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Executive summary

Executive of the training manual for
the “Municipal Solid Waste
Collection Trainer” project

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Executive summary:

Waste collection is a very important aspect for all of the municipalities; therefore, the waste collection fleet must be in optimum condition for the vehicles to operate at the highest level. A training manual had been developed to address the basics of the mechanical and electrical works for the different types of vehicles, to help the technicians and drivers maintain these vehicles in optimum shape and to fix any failures that might cause problems to the people or the vehicle. The maintenance departments at the targeted municipalities need improvements in various fields of work; this training manual aims to detail the technical aspects of work in the maintenance department.

The training manual had been developed as a part of the “Municipal Solid Waste Collection Trainer” project in order to cover the main fields of work at the relevant municipalities to improve the knowledge of the current municipal staff, as well as emphasizing on the fields that the staff is relatively weak. The main topics that the training manual discusses are:

- The vehicle’s components.
- The preventive maintenance and daily checkup.
- The periodic maintenance.
- The computer diagnoses system.
- The personal and public health and safety measures.

The training manual describes the procedures for all of the maintenance and repair works for different types of vehicles to help the technicians carry out the required work in order to fix all problems that faces them as quick as possible using the right scientific methods.

The vehicle’s components are described in details to ensure that everything is obvious and clear to all of the workers in order to better understand the interior and exterior components of the waste collection vehicles. That the technicians will have a better overall view of the vehicles before the start of work, which will improve the work progress and better understanding of the problems that could occur to any vehicle and how to solve it.

The second part of training manual classify the different types of the failures in vehicles to four different classes, which help the technicians prioritize the various problems that faces them in the maintenance department in order to enhance the work progress and shorten the time spent by the vehicles in the maintenance department, the four classes are:

- 1) An exterior damage.

- 2) Mechanical failure.
- 3) Severe mechanical failure.
- 4) Safety threatening failure.

The preventive maintenance is the maintenance that deals with the changing or checking the mechanical or electrical parts before its wear to avoid the possible failures in the future as well as enhancing the productivity of the waste collection vehicles. The preventive maintenance is conducted in periods varying from one vehicle to another depending on the workload of each vehicle to ensure that the vehicles will never go a long period without maintenance; some of the preventive maintenance activities needs to be done on daily basis while other maintenance activities could be done over longer periods.

There are many mechanical and electrical maintenance components that are included in the training manual, some of had been described in more details than others for their importance such as:

- 1) Batteries.
- 2) Engines.
- 3) Hydraulic systems.

Batteries are essential to all kind of vehicles to start the engine, different type of vehicles require different type of batteries, some heavy vehicles require more than a single battery, which brings the need to show the right scientific methods in disconnecting, storing, charging and replacing different type of batteries in detail.

The engine is arguably the most important component of the vehicle; therefore, a lot of care must be taken by both drivers and technicians to ensure the engine lasts its projected life cycle. The training manual shows the different type of engine oils so that the technicians will know the suitable oil grade for any engine, it also show the engine's temperature; the possible causes to the increase in temperature, and the coolant system that keeps the engine at optimum temperature.

The mechanical repairs of the engine is also taken into consideration, such as the problems that could lower the engine's performance, how to prevent it and how to repair it when such problems occur.

The hydraulic systems is one of the most important components of the waste collection vehicles as it is the system that is used to dispose of the collected waste. therefore, the hydraulic systems' components are described in details such as hydraulic systems' exterior body, the various hydraulic pumps and the control valve as well as the different types of hydraulic systems, in order the to view it as best as possible to the technicians working the hydraulic department.

The periodic maintenance section concerns about the type of maintenance activities that must be done by the technicians. while it is dependent on the distance traveled to better ensure the right timing of the maintenance; as most mechanical part have a set life time before wearing that is measured depending of the odometer reading rather than the time spent on the roads.

The periodic maintenance details the exact maintenance activities to be done after a certain traveled distances, because different parts are set to last different working periods depending on their work function, the traveled distance milestones are:

- 1) 1000 KM.
- 2) 5000 KM.
- 3) 10,000 KM.
- 4) 15,000 KM.
- 5) 25,000 KM.

All vehicles manufactured after the year 2000 are equipped with an On-Board-Diagnostics system (OBD) connection to ease the process of diagnosing the vehicle's problem, modern types of vehicles are slightly more complicated, especially that the municipalities technicians did not receive any training on those types of vehicles. Therefore, the OBD system is showed in detail in this training manual so that it can be useful to all relevant maintenance sections.

The training manual displays the different types of sensors used in the vehicles, its position, function and its purpose in order to increase the knowledge in this field for anyone who reads it.

The work in the vehicles maintenance department could expose the workers to different dangers, which highlights the needs for taking precautionary actions to ensure the safety of the people close to the working area.

The training manual shows the safety precautions that should be taken into consideration before, during and after the required work on any vehicle, to avoid the dangers that could face the workers or any of their colleagues, all of the workers involved have to carry out these safety measures to ensure the safety of the workers and their surroundings. As well as displaying the possible hazardous objects, that could harm the workers and their colleagues.

The training manual aims to improve the knowledge of the workers and anyone who reads it in all relevant fields of work, while making sure that it is not complicated and easy to understand, In order to improve the expertise of the municipalities' technicians to enhance the work progress efficiency at the maintenance department.