GLO – SOP – WORKSHOP WASTE MANAGEMENT

Disclaimer*: All abbreviations and definitions are available **at the following repository.***

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1 PURPOSE AND SCOPE

Following the adoption of The Climate and Environment Charter for Humanitarian Organizations, ICRC sets the ambitious target to reduce greenhouse gas emissions by at least 50% by 2030, compared to the levels in 2018.

ICRC's organisational sustainability objectives must be applied to its fleet operations to target reductions in fleet emissions and fleet generated workshop waste. Emissions and waste can be minimised over time through the implementation of the ICRC Fleet Optimisation Strategy, which can include a variety of measure such as the use of low emission vehicles, more efficient use of existing vehicles, reducing dependence on diesel-powered generator, thereby reducing the amount of fuel consumed during operational activities.

To obtain a better understanding of garage waste, its potential impacts, and the most sustainable means to handle harmful garage waste ICRC contracted Centre for Business in Society, Coventry University and Department of Civil and Environmental Engineering, Politecnico di Milano to perform a study on the subject.

These document is based on the conclusions and recommendations from that study.

2 DISTRIBUTION

2.1 Recipients

Regional Vehicle Fleet Managers (RVFM), Vehicle Fleet Managers (VFM), workshop managers (WSM), Regional spare Parts Managers (RPM).

2.2 Training

Document to be read.

3 INTRODUCTION

3.1 Common activities, pollutant sources and associated pollutants at vehicle maintenance facilities

In addition to the emissions of the ICRC Fleet, maintenance, and repair of the fleet in workshops generates a wide range of pollutants:

Activity	Pollution Source	Pollutants
Vehicle maintenance and repair	Oil, antifreeze, coolant, batteries, fuel, hydraulic fluids, tyres, metal, plastic and glass components/spare parts	Sulphuric acid, galvanised metals, oil and grease, heavy metals, petroleum hydrocarbons, total suspended solids
Storage of vehicles and equipment	Leaking oils, chipping corroding	Oil, grease and other fluids, Heavy metals, organics, suspended solids
Waste material storage	Oil, antifreeze, coolant, batteries, fuel, hydraulic fluids, tyres, metal, plastic and glass components/spare parts	Sulphuric acid, galvanised metals, oil and grease, heavy metals, petroleum hydrocarbons, total suspended solids
Air conditioning gas recharging	Leaking AC units, refrigerant gases escaping during recharge	Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrofluorocarbons (HFCs)
Vehicle equipment and parts washing	Washing and steam cleaning waters	Oil and grease, detergents, heavy metals, chlorinated solvents, phosphorous, salts, suspended solids.

The most significant contribution comes from the waste generated in the maintenance and repair of the fleet. Waste can include:

- Matter, including solid, liquid, or gaseous matter, that is deposited, discharged, emitted or disposed of into the environment in a manner that can impact the environment
- A greenhouse gas substance emitted or discharged into the environment
- Matter that is discarded, rejected, abandoned, unwanted or surplus, irrespective of the potential use or value
- Matter prescribed to be waste.

These SOPs are designed to provide day-to-day guidance to ICRC Delegations, operations, and workshops on good practice for the handing and processing of vehicle related waste and to prevent or minimise risk of harm to human health and the environment, as a result of handling and processing of vehicle related waste.

3.2 What is Workshop Waste

Workshop waste includes the used or spent materials that are generated during the maintenance and repair of vehicles. This can be ‘hard waste’ such as metal, plastic and glass components or spare parts, and ‘soft waste’ which may include lubricants, fluids, and gases.

The ICRC workshop waste can be assessed by two criteria to determine the level of criticality of each waste type:

- Hazardousness, being the risk to the environment or those handling the waste and,
- Volume in which the waste is created.

Critical waste is determined to be waste that is hazardous and generated in significant volume. It is most important that critical waste is minimised and handled to mitigate the hazard. See the illustration below:

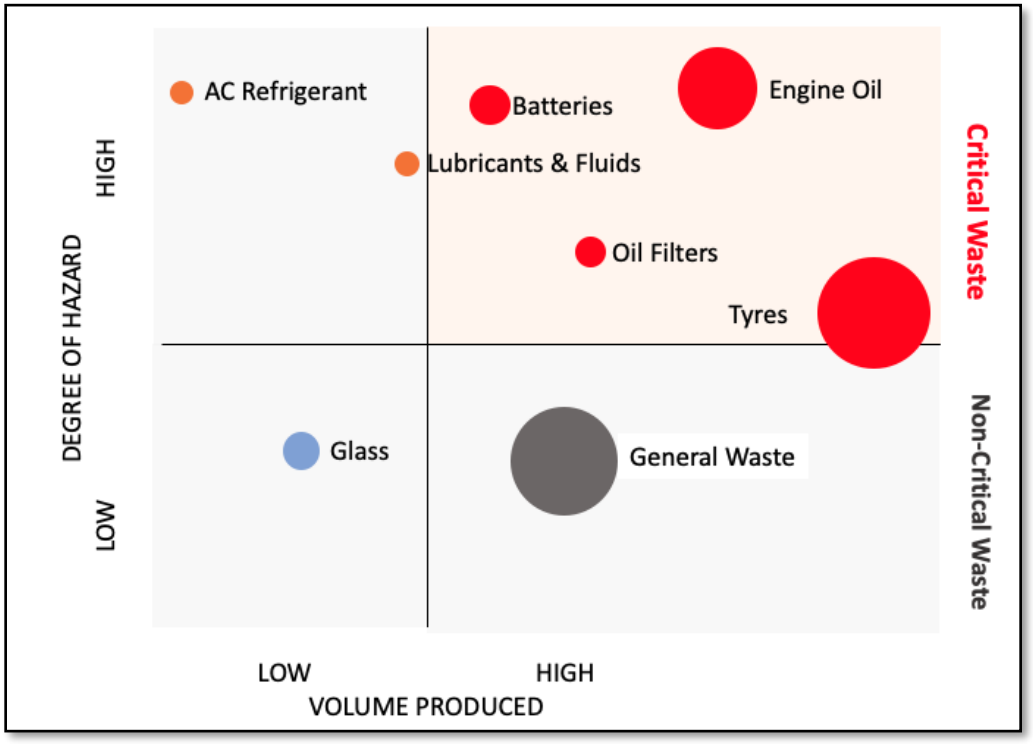

Image 1 - Identifying Critical Waste

In the graphic above, air conditioning refrigerant is highly hazardous but is produced only in minimal quantities, whereas, used general waste is produced in high quantities but are rated as a low hazard. Both these waste types are deemed non-critical.

Conversely, used oil is classified as hazardous waste as it contains carcinogens, heavy–metals, and other potentially harmful by-products and generated in significant quantities; it is therefore considered as critical waste. Used filters and batteries are highly toxic and generated in quantity and therefore also classified as Critical Waste.

In the following sections these SOPs provide information on the handling of all workshop waste identified as Critical or Non-Critical.

3.3 The Best Waste is No Waste

Effective and sustainable management of vehicle related waste can be achieved by taking steps minimise the creation of waste as far as practicably possible: *The Best Waste is No Waste*.

The disposal and/or recycling of waste is often problematic and expensive. All practical steps should be taken reduce the amount of waste generated at source, which thereby, reduces the issue of disposal and/or recycling.

As waste is often hazardous, handling, storage, transport and recycling or disposal, of unavoidable waste must be done in a sustainable manner wherever possible.

It is recognised and understood that the organisation operates in a wide range of contexts and environments, often where the range of facilities for the handling, reprocessing, and recycling of critical waste available may be limited. For example, oil reprocessing and recycling facilities may not be accessible, however, these SOPs offers good practice to suit the context of most operations.

3.4 Sound Decision-Making on Waste Management

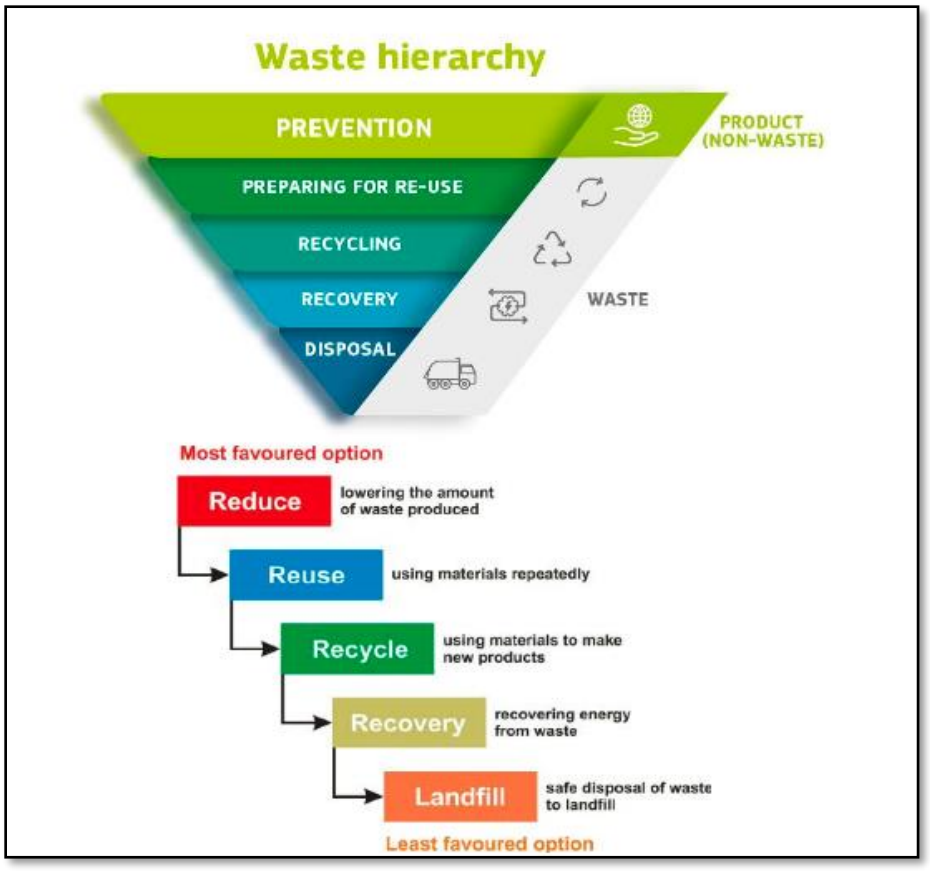

Image 2 - EU Waste Framework Directive[1]

4 WASTE CATEGORIES

The different waste types included in this document include:

4.1 Critical Waste

- Used Engine Oil
- Used Oil filters
- Batteries
- Tyres
- Used Fluids and Lubricants
- Air Conditioning and refrigerant gases
- Empty Containers such as chemical containers, paint tins, solvent containers and oil containers can only be put into the general waste or scrap metal waste if they are drained through various processes

[1] *Source: https://ec.europa.eu/environment/topics/waste-and-recycling/waste-framework-directive_en*

4.2 Non-Critical Waste

- General Waste (use wheelie bins or dump master bins)
- Paper and cardboard (use covered bins)
- Metal (use a dedicates bin for scrap metal)
- Plastics
- Glass

4.3 Waste segregation

Different types of waste may never be mixed. Mixing wastes may make recycling impossible or make waste disposal much more expensive.

Different types of waste must be systematically segregated at the time of creation into separate areas for handling and storage and ultimately recycling and/or disposal. For example, oil filter casings can be recycled with scrap metal after cleaning the filter to remove all free oil from the metal casing.

4.4 Waste Storage

Waste may be stored for potentially prolonged periods while awaiting recycling/disposal. This may be due the lack of available local recycling/disposal facilities, or those facilities only able to process quantities above certain levels. In cases of where waste must be exported due to lack of appropriate in-county facilities there may be delays in organising cross-border transit.

In all cases, storage of waste must be managed correctly to ensure leakage and/or deterioration of packing materials and containers does not occur.

4.5 Waste disposal/recycling

The available options for the disposal and/or recycling of different waste types will vary for location to location and situation to situation. A high-level indicator as to the favourability of available options is provided in the table below:

Traffic Light System Recommendations

Recommendation	**What** is it?	**When** should it be applied	**How** should it be applied?
GOOD	Green recommendations: • Have a positive impact on the environment; or • Have no negative impact on the environment; or • Have a negligible negative impact on the environment.	ICRC should start any garage waste management activities from green recommendations, as they are the most environmentally friendly recommendations.	The "how?" column shows how ICRC can operationalize the recommendations (for example, through waste management kits, searching for recycling plants, etc.). It includes considerations related to quality, safety, and environment (QSE) that ICRC should consider while following a specific recommendation. It also identifies the responsibilities of ICRC, recyclers, and other stakeholders, where possible.
WARNING	Amber recommendations have some negative impact.	Should be chosen only if green recommendations are not available or not economically feasible.	
NO GO	Waste management options in the red category have significant negative impact on the environment.	Should be avoided at all costs.	

4.6 Quality, Social and Environmental (QSE) Audits and Assessments

ICRC fleet waste management suppliers are selected on their ability to manage and handle the fleet waste meeting ICRC requirements. Effective suppliers must commit to handle the fleet waste in the right way and must conform to social and environmental compliance.

To that end, ICRCs assessors and purchasers perform on-site audits and assessments to ensure that the minimum standards of quality, social responsibility and environmental protection are applied.

The Regional Vehicle Fleet Manager or Regional Spare Part Manager are responsible to perform QSE assessments. In the process they are the Subject Matter Expert (SME). During the QSE assessment they will be supported by the CSN Quality Technician (CQT). A QSE assessment will be valid for 3 years.

The QSE assessment is a structured process which is described in the following document: GLO-SOP-QSE Audit and Assessment.

All ICRC fleet waste management suppliers must be assessed using the GLO – FOR - QSE Assessment form.

4.7 Tracking and Monitoring of Waste Disposed/Recycled

The disposal and/or recycling of certain critical waste types must be tracked in FleetWave and the ratio of the units of waste generated to the units of waste disposed/recycled will be monitored.

The volume of waste generated will be determined through FleetWave as the number units issued through individual job-cards. For example, during a maintenance intervention, 5 litres of oil and an oil filter may be issued. It will be assumed that for each litre of oil and for each filter a corresponding number of units of waste will be created.

Recycling performance can be measured by the proportion of the waste generated that is subsequently recycled or correctly disposed according to the defined ICRC standard recycling or disposal methods. For example, the number of litres of oil which are delivered to an approved oil recycling facility as a proportion of the total number of litres of oil issued according to the relevant job cards.

4.7.1 Types of Waste Disposal/Recycling to be Tracked

Due to the complexity of these new processes, it is recommended that only key specific waste types are tracked. Once the processes are proven to be robust and effective, the number of waste types can be expanded to include all critical waste types. It is proposed that during the first phase only the following waste types are tracked:

- Used Engine Oil – recorded by the number of litres of issued in a maintenance event.
- Used Oil Filters - recorded by the number of filters of issued in a maintenance event.
- Tyres – recorded by the number of replacement tyres issued by size.
- Batteries – the recorded by the number of replacement batteries issued by rating.

4.7.2 Measuring Waste Generated

By extracting the number of units of specific spare parts or consumables issued under workshop job cards, the total number of units of waste created over a defined period in a specific location or locations can be determined (it may be assumed there is a small proportion of loss of certain types of waste, e.g., engine oil which may be factored in).

Reports will automatically be generated in Tableau defining the number of units of each waste type created by period and location.

4.7.3 Measuring Waste Disposed/Recycled

Data on the amount of waste created currently exists in FleetWave and the creation of the appropriate report is the only requirement to measure the quantities. However, currently no mechanism exists to measure and monitor the volumes of wastes that are created, and a new process will need to be established to:

1. Capture disposal/recycling data;
2. Enter disposal/recycling data into FleetWave, and;
3. Generate a report in Tableau which shows the volume of waste properly disposed/recycled as a proportion of waste created over time.

4.7.3.1 **Capturing Disposal Data**

When workshop waste is shipped or prepared for shipping to a disposal/recycling service provider a Job Card will be created which specifies the waste type and volume/number of units. Please refer to the FleetWave user manual for details.

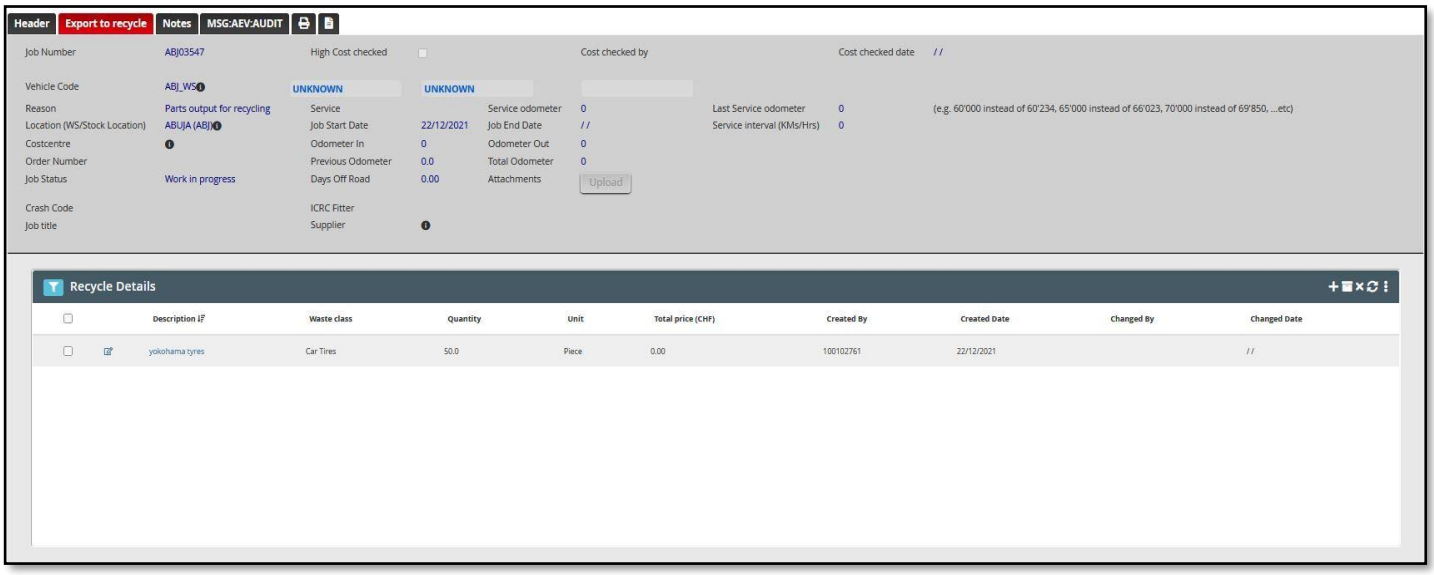

Image 3 - An example Job Card recording the issue of new tyres

4.7.3.2 **Enter disposal data into FleetWave**

The Job Card should be created in FleetWave.

On reception the service provider will sign for and/or provide a receipt. This proof (in terms of this data collection process) of reception may be regarded as proof that the waste has been handed over to disposal/recycling. The volume /number of units of waste shown on the receipt can then be validated in FleetWave against the Job Card and the waste can consider as disposed or recycled.

A challenge to be addressed is reconciliation of the units of measurement the waste material. For example, new tyres issued under the Job Card can be recorded by number as well as the tyre size/type. When used tyres are delivered to a waste/recycling facility they will most likely be recorded by the weight of waste delivered. A means of linking the weight of waste tyres recycled and the number of new tyres issued must be found to allow a reasonably accurate analysis of the proportion issued to the proportion recycled.

4.7.3.3 **Reporting**

With the volume of waste generated and the volumes of waste disposed/recycled captured in FleetWave the standard ICRC reporting tool can be used to provide customisable reports to the users.

An example of how the progression of disposal/recycling could be graphically represented.

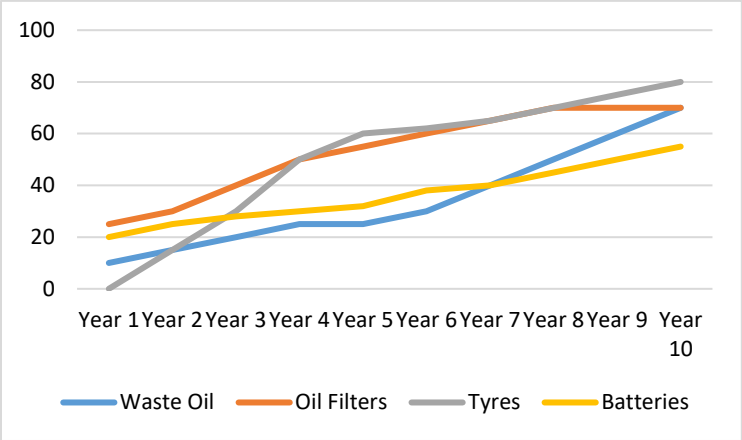

Image 4 - Workshop Waste Disposal/Recycling Percentage Rate by Waste Type

The volume of waste generated will be determined through FleetWave as the number units issued through individual job-cards. For example, during a maintenance intervention, 5 litres of oil and an oil filter will be issued. It will be assumed that for each litre of oil and for each filter a corresponding number of units of waste will be created.

5 FEET AND WORKSHOP WASTE MANAGEMENT OVERVIEW

Waste Type	Hazard Level	Risks	Opportunity for Reduction	Storage	Disposal	Tracked
Engine oil	HIGH	• Leakage or spillage of waste oil during handling or storage. • Inappropriate re-use of waste oil (e.g. anti-termite treatment). • Fire	• Use of synthetic oils in the place of mineral oils • Extending service/oil replacement intervals (subject to approval by RVFM) • Operating vehicles with smaller engine sizes • Replacing ICE vehicles with EVs	• Specialist container with spillage capture • Different types of engine oil must not be mixed	• Recycle with specialist service provider	YES
Oil filters	HIGH	• Leakage or spillage of waste oil during handling or storage.	• Use of synthetic oils in the place of mineral oils • Extending service/oil replacement intervals (subject to approval by RVFM) • Operating vehicles with smaller engine sizes • Replacing ICE vehicles with EVs	• Storage with spillage/leakage capture	• Puncture & hot-drain the filter for up to 12 hours. • Separating • Metal waste can be disposed with other metals	YES
Batteries	HIGH	• Damaged batteries may leak. • Highly toxic, contains carcinogens, heavy–metals, and other potentially harmful by-products. • Highly corrosive • Polluting • Very reactive	• Use long-life, sealed batteries wherever possible. • Avoid allowing batteries to lose charge completely. • Recharge stock batteries periodically (at 2–3-month interval) • Install a fixed roof mounted solar powered battery charger • Reduce unnecessary drainage of batteries • Train drivers on techniques to prolong battery life	• Batteries should be stored upright under cover to keep them dry. • Stacking needs to be separated with cardboard to prevent terminals from puncturing adjacent units. • Cracked or leaking batteries needs to be placed in acid-proof containers with neutralizers. They should be stored in impervious surfaces and not on bare ground	• Recycle with specialist service provider	YES

Waste Type	Hazard Level	Risks	Opportunity for Reduction	Storage	Disposal	Tracked
Tyres	HIGH	• Tyres can cause significant fire hazards. • Tyre stacks can be breeding sites for mosquitos and vermin and increase disease transmission.	• Limited	• Storage area should be away from buildings and other equipment, fire extinguishing equipment should close at hand. • Storage should be covered to prevent capture of rainwater in tyres • When storing tyres onsite, ensure that they are stacked in a manner to prevent vermin from breeding.	• Recycle with specialist service provider	YES
Fluids & lubricants	HIGH	• Chlorinated compounds and other potentially harmful by-products. • Polluting • Corrosive	• Use environmentally friendly, biodegradable fluids • Extending coolant life • Operating smaller vehicles • Replacing ICE vehicles with EVs	• Store separately, do not mix	• Recycle with specialist service provider	NO
Air conditioning & refrigerant gases	HIGH	• HFCs, HCFCs and CFCs must not be discharged into the atmosphere, they can damage the ozone layer and impact the climate.	• Limited	• Captured and stored in specialist AC gas recovery cylinders.	• Return specialist refrigeration service provider	NO
Empty containers	MEDIUM	• Residual contaminants in containers	• Limited			NO
General waste	LOW	• Fire • Vermin infestation	• Day to day low-hazard waste generated during workshop activity	• Waste types must be stored in separate containers	• General and/or specialist waste collection and recycling	NO
Cardboard & paper						NO
Metal						NO
Plastics						NO
Glass						NO

6 CRITICAL WASTE TYPES

6.1 Critical Waste Type: Used Engine Oil

Definition of the Waste Concerned:

Mineral or synthetic oil removed from an engine or transmission (vehicle, generator, etc.) during periodic maintenance.

Hazards associated with the waste type:

- Toxic, contains carcinogens, heavy–metals, and other potentially harmful by-products.
- Highly polluting
- Highly flammable

Key Risks:

- Waste oil entering and contaminating ground water
- Leakage or spillage of waste oil during handling or storage.
- Inappropriate re-use of waste oil (e.g. anti-termite treatment).
- Fire

Source of waste:

- During periodic maintenance engine oil, oil filters and transmission oils replaced due to degradation during engine/vehicle operation. The frequency of oil changes depends on vehicle type, oil type and operating environment/conditions.
- Oil changes are normally performed at prescribed intervals, for example, every 10,000kms for vehicles or 100 running hours for generators – these intervals may be extended depending on the variables above.

Opportunities for reducing waste oil:

- Use of synthetic oils in the place of mineral oils
- Extending service/oil replacement intervals if technical viable and recommended.
- Operating vehicles with smaller engine sizes
- Replacing ICE vehicles with EVs

Handling waste:

- Oil changes can be performed in a workshop environment or at the location of the equipment.
- Oil changes performed under workshop conditions are controlled with access to the necessary equipment to capture, contain and store waste oil, minimising the risk of spillage (See ICRC Workshop Waste Kit).
- Oil changes performed in the field or in the delegation are significantly higher risk of spillage and extra precautions must be taken in the draining, storage, and subsequent transport of the waste oil.
- Different types of waste oil may never be mixed. Mixing wastes may make recycling impossible or make waste disposal much more expensive.

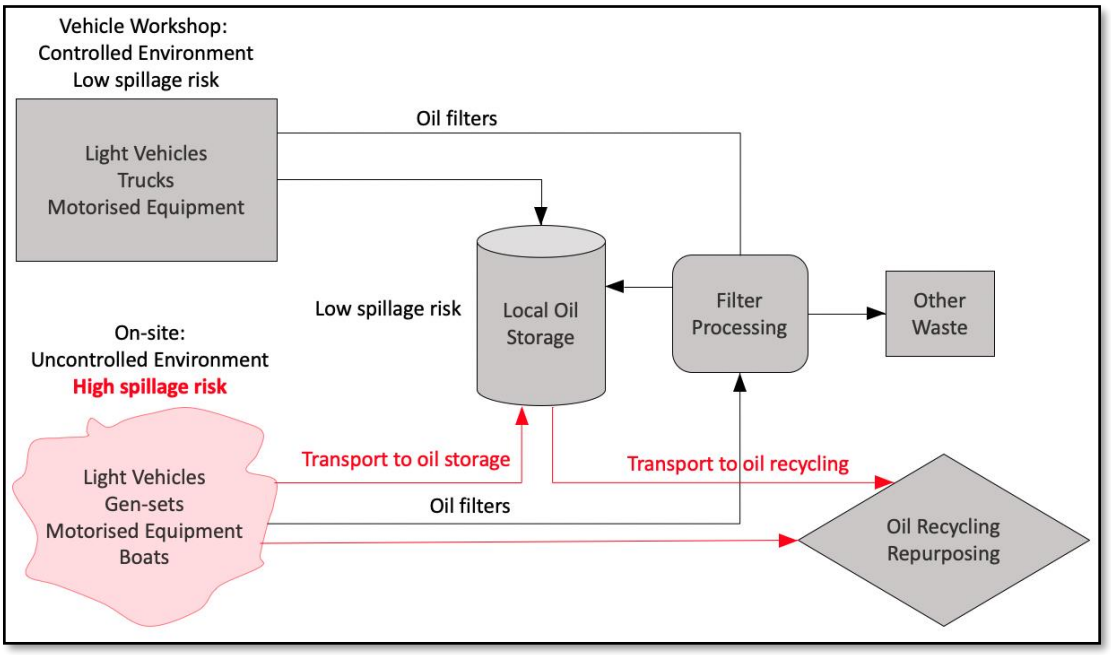

Image 5 - Handling used engine oil and filters (in a workshop vs. not in a workshop)

Required Equipment:

Refer to the GLO – SUP- Workshop Equipment Kit and user instructions

Storing waste:

- Waste oil should only be stored in clean receptacles and/or drums that have only been used to store engine oils or fuel (JET A1 /Diesel only).
- Do not reuse old drums that have previously stored other chemicals or products.
- Drums should be stored under a shelter or in such a manner that water contamination does not occur over time.
- Drums should be stored in an area away from daily movement of vehicles and equipment to minimise the possibility of collision damage.
- Waste oil must be stored within spill containments kits mounted on a concrete base to avoid any oil from coming into contact with storm or ground water as shown above.
- Waste oils should not be mixed with other lubricants or fluids, so each type of oil should have its own receptacle.

Transporting waste:

- Waste oil should only be transported in clean receptacles and/or drums that have only been used to store engine oils or fuel.
- Containers must be loaded correctly and properly secured within the vehicle, to prevent movement or shifting during transit and/or off-loading which may lead to damage and subsequent spillage or leaks.
- It is highly recommended that an absorbent spill kit is kept on board every vehicle carrying fuel or any other form of dangerous liquids.
- Vehicles transporting fuel must be equipped with a minimum of one 2kg fire extinguisher which must be easily accessible to the driver and protected against the effects of the weather.

Traffic Lights for Used Oil:

Used oil	What?	When?	How?
Green ***(ideal)***	Recycling (i.e., re-refinery)	To manage used oil collected from vehicles and generators	Recycle used oil in recycling plants (i.e., re-refineries). In traditional recycling plants, the usage of activated clay in bleaching the used oil creates the highest negative environmental impact. The plant is recommended to optimize the use of activated bleaching clay. If different plants are available, choose the one which applies another technology than activated clay. Moreover, always choose the plant with *the highest percentage of base oil recovery*, *highest energy efficiency, cleanest source of energy (natural gas or electricity from renewables),* and finally *the most robust emissions control system.*
	Energy recovery by incineration	To manage used oil collected from vehicles and generators	It is a viable option *only when* the facility is certified to deal with hazardous waste incineration and equipped with flue gas abatement and emissions control. The facility can be: - A stand-alone waste to energy plant (WTE) generating heat or electricity, or both, - A complex facility in another industrial context such as a cement manufacturing plant, using used oil for incineration in their kilns.
	Distillation	To manage used oil collected from vehicles and generators	Distil used oil to produce combustible products such as marine diesel oil fuel and by-products such as asphalt and light ends (this might be a less common approach in developing countries).
	Transport	To send used oil to recycling plants	Where the recycling plant is located in remote areas, it is recommended to transport used oil. Even if the recycling plant is located in a neighbor country more than 700 km away, it is still environmentally beneficial to send used oil, despite the emissions of transportation. Choose suitable means vehicles: sealed tanker trucks are the best option to avoid leakage. Where possible, work with approved waste transportation companies with transport licenses for the movement of hazardous waste.
Amber ***(warning)***	Storage	To store used oil until sent to recycling plant	Use leakage prevention kits for the containers.
Red ***(no go)***	(Do not) give to local population or local contractors who use it as anti-termite	Never	Record the amount of waste, location, and the time for which a red solution has been used and report this information to the HQ. In the inevitable case of using as anti-termite by local population and contractors, they should be advised to reduce or refrain from mixing used oil with diesel as it considerably adds to the negative environmental impact.
	(Do not) landfilling or open dump	Never	

Disposal / Recycling / Reuse:

✓	Used oil treated at local dedicated reprocessing plan
✓	Used oil transported to nearest available dedicated reprocessing plant (even if in neighbouring contry.)
✓	Used oil provided to facilities certified for waste incineration, e.g. cement production
✓	Used oil provied for repurposing by certified facilities
X	Used oil provided to other for non-approved industrial processes
X	Mixing oil with diesel and using as anti-termite treatment

Recycling/disposal data capture:

- The recycling/disposal of waste oil must be recorded in FleetWave.
- Refer to section: 5.4 Tracking and Monitoring of Waste Disposed/Recycled.

6.2 Critical Waste Type: Used Oil Filters

Definition of the Waste Concerned:

Metallic filter casing and paper/fabric lining removed from an engine (vehicle, generator, etc.) during periodic maintenance.

Used filters contain traces of used oil and therefore the hazards and key risks related to used oil also apply to oil filters.

Used filters are liquid waste and cannot be placed in a bin or skip for disposal.

Hazards associated with the waste type:

- Toxic, contains carcinogens, heavy–metals, and other potentially harmful by-products.
- Highly polluting
- Highly flammable

Key Risks:

- Waste oil entering and contaminating ground water
- Leakage or spillage of waste oil during handling or storage.
- Fire

Source of waste:

- During periodic maintenance engine oil and oil filters are replaced due to degradation during engine operation. The frequency of oil changes depends on vehicle type, oil type and operating environment/conditions.
- Oil changes are normally performed at prescribed intervals – these intervals may be extended depending on the variables above.
- Oil filters contain approximately 20% oil and are therefore treated as hazardous waste.

Opportunities for reducing oil filters:

- Use of synthetic oils/ bio-oils (testing in progress in Nairobi)
- Follow ICRC standard intervals service/oil replacement as they have been tested (local oil could have different intervals approved by RVFM).
- Operating vehicles with smaller engine sizes
- Replacing ICE vehicles with EVs

Handling waste:

- Oil filters must be disposed of properly since they contain, at the very least, trace amounts of used oil. The optimum method is draining and crushing.
- Puncture & hot-drain the filter for up to 12 hours.
- To hot-drain the filter, carefully remove the filter from your unit while it is still warm. Use caution when hot-draining filter to avoid being burned. Protective equipment such as safety glasses and gloves should be worn to prevent injury. Then carefully puncture the end of the filter and set upside down for at least 12 hours to let the oil drain out into a container or pan.
- Once completely drained, you can recycle the empty can and the oil. For the disposal or recycling of the oil, the SOP for used oil should be consulted.
- Crushing: After removing the filter elements metal casings should be separated, crushed to extract trapped oil and the cleaned metal casing can be disposed as scrap.

Storing waste:

- Oil filters should be stored in a covered, rainproof receptacle so that used oil is not washed from the filters into the surrounding environment.
- The receptacle should be capable of holding any used oil that seeps from the filters, for example in an oil drum retention tray (see ICRC Workshop Waste Kit).
- The receptacle should be used only for storage of oil filters and not be mixed with other lubricants or waste.

Required Equipment:

Refer to the GLO – SUP- Workshop Equipment Kit and user instructions.

Traffic Lights for Used Oil Filters:

Used oil filters	What?	When?	How?
Green ***(ideal)***	Recycle	All oil filters at the end of their life	*Recommendations related the recycling plant:* - Conduct a facility visit where possible. The recycling facility should be able to capture oil residue in the oil filters. - The plant should typically follow these processes: *shredding, centrifuge for oil separation, iron and aluminum recovery*. If any of the processes are missing, this means the product related to that process is likely to be landfilled. Special attention should be given to the presence of magnetic separator and Eddy Current Separator (or any non-magnetic separator to separate non-ferrous metals), which are essential for appropriate recycling. - For iron scrap recycling in electric arc furnace after separation from other filter components, the landfilling of furnace slag should be minimized. Instead, the slag can be used in other industries. Iron scrap recycling plants with other kinds of furnace which produce less slag should be prioritized. - The extracted used oil should be sent to energy recovery (e.g., a certified cement kiln) or to oil re-refinery. It shall NOT be sent to landfilling due to hazardousness. Refer to used oil study for details on how to manage used oil.
	Transport	To send used oil filters to recycling plants	Where the recycling plant is located in remote areas, it is recommended to transport used oil filters. Even if the recycling plant is located in a neighbor country more than 1000 km away, it is still environmentally beneficial to send used oil filters, despite the emissions of transportation.
Amber ***(warning)***	Storage	When recycling is not possible	Oil filters must be stored with two containments to avoid leakage. A primary packaging in a leak-proof bag with a tight seal. Large zip-top bags work well for this (can be added to the waste kit). Store the bags in a secondary containment (e.g., a bottom-sealed barrel) away from direct sunlight.
Red ***(no go)***	(Do not) dispose together with other garage wastes	Never	Record the amount of waste, location, and the time for which a red solution has been used and report this information to the HQ.
	(Do not) landfilling or open dump	Never	

Disposal / Recycling / Reuse:

Waste solid material (oil filter casing only)

✓	Disposal to scrap metal dealer

Waste Oil

✓	Used oil treated at local dedicated reprocessing plan
✓	Used oil transported to nearest available dedicated reprocessing plant (even if in neighbouring contry.)
✓	Used oil provided to facilities certified for waste incineration, e.g. cement production
✓	Used oil provied for repurposing by certified facilities
X	Used oil provided to other for non-approved industrial processes
X	Mixing oil with diesel and using as anti-termite treatment

Recycling/disposal data capture:

- The recycling/disposal of waste oil must be recorded in FleetWave.
- Refer to section: 5.4 Tracking and Monitoring of Waste Disposed/Recycled.

6.3 Critical Waste Type: Used Lead Acid Batteries

Definition of the Waste Concerned:

Battery removed from an engine (vehicle, generator, etc.) during periodic maintenance. Batteries may include wet-cell batteries and valve regulated lead acid batteries (sealed or low maintenance).

With the introduction of fully electric vehicles (EV) into the fleet, in cases of vehicle damage or destruction, waste lithium ion (Li-ion) batteries will require specific handling and management. Lithium ion battery parts are recyclable.

Hazards associated with the waste type:

- Damaged batteries may leak.
- Highly toxic, contains carcinogens, heavy–metals, and other potentially harmful by-products.
- Highly corrosive
- Polluting
- Very reactive

Key Risks:

- Exposure to levels of lead can cause anaemia, weakness, kidney and brain damage. Very high exposure can cause death
- Exposure to sulfuric acid can cause severe irritation or corrosive damage if inhaled.
- Exposure to sulfuric acid can burn any plants, birds or land animals exposed to it. It has moderate chronic (long-term) toxicity to aquatic life.
- Sulfuric acids' strong reactivity may ignite organic material (like paper or other combustible materials) if mixed together.
- Electric vehicle batteries are of a very high voltage and can cause electrocution if not handled according to manufacturer's guidelines. Staff required to handle these batteries require additional training to prevent serious accidents when recycling.

Source of waste:

- During periodic maintenance 12-Volt batteries are replaced due to degradation during engine operation. The frequency depends on vehicle type and operating environment/conditions.
- Batteries contain approximately lead and sulfuric acid (also known as battery acid) and are therefore treated as hazardous waste.

Opportunities for reduce battery waste:

- Use long-life, sealed batteries wherever possible.
- Use Calcium maintenance free batteries where possible.
- Avoid allowing batteries to lose charge completely.
- Trickle charge batteries that may not be used over prolonged periods.
- Recharge stock batteries periodically (at 2–3-month interval)
- Reduce unnecessary drainage of batteries
- Scrap batteries should be properly stored and fully recharged on trickle charge, and load tested before simply considering those as scrap.

Handling waste:

- Battery changes can be performed in a workshop environment or at the location of the equipment.
- Battery changes performed under workshop conditions are controlled with access to the necessary equipment to remove and store used batteries, minimising the risk of exposure to risks (See ICRC Workshop Waste Kit).

Transporting waste:

- Used batteries must be well secured to prevent movement which may lead to leakage and/damage during transport.
- It is important that if batteries are stacked on a pallet they must be well secured with a layer of non-conductive material (e.g. cardboard) separating the layers of batteries.
- Batteries should be transported within an acid-proof spillage tray. A spillage kit should be available if leakage occurs.

Storing waste:

- Batteries should be stored upright under cover to keep them dry.
- Stacking needs to be separated with cardboard to prevent terminals from puncturing adjacent units.
- Cracked or leaking batteries needs to be placed in acid-proof containers with neutralizers. They should be stored in impervious surfaces and not on bare ground

Required Equipment:

- Battery tray
- Battery tester
- Battery charger
- PPE: Rubber apron, rubber gloves, face shield

Traffic Light System:

Lead-acid batteries	What?	When?	How?
Green ***(ideal)***	Replace	When purchasing new batteries or new vehicles	Replace traditional lead-acid batteries with calcium lead-acid batteries. These batteries are greener alternatives and provide operating advantages such as improved resistance to corrosion and lower self-discharge.
	Recycle	Used batteries at the end of their life	Recycle used lead-acid batteries in certified lead-acid batteries recycling plants. If different recycling options are available, always choose the recycler with the *highest percentage of lead recovery*, *highest energy efficiency, cleanest source of energy (natural gas or electricity from renewables),* and finally *the most robust emissions control system.*
	Transport	To send used batteries to recycling plants	Where the recycling plant is located in remote areas, it is recommended to transport used batteries. Even if the recycling plant is located in a neighbor country more than 1000 km away, it is still environmentally beneficial to send used batteries, despite the emissions of transportation. Batteries should be loaded on trucks in a way that can absorb any extreme shocks or bumps during the transportation.
Amber ***(warning)***	Storage	When green recommendations are not possible	Stack batteries in an upright position (no more than four batteries). Ensure the acid will not leak out of the top vent holes. Batteries can be placed on pallets indoors or outdoors. Inspect store batteries weekly for cracks or leaks. For outdoor storage, avoid batteries from freezing as it leads to cracking and leakage. It may also require covering and diking to prevent stormwater contamination. Place cracked and leaking batteries in sturdy, acid-resistant, leakproof sealable containers (can be added to waste kit) and keep the containers closed within the storage area.
Red ***(no go)***	(Do not) dispose together with other garage wastes	Never	Record the amount of waste, location, and the time for which a red solution has been used and report this information to the HQ.
	(Do not) landfilling or open dump	Never	
	(Avoid) primitive recycling activities or backyard smelters with no monitoring or environmental certification	Never	
	(Avoid) extreme shocks or deformations of battery casing or seals during storage or transportation	Never	

Disposal / Recycling / Reuse:

All types of batteries can be recycled and doing so will conserve valuable metals and reduce environmental impacts to landfill.

✓	Send waste batteries to recycleing plant
X	Dumping, disposal, handing over to any other recipient than recycler

Recycling/disposal data capture:

- The recycling/disposal of waste batteries must be recorded in FleetWave.
- Refer to section: 5.4 Tracking and Monitoring of Waste Disposed/Recycled.

6.4 Critical Waste Type: Tyres

Definition of the Waste Concerned:

Tyres unfit to be used on a vehicle are classified as waste tyres and such tyres should be recycled.

Hazards associated with the waste type:

- Large volumes of waste tyres and limited disposal options can lead to last-resort incineration which produces high level of pollutants.
- Leachate from tyres that have broken down can contaminate soil and groundwater.

Opportunities to reduce tyre waste:

- Driver awareness training on maintaining correct tyre pressures
- Regrooving of tyre where possible (larger tyres only)
- Ensuring tyres are not replaced when there remains useable depth of tread.

Key Risks:

- Tyres can cause significant fire hazards.
- Tyre stacks can be breeding sites for mosquitos and vermin and assist in the spread of diseases.

Source of waste:

Vehicle and/or equipment tyre replacement at end of useful life.

Handling waste:

No specialist handling equipment is required for used tyres.

Transporting waste:

There are no special requirements for the transport of used tyres.

Storing waste:

- Storage area should be away from buildings and other equipment, fire extinguishing equipment should close at hand.
- Storage should be covered to prevent capture of rainwater in tyres

- When storing tyres onsite, ensure that they are stacked in a manner to prevent vermin from breeding in them.
- Where possible, tyres should be shredded to reduce volume.

Required Equipment:

No specialist handling equipment required.

Traffic Light Recommendations

Used tires	What?	When?	How?
Green ***(ideal)***	Retread	For used tires with some life left	Give to local or advanced retreading facilities, especially for SUV and truck tires.
	Transport	For any type of used tire when transportation is needed	Transport used tires to recycling plant, retreading facility, incineration (e.g., cement plant or urban heating), or to construction companies, even if these facilities are located in long road distances and a cross-border transportation is needed.
	- Recycle for material recovery - Controlled incineration for energy recovery	For used tires at the end of their life	Choose any recovery method that is available, for example, sending to a recycling plant or controlled incineration in cement kiln or urban heating. Ensure that the recycling / recovery facility has robust emissions control system and, ideally, is environmentally certificated.
	- Use in construction	For used tires at the end of their life	- Give to construction companies to be used for construction purposes such as asphalt mix, roofing, sports grounds, playground equipment, sports matts, insulation, sound proofing, anti-vibration support, etc. - Partner with NGOs and local authorities to use used tires in playgrounds or other innovative uses. This has a positive social impact by creating jobs. Please refer to the note at the bottom of this page.
Amber ***(warning)***	Shred and store	When green recommendations are not possible.	Shred the used tires and store the shredded rubber in heavy duty sacks to avoid the risk of fire until a green solution is found. Use third-party or local shredders.
Red ***(no go)***	(Do not) landfilling used tires.	Never	Record the amount of waste, location, and the time for which a red solution has been used and report this information to the HQ.
	(Do not) burn in open air.	Never	
	(Do not) give to uncertified recyclers / local population for recycling, oil extraction, or secondary use.	Never	

Note: while recycling tires for material recovery is important, it's worth mentioning that the European Parliament has stated recycled rubber may contain toxic chemicals which can be harmful to children. Quote" Given the lack of scientific certainties on exposure to dangerous chemicals included in recycled tyres, the precautionary principle should apply and the use of rubber from recycled tyres in playgrounds and sports fields should be banned." Unquote.

Use of recycled tires in children's playgrounds and artificial turf fields (europa.eu)

Disposal / Recycling / Reuse:

End of life tyres may be sold for reuse, regrooving or under some circumstances, incineration is specialist facilities, such as cement production.

✓	Sold to used tyre recycling facility
✓	Larger tyres sold for regroving
✓	Tyres sold for retreading
✓	Tyres shredded
✓ / X	Sold for incineration in cement production plants
X	Dumped in landfill
X	Burning/incineration

Recycling/disposal data capture:

- The recycling/disposal of used tyres must be recorded in FleetWave**.**
- Refer to section: 5.4 Tracking and Monitoring of Waste Disposed/Recycled.

6.5 Critical Waste Type: Used Fluids and Lubricants

Definition of the Waste Concerned:

Fluids (such as coolant, power steering, brake and transmission fluids) are used to keep almost every function of the vehicle operating.

Lubricating grease and heavy oils are used in many applications to reduce the wear and friction between movable parts in the vehicle.

Hazards associated with the waste type:

- Toxic, contains hazardous residues such as metal particles, chlorinated compounds and other potentially harmful by-products.
- Polluting
- Corrosive

Key Risks:

- Fluids entering and contaminating ground water
- Leakage or spillage of fluids during handling or storage
- Health (skin irritation)
- Fire

Source of waste:

During periodic maintenance lubricants are used to reduce the wear and friction of moveable parts in the vehicle.

Fluid levels are checked at a regular basis and added when necessary

Opportunities for reducing fluids and lubricants:

- Switch to environmentally friendly, biodegradable fluids
- Extending coolant life
- Keep lubricants clean, cool, and dry
- Operating vehicles with smaller engine sizes
- Replacing ICE vehicles with EVs (as they use less fluids than an ICE vehicle)

Handling waste:

Fluids and lubricants must be disposed of properly since they contain, at the very least, trace amounts of used oil.

Transporting waste:

- Containers must be loaded correctly and properly secured within the vehicle, in order to prevent movement or shifting during transit and/or off-loading which may lead to damage and subsequent spillage or leaks.
- It is highly recommended that an absorbent spill kit is kept on board every vehicle carrying fuel or any other form of dangerous liquids.
- Vehicles transporting fuel must be equipped with a minimum of one 2kg fire extinguisher which must be easily accessible to the driver and protected against the effects of the weather.

Storing waste:

- Fluids and lubricants should be stored in drums or containers that are in good condition, with no evidence of leakage, spillage, or damage and chemically compatible with the waste
- The container should be kept closed and sealed at all times except when used fluid is added or removed.
- Fluids and lubricants must be stored within spill containments kits mounted on a concrete base to avoid any oil from coming into contact with storm or ground water as shown above
- Clearly labelled or marked to identify the contents

Required Equipment:

Refer to the GLO – SUP- Workshop Equipment Kit and user instructions

Disposal / Recycling / Reuse:

✓	Used fluids at local approved recycling point
✓	Used fluids transported to nearest approved recyclying point
X	Dumping, pouring onto ground

Recycling/disposal data capture:

The recycling/disposal of used fluids are not recorded in FleetWave.

6.6 Critical Waste Type: AC Refrigerants

Definition of the Waste Concerned:

Air conditioning (AC) is used to cool the vehicle. The AC system uses a refrigerant gas. Vehicle AC systems need to be re-gassed during periodic maintenance cycles. There are three types of gas used:

- **R12** refrigerant used in vehicles sold up to 1994
- **R134a** refrigerant used in vehicles from 1994 - 2017
- **R1234yf** refrigerant used in vehicles sold as of 2017.

The below table compares R134a (currently widely used in ICRC vehicles) with greener alternatives. GWP stands for Global Warming Potential. The lower the GWP, the better.

Refrigerant	Description	GWP
R134a	Currently being widely used in ICRC vehicle air conditioning systems but is no longer approved for new cars manufactured from 2021.	1,430
R152a	R152a is a refrigerant that is not currently being used widely in vehicle air conditioning systems but may be pursued in the future. R152a is flammable but can be used safely.	124
R1234yf	R1234yf is a refrigerant being introduced by many automobile manufacturers. There are already cars on the road using this alternative. R1234yf is mildly flammable but can be used safely.	4
R744 (CO_2)	CO_2 is a high-pressure refrigerant being considered by automobile manufacturers. CO_2 systems operate at 5 to 10 times higher pressure than other vehicle air conditioning systems. It contains the lowest GWP amongst alternatives.	1

Hazards associated with the waste type:

Gases that are hydrofluorocarbons (HFC), hydrochlorofluorocarbons (HCFC) and Chlorofluorocarbons (CFC) must not be discharged into the atmosphere, they can damage the ozone layer and impact the climate.

Key Risks:

- Gas escaping to the atmosphere during maintenance intervention.
- Significant negative environmental impact
- Unexpected discharge of gases can cause injury to mechanics.

Source of waste:

During periodic maintenance the AC is re-gassed to ensure that the AC is maintained in good condition.

Opportunities for reducing fluids and lubricants:

Ensuring vehicles are using cleaner alternatives such as R1234yf refrigerant gas.

Handling waste:

- Mechanics handling gases that are HFC, HCFC and CFC must be specially trained wherever possible.
- A gas recovery cylinder (compatible with both R134a and R1234yf gases) must be used to capture and recover used and contaminated refrigerants from systems serviced.
- Full cylinders of waste gases must be returned to a specialist refrigeration dealer.

Transporting waste:

Waste gases must be transported in specialist gas recovery cylinders.

Storing waste:

Waste gas must be stored in a recovery cylinder and clearly marked with the type of refrigerant gas.

Required Equipment:

Waste gas recovery cylinder.

Traffic Light Recommendations:

AC Refrigerant	What?	When?	How?
Green ***(ideal)***	Substitute R134a with greener alternatives	At vehicle procurement stage	Purchase vehicles that run on greener AC refrigerants such as R1234yf.
	Change the refrigerant used in current ICRC vehicles from R134a to greener alternatives	For current fleet running on R134a	Experienced technicians required to ensure compatibility of lubricant, seal, and valves.
	Purchase R134a from suppliers that offer take back schemes	When refill for AC refrigerant of current fleet is needed	Scout for suppliers that accept receiving empty containers of AC refrigerants and commit to recycling them.
	Recycle R134a	When dealing with R134a empty containers	- Capture the residual refrigerants in containers and then recycle the metals and plastics. - Use refrigerant recovery machine for capturing refrigerants. Add these machines to waste management kits. - Handle the gas properly during capturing process to prevent leakage.
	Reuse or sell the captured R134a	When residual gas in empty containers is captured	Reuse the captured R134a in current fleet or sell it to certified reclaimer.
Amber ***(warning)***	Store AC refrigerant empty containers	When green recommendations are not possible.	Store outdoors (not under direct sunlight) or indoors with good ventilation.
Red ***(no go)***	(Do not) scrap or landfill empty containers without capturing AC refrigerant residuals	Never	Record the amount of waste, location, and the time for which a red solution has been used and report this information to the HQ.
	(Do not) give the empty containers to local population	Never	

Disposal / Recycling / Reuse:

✓	Waste gas capture in recovery cylinder and specialist recycling
X	Releasing waste gas into atmosphere

Recycling/disposal data capture:

The recycling/disposal of used AC refrigerants are not recorded in FleetWave.

6.7 Critical Waste Type: Empty Containers

Definition of the Waste Concerned:

Metal, plastic or other containers that previous held material that may be hazardous, including (but not limited to) oils, lubricants, fluids, solvents, paints.

Hazards associated with the waste type:

- Toxic, contains hazardous residues such as metal particles, chlorinated compounds and other potentially harmful by-products.
- Polluting
- Corrosive

Key Risks:

- Residual material leaking

Source of waste:

- Use of contents during periodic maintenance and repair of vehicles and equipment
- Cleaning materials

Handling waste:

Drain all containers completely before disposing/recycling. Puncture metal containers safely remove any vapour build-up. Puncturing will also provide visual verification that the contents have been emptied. Do not fill containers with wastewater or any other waste liquids.

Storing waste:

- When empty, metal containers can be stored with general scrap metal.
- Plastic containers can be stored with general plastic waste.
- Paper and other material can be disposed of with general waste.

Required Equipment:

No special equipment required.

Disposal / Recycling / Reuse:

- Metal containers can be disposed/recycled with general scrap metal.
- Plastic containers can be disposed/recycled with general plastic waste.
- Paper and other material can disposed/recycled with in general waste.

Recycling/disposal data capture:

- The recycling/disposal of used containers is not recorded in FleetWave

7 REFERENCES

- *Sustainable Management of ICRC's Garage Waste*, *Coventry University*
- *Waste Framework Directive*
- *GLO-SOP-QSE Audit and Assessment*
- *FleetWave user manual*

8 ASSOCIATED DOCUMENTS LIST

File name	Document ID	Record	Record Location
GLO – SUP - Workshop Equipment Kit	*TSLOG-16-85625*	☐	/
GLO – FOR - QSE Assessment form	*TSLOG-16-85627*	☒	TS LOG - QM
GLO – INS - QSE Assessment Questions and Answers	*TSLOG-16-85626*	☐	/

9 APPROVAL

Business Process Owner Approval:
Name: Werner Rohrbach
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Position: Sustainable Supply Chain Project Manager
Date: 15.03.2022.
Created/Modified by:
Name: Romain Guillet
Position: Deputy Head of Fleet Management
Date: 20.06.2022.

10 CHANGE LOG

Version	Change	Date	Who?	Why?
1.0	First version published.	23.03.2022.	/	See Purpose.
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