Inspection and Detection

Introduction

In this module the officer will learn how to inspect, recognize and identify waste streams. Inspection methods, visual screening and sampling will be discussed as well as the use of codes and trade names during the identification process. Special attention will be paid to the safety of the officers whilst performing visual screening.

Upon completion of this module, the participant will be able to:

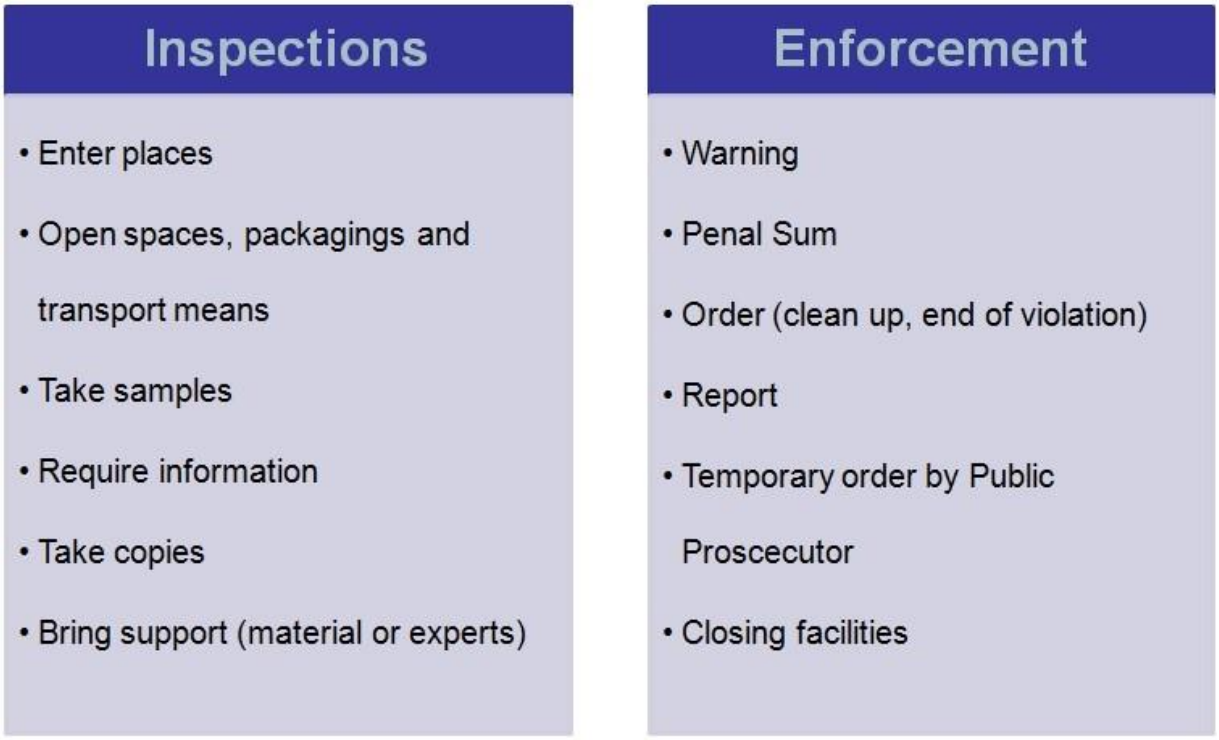
- Understand what competences are required to perform inspections and enforcement actions;
- Describe different ways to perform inspections;
- Understand what to look for when checking possible waste shipments and involve companies.

Legal requirements and competencies

According to Article 34(1) of the **Waste Framework Directive**, establishments or undertakings which carry out waste treatment operations, establishments or undertakings which collect or transport waste on a professional basis, brokers and dealers, and establishments or undertakings which produce hazardous waste shall be subject to appropriate periodic inspections by the competent authorities. Article 34(2) of the same Directive emphasizes that inspections concerning collection and transport operations shall cover the origin, nature, quantity and destination of the waste collected and transported.

A general obligation to inspect facilities is also contained in Article 50(2) and (3) of **Regulation (EC) No 1013/2006 on shipments of waste ("Waste Shipment Regulation", "WSR")**. According to para. 2 of this article, Member States shall, by way of measures for the enforcement of the WSR, provide, inter alia, for inspections of establishments and undertakings in accordance with the WFD and for spot checks on waste shipments or on the related recovery or disposal. Under Art. 50(3), checks on shipments may take place in particular, among others, at the point of origin, carried out with the producer, holder or notifier. Details about the frequency of inspections are laid down in **Article 23(4) of Directive 2010/75/EU on industrial emissions ("IED")** for installations to which that Directive applies.

At national level legislation must be in place to regulate the necessary competences and appoint the relevant authorities. As in most cases authorities do have all the required competences, inter-agency is needed to perform the actions (see Module Interagency collaboration and networking).



Examples of competencies.

Inspection methods and types

Inspection methods

Preferably, inspections are carried out based on a risk assessment and targeted, and are part of an inspection plan. The inspection can be performed at a site, during the transport phase or at one of the actors' location facilitating the waste shipment (e.g. transporters, shipping lines, brokers and dealers). The inspections are from administrative nature (company administration, test results, incident reports, financial administration, etc.) and/or physical inspections.

Other types of inspection

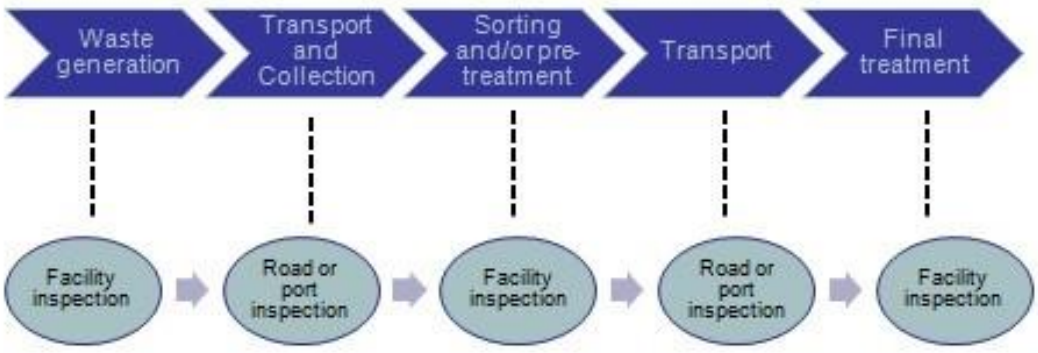
- **Ad hoc inspections**
  - Carried out outside the inspection plan.
  - Based on complaints or off spin from other inspections/investigations.

- **Specific inspection campaigns**
  - Obtain insight in a specific environmental issue.
  - Branch check.
- **Emergency inspections**
  - Direct threat to public health and environment.
  - Emergency response (e.g. to a fire or spill).
  - Limited preparation time.

NOTE: an inspection aims to check and ensure compliance, whilst an investigation aims to collect evidence of a possible case of non-compliance (see Module Investigation).

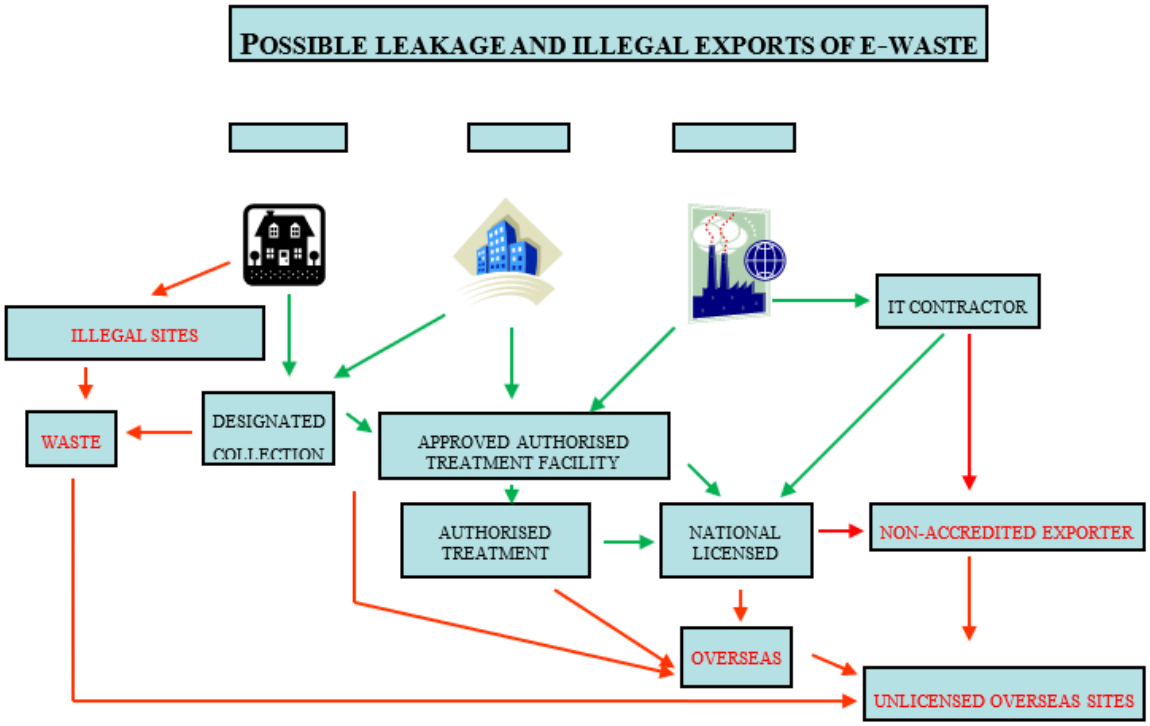
Waste chain approach

In addition to focusing just on one part of the waste shipment or management process, it is highly recommended to follow the waste chain approach. This approach implies that based on the findings of an inspection in one part of the chain, up or downstream checks are performed. For example, to check the final destination of the waste and to verify if the receiving company is licensed and able to deal with the waste in an environmentally sound and approved manner. Upstream inspections could aim to learn more about the generation process and composition of the waste. In case of transfrontier shipments of waste, this could imply contacting inspectors or enforcers in another state (see Module Interagency collaboration and networking).



Example of waste chain. Source: DOTCOM Waste project.

Another example of a waste chain approach is to develop a complete chain of a certain waste stream and identify possible weak spots in that chain to target the inspections on.



Example of diagram with possible espcapes of the legal e-waste management process. Source: IMPEL e-waste project.
References: European Commission, Inspection and enforcement, Waste Framework Directive, 2019.

Inspection phase

1. Preparation.
2. Execution.
3. Evaluation/ Reporting.

References: IMPEL, Waste sites manual, 2012.

Indicators

Examples of physical indicators that could provide information about a load or shipment:

- Labels.
- Appearance.
- Packaging.
- Loading methods.

Examples of administrative indicators when performing an administrative check of a shipment:

- Required documents and/or permits accompanying the shipment.
- Coding (customs codes, waste codes, UN coding).
- Weight indicated.
- Trade names.
- Names and addresses of involved companies.

In order to view images of the given examples, please download the Watch-IT application:

Link

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Examples of administrative indicators when performing an administrative check of a company:

- Required documents and/or permits in place and valid for the operation of the company.
- Historic compliance records.
- Coding (customs codes, waste codes, UN coding).

- Trade names.
- Company names and addresses.
- Self-monitoring mechanisms by the company.
- Proper data management by the company.
- Closing balances regarding input and output of materials/waste.
- Financial reports.

Safety measures

The safety of the officers and surroundings is a high priority when monitoring shipments of waste. The exact composition of a material is not always clear; clues that can support the classification of the content of a shipment and thus evaluate potential risks should therefore be closely watched. Several sources exist to gain more knowledge about the possible hazardousness of specific chemicals and wastes moved across borders.

The administrative examination should focus on who is involved, the origin and destination of the chemicals or waste, the description and the composition of the load. Important indicators are for example: HS codes, waste codes and trade names. A visual screening, labels, packaging and appearance all provide information that helps the officer with the identification of the load. Sampling and testing are also an option, although it is strongly recommended that these be performed by specialists. It needs to be stressed that during the identification of the load, the safety of officers and others is of paramount importance. UN, GHS and IMDG codes as well as data information sheets give information about possible hazardous characteristics of the load, which should be taken into account. Once the information concerning a shipment has been gathered, concrete safety measures may be taken during any physical inspection.

Possible risks for physical inspections of possible shipments of (hazardous) waste include:

- Loading method (risk of waste falling out).
- Radio-active materials (specifically for metal waste).

- Fumigated containers.
- Instable packaging or loading (e.g. old drums).
- Hazardous characteristics (e.g. flammable, explosion, or poisonous).

Common precautions measures apply for all situations, such as:

- Do not open and/or enter drums, trailers, trucks, containers or other confined spaces without appropriate prior assessment.
- Do not assume exact content based on labels and information sheets solely.
- Do not touch hazardous materials directly.
- Secure the scene.
- Report to and involve appropriate health, safety and regulatory authorities.
- Use appropriate personal protective equipment and adequate sampling equipment.

Safe container opening

Aim

Transport and freight areas can pose various hazards. As part of the supervision of the transport of waste, environment officers open thousands of containers across Europe. Opening containers involves a number of risks. One of these is that the contents of containers are not always stacked in a stable way (e.g. loose bulk scrap). Another, which this guidance aims to address, is the risk that the container atmosphere is harmful for the inspecting officer e.g. low levels lack of oxygen or the presence of harmful gases.

This guidance has been written with the kind assistance of the competent authority of Flanders. Authorities should write their own procedures and ensure that their officers are appropriately trained in

them. However, this guidance may serve as a basis for those procedures.

Risks at port sites

A wide range of vehicles operate in ports and freight areas. Many sites are also connected to the rail network, for passenger and/or freight traffic. Examples include:

- Mobile cranes and lifts: Operators often have limited visibility from their cabins and might not be able to keep a close look-out for pedestrians. Indoors, such as in transit sheds, there may be an added risk from diesel or petrol fumes. Always tell the driver's supervisor that you are there. He can usually contact the driver by radio.
- Straddle cranes and container stacks: Straddle cranes may be operated remotely or even by computer. In areas where containers are stacked, visibility between the stacks is sometimes seriously reduced or nil. Do not enter a container stacking area until all operations have ceased.
- Electrically-operated vehicles: These include fork-lift trucks, electric wheelbarrows and pedestrian-operated vehicles. They are particularly hazardous because they are almost silent, capable of quite high speeds and often unable to offer the driver a full field of view.

Reduction of risk in general

Always wear high-visibility clothing and try to work in pairs where possible.

If you are on foot, stick to the designated safe walkways at all times. Keep well away from large vehicles such as mobile cranes and straddle carriers. The driver might not be able to see you.

Only enter any restricted zones with the operator's consent.

It is safer to avoid all areas where vehicles may be on the move, particularly larger vehicles where the driver's view might be restricted or the vehicle could take a while to stop. If you have to work in these areas, watch out for the flashing yellow beacons which tell you when a vehicle is moving, and always face oncoming traffic.

Risks related to container atmospheres

The following risks of gasses of concern have been identified for the waste streams below:

WEEE

- Benzene
- Hexane
- Carbon dioxide
- Carbon monoxide
- Toluene

Second-hand vehicle parts

- Benzene
- Carbon dioxide
- Carbon monoxide

Metal waste

- Benzene
- Carbon monoxide
- Oxygen (lack of)

Paper waste

- Alpha Pinene

- Formaldehyde
- Carbon dioxide
- Carbon monoxide
- Oxygen (lack of)

Plastic waste

- 1-Butanol
- Alpha Pinene
- Benzene
- Cyclohexane
- Carbon dioxide
- Carbon monoxide
- Methyl vinyl ketone
- Oxygen (lack of)

The identified risks arise from gases released from the waste in the container. Belgian studies have not identified risks identified that are related to the active fumigation of sea containers for preservation or quarantine purposes. It is nevertheless suggested that to cover those exceptional situations where a container was actively fumigated and the party undertaking this fails to affix the necessary hazard labels to the container, gas meters with phosphene sensors should be used.

Fumigants

There are three common types of fumigant, each posing its own particular hazards:

Methyl bromide (bromomethane)

A highly toxic chemical which is widely used as a fumigant, particularly with containers of soil or timber. Although methyl bromide

is highly toxic, the symptoms of poisoning can take several hours to develop. They include:

- burns to the skin from prolonged contact with the liquid form of the chemical;
- massive accumulation of fluid in the lungs from inhalation of vapour;
- damage to the brain and nervous system and, possibly, the kidneys.

Even short-term exposure to methyl bromide fumes can cause discomfort, including headaches, sore eyes, stomach pains and numbness of the feet. These effects can last several days, but their severity depends on the concentration and on the length of exposure. Long-term exposure to methyl bromide can even result in death.

Aluminium phosphide (phosphine)

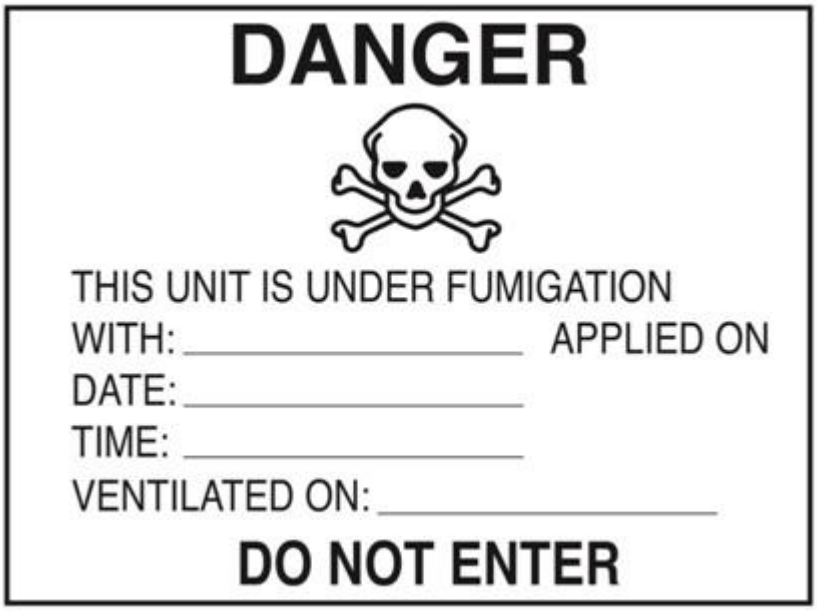
Pellets of aluminium phosphide are used to fumigate containers of foodstuffs, tobacco and other perishable goods while they are in transit. The pellets deteriorate during the journey, releasing phosphine gas which destroys pests and then disperses within two or three weeks. Danger arises when:

- two or three weeks have not elapsed since fumigation; or
- the pellets were placed in a secluded area where they could not decompose efficiently; or
- the fumigation records are missing or unavailable.

Incorrectly fumigated containers are occasionally imported from Africa, South America and the Middle and Far East. Phosphine gas is colourless, but has an unpleasant odour reminiscent of decayed fish. If inhaled, it can inflame the respiratory passages and affect the central nervous system. Symptoms include tremors, nausea, vomiting, headaches and gastric pain. Serious cases can even lead to coma or death.

Hydrogen cyanide

This fumigant is less widely used than methyl bromide and aluminium phosphide, but is particularly dangerous. It has a smell reminiscent of almonds. Even at low concentrations it can cause dizziness, nausea, headaches and stomach pains, leading to unconsciousness and paralysis. Inhalation of high concentrations can rapidly lead to death.



Fumigation label

Explosion hazard

Explosion hazard has not been identified as a risk. The risk of explosion is thus very small, but the immediate consequences are large. For that reason, the LEL (Lower Explosive Limit Level) should be measured.

Carbon dioxide was identified as a risk but in values that are much lower than the short term exposure value, and in addition always in combination with reduced oxygen values. For this reason it is not necessary to measure CÖ2 when opening containers.

Container safety chains

Container Safety Chains can be used when opening a shipping container. The chains secure the doors from opening spilling the cargo and potentially injuring those unloading.

Use of container chain in case of bulk loading

Back loading of containers increase risk of cargo falling out

Measuring devices

The officers performing the waste inspection should have access to calibrated gas meters.

These gas meters should be are equipped with sensors for oxygen, carbon monoxide, lower explosive limit, phosphene and a Photo ionisation detector (PID) / VOC (volatile organic compounds) sensor in order to overcome the risks identified in section 2. The gas meters should be serviced and calibrated (by third parties) every six months.

Guidelines for gas measurements when opening containers

For safety reasons, the officer should analyse the container atmosphere prior to opening the container and the visual inspection of the contents. Even if the measurement results show that no risks are present, the officer may still be effected when opening the container: irritated eyes, skin, effect on breathing.

The threshold values set in the aforementioned risk analysis only related to the five waste streams that were investigated in the Flemish study. If the documents accompanying the container suggest it contains other waste streams, in principle these should only be opened after selective measurement by third parties. When a measurement by third parties is not immediately possible, and the officer e.g. using the available documents can assume that the goods have no hazardous properties, then the container may be opened after an explosion risk and the presence of phosphene have been measured and a natural ventilation of 30 minutes has occurred.

If the values below are exceeded, the container is not safe for immediate use opening and inspection.

Gas measurement table

Waste	PID/ VOS ppm	CO ppm	O_2 %	Direct effect	PH_3 ppm	LEL %	Marked as fumigated container	Other
WEEE	>23.6	>52	<19.5	Itchy eyes, skin, effects on breathing	>0.3	>10	Yes	N/A
Second-hand vehicle parts	>17.9							
Metal	>14.9							
Paper	>9.2							
Plastic	>8.8							
Other waste without anticipated hazard characteristics; only in case measurement by third parties is not possible.	Always	N/A	N/A					
- Other waste, with expected hazard properties such as metal connections in dispersible form - Perishable products such as food, wood, ... - Unknown content	N/A	N/A	N/A	N/A	N/A	N/A		Always
↓↓↓↓↓↓↓								
Procedure to be followed when limits exceeded	30 minutes natural ventilation	15 minutes natural ventilation		Immediately close doors and ensure third party measurement	Only open container after selective measurement by third party			

Gas monitoring equipment

Two distinct types of gas monitoring equipment are available:

Oxygen meters

These measure the percentage of atmospheric oxygen, which should be approximately 20.9 % of the air. They will give you an audible and visual warning if the level:

- drops below 19 % (a danger to life); or
- exceeds 23 % (a fire/explosion hazard).

They are equipped with an earphone for use in noisy areas, an aspirator to allow remote sampling and a waist clip.

Remember: oxygen meters only measure oxygen levels — not other gases.

Multi-gas personal monitors

These will detect hazardous gases at the same time as monitoring the level of atmospheric oxygen. They provide a warning in cases of:

- oxygen deficiency (less than 19 % in the air);
- oxygen enrichment (more than 23 % in the air);
- dangerous levels of methane (potentially flammable and explosive); and
- dangerous levels of hydrogen sulphide (poisonous and potentially flammable).

Ventilation procedure

The step-by-step plan below provides good practice for opening and ventilating containers:

- STEP 1: Take the container to the ventilation location and place it perpendicular to the doors perpendicular to the prevailing wind direction.

- STEP 2: Check that the container is not marked with labels indicating the presence of a fumigant.
- STEP 3: Secure the doors with a container safety strap and carefully open the doors ajar.
- STEP 4: Remove the safety strap and open door 1 completely; use the doors as a physical barrier to protect yourself.
- STEP 5: Walk around the container (not along the open side) to open the other door.
- STEP 6: Open the second door in the same way as door 1.
- STEP 7: Wait in a zone opposite the prevailing wind direction until the full ventilation period has passed.

Personal Protective Equipment (PPE)

In addition to the standard equipment (helmet, safety shoes and fluorescent clothing), the inspecting officer should wear a full-face mask equipped with a combination filter (ABEK + CO.) The filter should be removed from the mask after each use and closed. The filter must be replaced if there is a noticeable taste or odour, and / or an increased breathing resistance occurs.

Cut-resistant gloves should be worn when opening the container.

Hands and wrists should be washed before and after eating. No food should be eaten during the inspections.

Record keeping

Each time ventilation is necessary, or measurement by third parties (see the gas measurement table) becomes note in the inspector's files should be made, and a report to Line Management. If a threshold value has been exceeded, then the relevant parameter and the measured value should be noted.