil and groundwater deterioration.

CARBURETOR OR CLEANING CLEANER.

Its composition is a variety of chemicals and was invented in the first instance for cleaning by immersion.

Risks in health.

- Causes severe eye irritation.
- May create fire hazard.
- Harmful if inhaled.
- Causes skin irritation.
- Cause irritation in the respiratory tract.
- It is harmful if absorbed through the skin.

For small spills of liquid, stop the spill with sand or any other non-combustible absorbent material and place it in closed containers for later confinement.

INJECTOR CLEANER

These additives, like most high-power cleaning agents, have almost one hundred percent chemical composition: Morpholine (anticorrosive), Xilene (solvent), Naphtha solvent (petroleum), Benzene, Propyl alcohol and Polyeteramine.

Because of its high component in alcohol, easily inflamed, harmful by inhalation and in contact with the skin; Toxic to eyes and mouth.

OIL FILTERS

Health hazards: These are the same as used oil. Contact with an oil filter can cause burns if extracted when the engine is hot.

Contaminant effects: Same as used oil, because the filters still perforated and drained for 12 hours can contain almost 40% of used oil, which can contaminate the place where it is.

FUEL FILTERS

Fuel filters are manufactured in accordance with engine and vehicle manufacturer recommendations. The applied filter media provides efficient fuel filtration and excellent water separation. The current structure consists of a casing made of stainless steel, resistant to corrosion and inside has a filter cartridge.

CONTAINERS CONTAINING HAZARDOUS WASTE

It includes all containers or containers that have previously had lubricating products, or petroleum products used in automotive workshops, these containers must be given an appropriate management to avoid contaminating the environment.

ABSORBENT CONTAMINANTS.

Absorbent contaminants or contaminated products such as sawdust, rags, flannels or guaiques that have come into contact with oils, fatty fuels or any product derived from petroleum or chemical products, all these products mentioned should be placed in

containers suitable for Then be treated and in this way do not pollute the environment.

Solvents used in cleaning parts

These solvents tend to evaporate, being inhaled by workers producing lung irritation and throat discomfort, pulmonary edema, blurred vision, dizziness, confusion, even death in large amounts of inhalation, can also be absorbed into the body by contact with The skin and cause the removal of vital oil and fat from the skin cells resulting in redness, appearance of scales or cracked skin.

It is important to know that repeated exposure could favor chronic bronchitis, kidney and liver damage, neurological problems, and even some solvents used for this work may cause cancer.

FAT TRAPS

WHAT ARE FAT TRAPS?

Grease traps or hydrocarbon and sludge separators is a tank located between the drain lines of the source and the sewer system, this allows the separation and collection of greases and oils from used water, preventing these contaminant residues from coming into contact Direct with the main public sewer network.

WHY HAVE A FAT TRAP

Oil products such as greases and oils generate great damage to the sewage collection system. For this reason, the municipalities require industries, automotive workshops, hotels, restaurants and gas stations to prepare grease traps depending on the requirements of each business Or industry, in order to regulate the proper functioning of the sewage system.

FUNCTIONING

The tanks or grease traps prolong the time of the flow of water that goes from the drains, so that the fats, oil and other residues mixed with the water have in sufficient time to separate. Fats and oils float on the surface as the solids fall to the bottom of the tanks.

The correct management of water contaminated with residues of fats, oils and sludge is carried out by means of a gravitacional separation system, where the density difference of each liquid is taken advantage of.

For proper operation, the traps must always remain with a suitable water level or indicated by the manufacturer or technician, generally work with 60 percent of their total capacity, in addition the collection of the separated oils, collection of the solids And the total cleaning of the tanks as needed.

For the design or construction of oil separating tanks and sludge or grease trap, the quantity of water and oil to be treated must be taken into account, in order to design the tanks with the correct size, taking into account Always a higher degree of fluids to be treated, for greater safety.

WHERE TO INSTALL FAT TRAPS.

- Install as close as possible to grease and sludge generating points.
- Can be placed floor or recessed as required.
- Must be located in an open area for easy maintenance and performance inspection.
- The tanks should be located in a safe place and not exposed to leaks or spills that cause damage to the environment.
- Connection distances per pipe where the grease and liquids will go to the tank should not exceed 20 meters.
- Washrooms, toilets or showers should not be connected to the separating tanks.
- The minimum total grease trap volume should be 300 liters.
- Tanks or grease traps can be built in stainless steel, civil works and PVC plastic and its shape can be rectangular or circular.

Oil and sludge separating tanks or other known grease traps should be installed at gas stations, automotive workshops, service stations, lubricators and other establishments working with chemicals or petroleum products to avoid contamination and malfunction of the network Sewage system.

BASE FOR THE DESIGN OF TRAPS FOR SOLIDS AND FATS

Depending on the type of fats to be treated are these animals or minerals we must take into account the following bases of designs.

TYPE OF MATERIALS FOR FAT TRAPS

They can be made of materials such as: stainless steel, fiberglass, bricks and concrete.

Stainless steel. Stainless steels are iron-based alloys with a low carbon content and a minimum of 11% chromium. Its main characteristic is its high resistance to corrosion. Stainless steel is a durable material, and is the cheapest option considering the life cycle.

Fiberglass. This material involves taking care in its manipulation and in its operation which can affect the respiratory health of the people who manipulate it or in itself when it is working, has a duration of approximately 60 years.

Concrete. This material is obtained by mixing cement, water and aggregates of various sizes, up to and including 5 mm, ie gravel and sand. For protection against moisture, it must be covered with a waterproofing agent or specialized additives such as SIKA FILLER 123 FIBERS.

PROPOSAL

PROCESS AND RESULT

DIAGNOSIS

It has been determined that the workshops of the Engineering in Automotive Maintenance Engineering of the Technical University of the North do not have a proper management system for their waste, nor does it have a grease trap in its facilities for the treatment of contaminated water that is thrown into the public sewer system.

It should be noted that the sanitary batteries are found to be in poor condition for their personal use and giving a poor physical appearance of their facilities.

Material in which the grease traps are manufactured in the workshops of the Engineering degree in automotive maintenance.

Receiving tanks or grease traps are made of 1mm thick stainless steel plates with PVC pipe connections of 4 inches, the steel sheets used to create the grease traps are welded with MIG and TIG welding Of TUNGSTEN (W) and sealed with silicone to avoid future leakage.

FAT TRAP MAINTENANCE MANUAL

Introduction:

The grease traps are designed to physically separate the grease, oils, fuels, additives and solids from the wastewater sent by the grids of the workshops of ENGINEERING IN AUTOMOTIVE MAINTENANCE OF THE TECHNICAL UNIVERSITY OF NORTH. Wastewater moves more slowly as it enters the trap, allowing particles of grease, oils, fuels, additives and solids that are lighter than water to cool and solidify, floating upwards, while solid particles They sink to the bottom; Allowing the purified water to pass through the compartments of the trap to continue its path to the Public Sewer network.

The longer the sewage remains in the trap, the better the separation, however, it has a grease and solid retention limit, so it needs to be cleaned periodically in order to function properly.

To begin with we must take into account the type of grease trap we have installed, the management plan that the establishment has with the liquid waste that can be oils, fuels, additives, brake fluids and car paint residues.

The workshops of the Engineering Degree in Automotive Maintenance at the Technical University of North have in their facilities in each workshop a grease trap of three levels that works by gravity, separating the contaminating liquids and sludge from the water that is sent to the network Of public sewerage.

Estimated time of maintenance according to the manufacturer.

The maximum flow that is handled for now in the workshops of the race is 15 l / min, our grease trap is designed to handle a maximum flow of 30 l / min, so we can say that works at 50% of its Capacity so according to the manufacturer's maintenance chart you should give maintenance every 3 or 4 months as needed.

Maintenance to be performed:

- Check the proper functioning of the grease trap once a month to verify that there are no leaks or spills and that you are doing your job of separating contaminating liquids and solids.

- Remove the products separated by the grease trap as indicated in the maintenance chart every 3 or 4 months as necessary.

- After removing all liquids and solids from the grease trap, it must be cleaned. Cleaning must be carried out with basic protection equipment such as rubber gloves, boots, mask and overalls. . Cleaning the inside of the tank should be done with a flannel, guaipe or an absorbent cloth, no detergent products of any kind should be used, as these would dissolve the fat remaining in the walls of the fat trap and at the time of Would go directly to the sewage system.

Why clean the fat trap regularly?

- The longer the fats, oils, fuels, additives and solids remain in the trap, the stronger the odors will be in maintenance.
- Longer life of the trap. Fats, oils, fuels, additives and decomposing solids produce acids that eat away the internal components and the tank, reducing the life of your trap.
- Easy cleaning. The more frequent, the easier the trap cleaning will be.
- No jamming. Cleaning the trap regularly helps keep pipes clean and reduces setbacks due to stuck lines.

PREVENTIVE MAINTENANCE

Good practices:

- Placing oils, fuels, greases and additives in the collection tank intended for these products,

Trampa de grasa trabajando 8 horas diarias a una capacidad de:	Tiempo de mantenimiento recomendado según el caudal y capacidad de trabajo
25 %	5 or 6 months recommended
50%	3 or 4 months recommended
75%	3 or 2 months recommended
100%	Every month for safety

should not be spilled directly into the grids that connect to the grease trap.

- Do not send direct solids like garbage, sludge among others, dispose them in their corresponding container.

- Sweep the area where the grids are located.

CORRECTIVE MAINTENANCE

Recommendations:

- Have "spill kits" that include absorbent materials (paper towels, sawdust, etc.) and are accessible.
- Clean the tanks after the authorized company removes grease, oils, fuels, additives and solids.
- Avoid using detergents, degreasers, acids or even hot water to clean the tanks, as detergents can dissolve the grease, oil or other products adhering to the tank walls and this would go directly to the sewer system.
- The grease trap should be thoroughly cleaned when grease and cemented solids occupy 75% of their volume, at least once every 3 or 4 months.

TOOLS NEEDED

Minimum personal protection equipment:

- Rubber tracks.
- Rubber boots.

- Safety glasses.
- Overlap or work apron.

Tank cleaning materials:

- Shovel solids collection.
- Flannel, guaípe or other element for cleaning the tank walls.
- Garbage bag to deposit garbage or solids.

Procedure for cleaning the grease trap:

Open the lid of the fat trap carefully between two people.

- Measure the amount of grease suspended in the trap. Insert a dipstick to the bottom of the trap, and gently shake so that the grease is marked on the dipstick. Remove the wand and use a tape measure to determine the amount of waste that is suspended.
- Once the tank reaches its maximum capacity, contact the company for the collection of oil and other products (OXIVIDA).
- Clean the lid and the walls of the trap with a flannel or guaípe. Remove any remaining solids from the bottom of the tank.
- Re-fill the two chambers of the tank with water to start using.
- Place the tank cap in place.

"OXIVIDA"

Company authorized by the Municipality of Ibarra for the collection of oils, fuels, fats and additives, to give the appropriate treatment.

"PROVIDED"

Company responsible for collecting oil filters, fuel filters, embassies containing pollutants and elements such as guaípe, flannels or rags that are contaminated with oils, greases, fuel or some kind of additive used in vehicles or for the cleaning of pieces.

Procedure for calculating the appropriate size of the grease trap for the workshops of the

Engineering Degree in Automotive Maintenance of the North Technical University.

In order to calculate the appropriate size of the grease trap (oil and sludge separator), which would be installed in the workshops of the Engineering in Automotive Maintenance Engineering of the Universidad Técnica Del Norte, all the water contaminated with Hydrocarbons or chemicals that are sent to the sewage network, through the grids previously installed in the workshop that is located in the university college, for a week, likewise took samples of the workshop located in the university.

The amount of water that was obtained as sample during a week was of 580 liter, with these data I can be ordered to design the fat traps suitable for both workshops, taking into account that the workshop with the highest flow rate that could be obtained was Of the college's workshop, where it was observed that there is greater use of products derived from hydrocarbons, chemicals and other pollutants that mix with water and are thrown into the sewer.

From the sample taken, it was possible to observe that the maximum flow of water to be treated per minute is 15 l / min, taking into account that a future flow rate to be treated by our trap can increase, the size has been dimensioned to double, for So the data sent to the company "SALHER" for the construction of the fat trap was 30 l / min.

For the contrición of the fat traps the company "SALHER", through the sample sent took into account the following parameters:

- Maximum flow rate per minute.
- Type of grease trap recommended
- Distance from grids to grease traps
- Establishment for which the fat trap will be built.
- Which waste collection system does the facility have?
- Hours of work of the establishment.

With the data provided the company responsible for manufacturing the fat traps determined that

the measures of the fat trap will be the following:

- Height: 80 cm
- Width: 70 cm
- Lake: 100 cm

Analysis of the water at the exit of the fat trap:

The Ministry of the Environment with registration No. 387, reforms the Environmental Quality Standards and effluent discharges to the sewerage network Book IV, where the maximum allowed amount of oils and grease for vehicle maintenance is 70mg / l. Resize Annex 2

The samples of water obtained at the exit of the grease traps of the two workshops of the Engineering of Automotive Maintenance Engineering of the Universidad Técnica del Norte were sent to the company "SALHER", where they were analyzed in a laboratory, where the results Were as follows:

The amount of oils and fats found in the sample at the exit of the fat trap was 70.0698 mg / l, which is almost in the values allowed by the Ministry of environment.

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