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## Reducing UPOPs and Mercury Releases from The Health Sector in Africa

# *Module 30: Operation, Maintenance & Monitoring*

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# INTRODUCTION

- ▶ All Healthcare waste treatment facilities should have internal procedures for maintenance of their buildings and equipment and in accordance with technical requirements and with National legislation
- ▶ Proper maintenance is important because it ensure that the building and the equipment are in fully operational mode.
- ▶ The management of the facility should promote, approve and control the maintenance procedures



# Basics

- ▶ As first step the institution has to develop internal maintenance policy
- ▶ All employees should be aware of it and need to handle with care for their equipment and tools
- ▶ They should be aware on the periods when the equipment is scheduled for regular maintenance
- ▶ The condition of the building and the equipment mainly depends on the awareness and responsibility of the users.



# Basics

- ▶ When procuring of new equipment, the user should request from the supplier to provide users and service training
- ▶ When procuring of new equipment, the user should request from the supplier to provide manufacturers maintenance routine, set of spare parts and consumables.
- ▶ The technical department should enlist the new equipment in the asset and include the manufacturers maintenance schedule in their own schedule.
- ▶ The users are responsible to report all minor or major defects to the maintenance department
- ▶ The maintenance department should work closely with the suppliers of the equipment needs to have stocks of most necessary parts and consumables.



# Operation & Maintenance (O&M)

## 1) Operation

- Operation refers to the everyday running and handling of a water supply which involves several activities:
  - Major operations are required to treat and convey safe drinking water to the users.
  - The correct handling of facilities by users to ensure long component life.
  - The proper operation of a supply results in its optimum use and contributes to a reduction in breakdowns and maintenance needs.

## 2) Maintenance

- Maintenance refers to the activities required to sustain the water treatment and supply system in a proper working condition. Maintenance can be divided into:
  - Preventive maintenance – regular inspection and servicing to preserve assets and minimize breakdowns.
  - Corrective maintenance – minor repair and replacement of broken and worn out parts to sustain reliable facilities.
  - Crisis maintenance – unplanned responses to emergency breakdowns and user complaints to restore a failed supply



# 10 Key element for successful O&M

## 1) An enabling environment

- An environment which encourages sustainable systems through appropriate legal provisions, regulations, education, information and other similar incentives.

## 2) Felt need and health awareness

- The existence of a genuine appreciation of the advantages of safe water supplies for hospitals so that users support O&M.

## 3) Strong institutions

- Structures with established legal status, clear responsibilities, adequate financial support, good organization and the representation of all users (Staff, Patient, Visitors).

## 4) Supportive attitudes

- A commitment by the hospital management to share responsibilities, establish clear ownership and contribute to the financial support of services.

## 5) Expertise and skills

- A clear identification of O&M needs and the training of staff in the necessary skills.



# 10 Key element for successful O&M

## 6) **Appropriate service level**

- An affordable and manageable service level which can be upgraded later as the socioeconomic
- situation improves.

## 7) **Appropriate technology**

- Practical, affordable and acceptable technology.

## 8) **Materials and equipment**

- Items such as spare parts must be available to keep systems functioning.

## 9) **Support services**

- O&M support systems must be effective.

## 10) **Financial matters**

- Factors such as capacity and willingness to pay are more likely to influence the financial sustainability of the systems.



# O&M – The operator role

The infrastructure, machinery and instruments in a treatment plant require regular inspection, adjustment, calibration, and maintenance. The task of an Operator includes:

- ▶ Operators must be able to recognize when instruments and controls are not functioning properly, and take command of the situation. This may involve anything from a simple adjustment to over-riding the equipment and operating manually.
- ▶ As instruments and control systems are complex, repair of these systems should be left to specialists and should not be done by operators.
- ▶ Simple corrective measures, such as cleaning sensors, can be done by the operator - cleanliness should be first priority.
- ▶ Routine maintenance procedures such as general inspection, mechanical zero calibration, replacement of charts lubrication and other basic items can be done by the operator if he is trained.





# O&M – important points

Some important points to remember when working on any instrument or control system

- ▶ Ensure that the recommended manuals, spare parts, and tools are available;
- ▶ If an instrument appears defective, refer to the manufacturer's trouble shooting guide before you pick up a tool;
- ▶ Observe all safety procedures such as turning off the power, tagging and locking out the system;
- ▶ Ensure that co-workers are aware of your activities;
- ▶ Where possible, ensure that an alternative method of operation is implemented while the instrument is out of service; and
- ▶ Keep records of work done, cause and effect if known and anything else that you think is important.



# Maintenance schedule

- ▶ The technical department together with the user must prepare internal building and equipment maintenance schedule
- ▶ The maintenance schedule at least must include periods and responsibility of the person who provides maintenance
- ▶ The maintenance schedule at least needs to be in accordance with the manufacturers recommendation
- ▶ National legislation must be taken into account when maintenance schedule is prepared for sensitive equipment or establishment (ionising sources, explosive materials, high pressure equipment etc. )



# Maintenance schedule

## Indicative Facility Maintenance Schedule

Task:	Responsible:	Month	January				February				March		
		Week	1	2	3	4	1	2	3	4	1	2	3
<b>Healthcare waste function area</b>													
		Frequency:											
1. Healthcare Waste treatment point													
Inspect electricity system	Tech. dept.	1/2 Yearly											
Check lights and plugs	Tech. dept.	Monthly											
Inspect water supply and sewage	User	1/2 Yearly											
Control taps (leaking)	Tech. dept.	Monthly											
Clean sinks with plunger	User	Monthly											
Inspect Windows, floor and doors	User	Yearly											
Inspect coating of wall and ceiling	User	Yearly											
Inspect roof	Tech. dept.	Yearly											
Check hinges and lock of storage	Tech. dept.	Quarterly											
Inspect storage areas	Tech. dept.	Yearly											
Inspect storage area, doors	Tech. dept.	Yearly											
Write Maintenance report	Tech. dept.	Yearly											

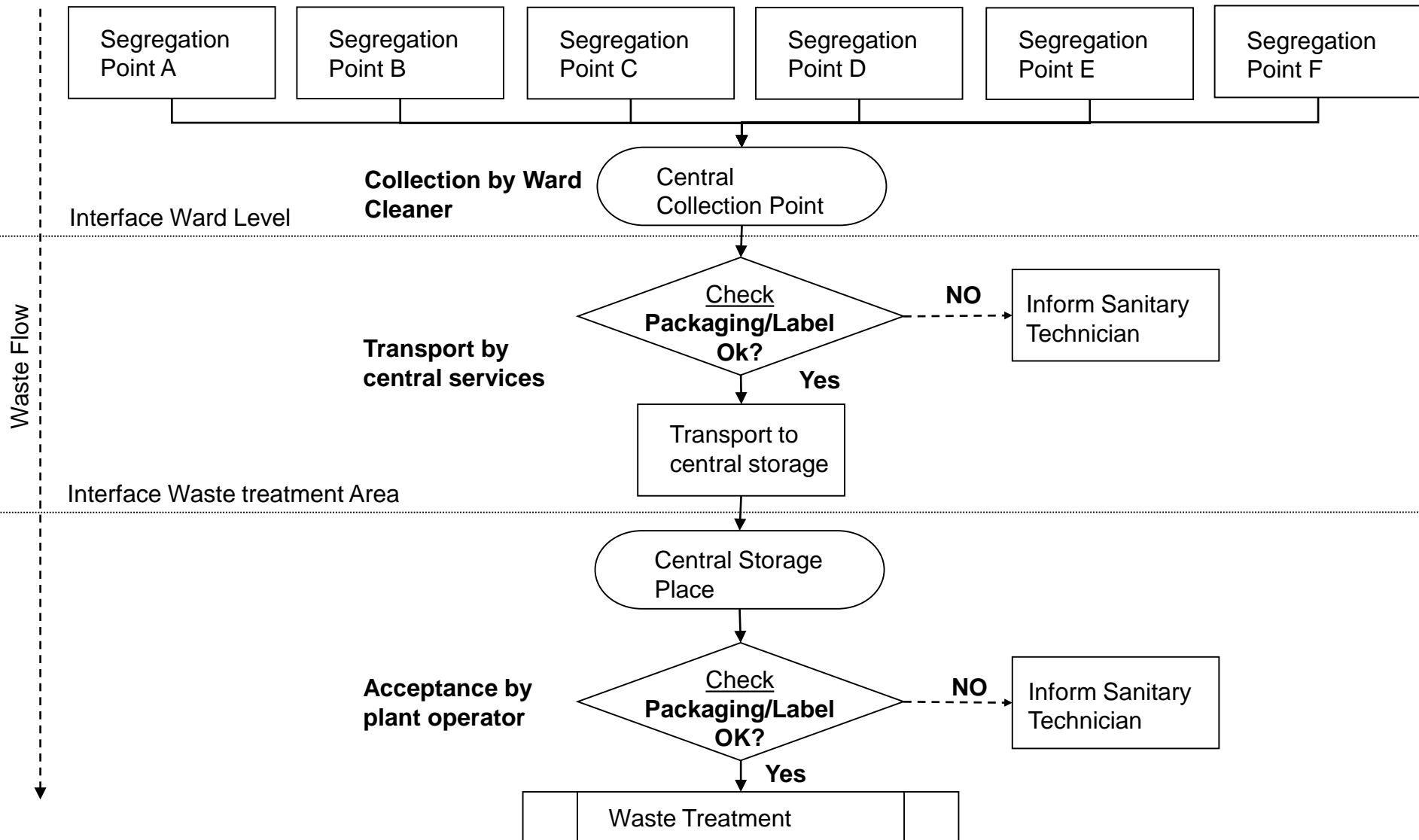


# Maintenance schedule

Indicative Equipment Maintenance Schedule			January				February			
Task:	Responsible:	Month Week	1	2	3	4	1	2	3	4
<b>Healthcare waste Treatment Equipment</b>										
		Frequency:								
Drain the steam generator	User	Weekly								
Check door safety mechanism	User	Weekly								
Inspect door gasket	User	Weekly								
Inspect air filter locking	User	Weekly								
Check time of use of the air filter	User	Weekly								
Check time of use of the HEPA filter	User	Weekly								
Drain the air compressor or line	User	Weekly								
Check printer pens and paper	User	Weekly								
Check the salt level in the water softener	User	Weekly								
Check the water lines for leakages	User	Weekly								
Drain the steam generator	Tech. dept.	Monthly								
Check door safety mechanism	Tech. dept.	Monthly								
Inspect door gasket	Tech. dept.	Monthly								
Inspect air filter locking	Tech. dept.	Monthly								
Check time of use of the air filter	Tech. dept.	Monthly								
Check time of use of the HEPA filter	Tech. dept.	Monthly								
Drain the air compressor or line	Tech. dept.	Monthly								
Check printer pens and paper	Tech. dept.	Monthly								
Check the salt level in the water softener	Tech. dept.	Monthly								
Check the steam lines for leakages	Tech. dept.	Monthly								
Check the water lines for leakages	Tech. dept.	Monthly								
Inspect the water level probes	Tech. dept.	Monthly								
Check the heaters	Tech. dept.	Monthly								
Change the water filter		Monthly								

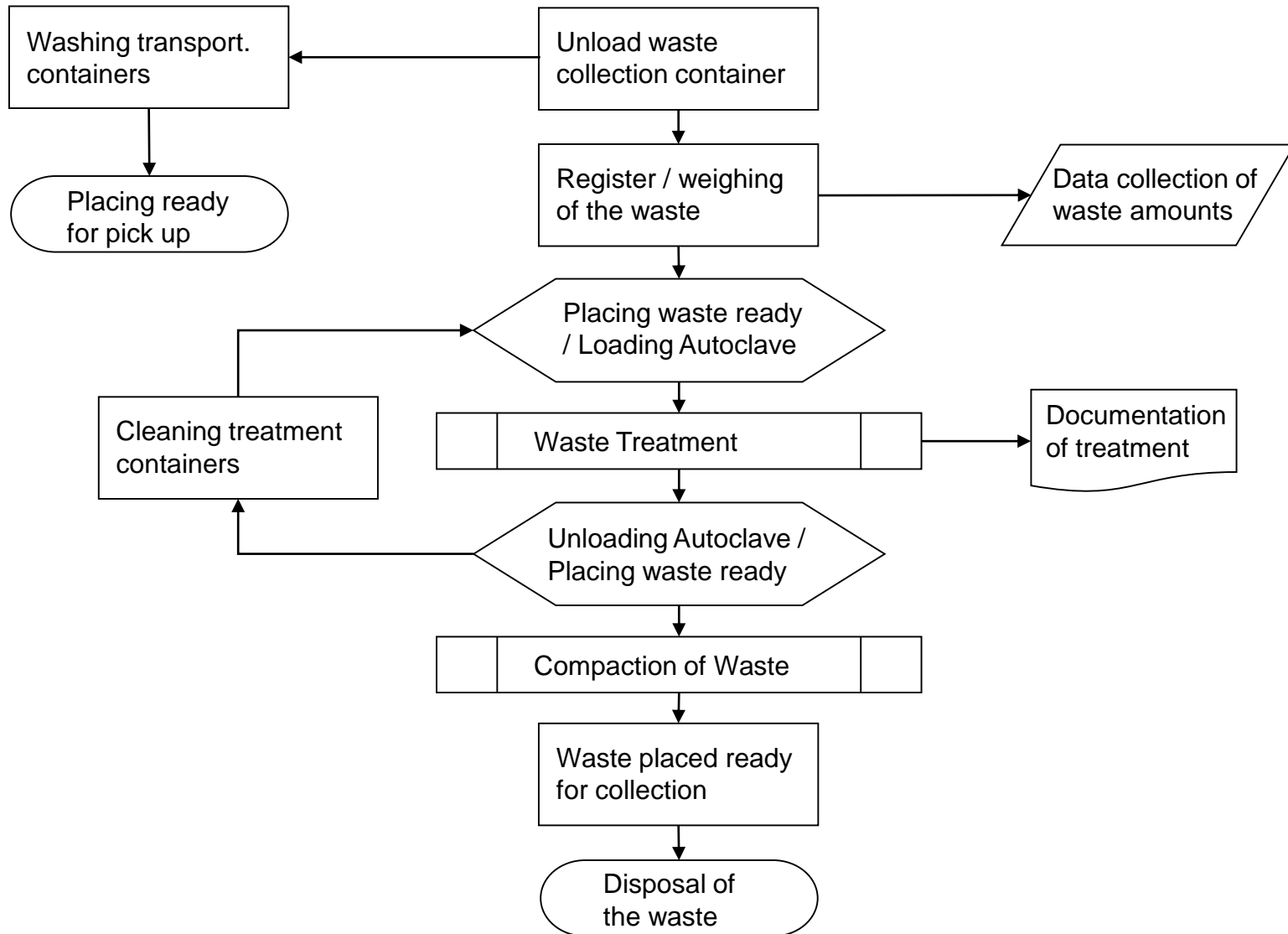


# Bio-Hazardous Waste flow – Hospital Level





# Bio-Hazardous Waste flow – Hospital Level





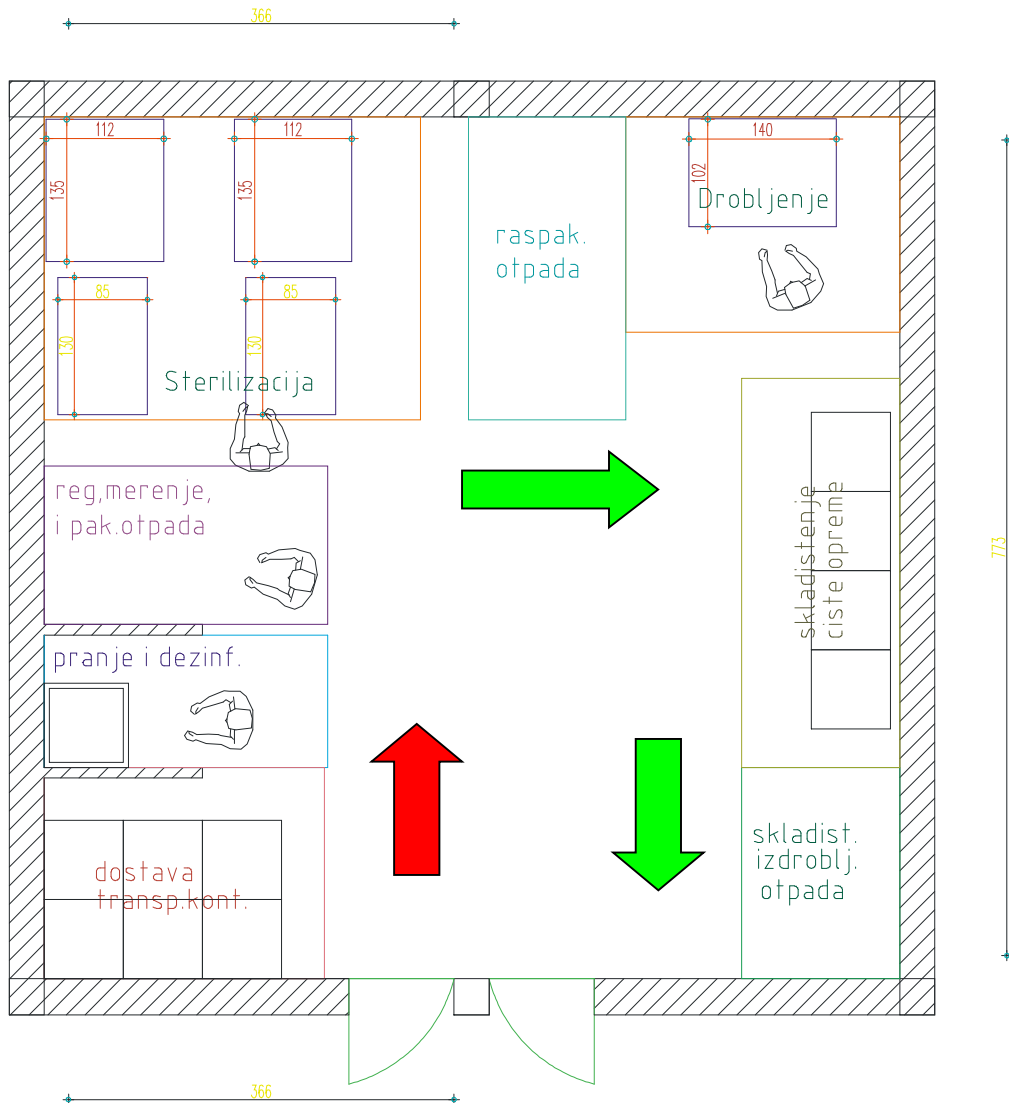
# OPERATION OF STEAM TREATMENT SYSTEMS

- ▶ Loading of the autoclave:
  - Only use heat stable plastic bags
  - Bags may be loaded in a basket instead of the containers provided
- ▶ Treatment of the waste:
  - Steam treatment is for bio-hazardous waste only
  - Use only pre-programmed cycles
  - Treatment of waste shall be carried out at high pressure (e.g. 2.05 bar) and temperature (e.g. 121°C)





# EXAMPLE ORGANISATION OF A TREATMENT PLANT

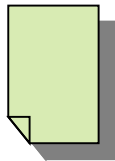


A)	Intake of transport containers
B)	Waste registration, weighing, packing
C)	Autoclaving
D)	Unpacking of waste
E)	Waste shredding
F)	Storage of shredded waste
G)	The space for washing and disinfection of transport containers
H)	Storage of clean equipment

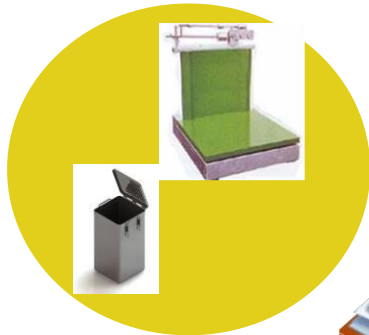




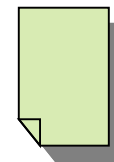
# WASTE FLOWS & DOCUMENTATION POINTS



Waste Refusal Notice



Waste Income Log



Process Documentation



Waste Treatment Log  
Process logs





# DOCUMENTATION

- ▶ All relevant data collected during the monitoring process needs to be documented:
  - the batch number for each cycle
  - the sterilisation date
  - the responsible person
  - the expiry date (if applicable).
- ▶ The same data but at least the batch number has to be documented on each pack.
- ▶ In case of an accident, legal proceedings may be raised and the healthcare facility may need to provide data to prove that the treatment of waste had been carried out according to the correct standard.



# WASTE INCOME LOG

Number	Registration No. of the Container	Danger	Type of waste	Origin of received waste and number of the waste packs	Quantity of received waste	
					kg	m <sup>3</sup>
1	2	3	4	5	6	
<b>Remark:</b>						



# WASTE TREATMENT & PROCESS LOGS

<p><b>BATCH NO:</b> _____ <b>DATE:</b> _____ <b>TIME:</b> _____ <b>WEIGHT:</b> _____ <b>OPERATOR:</b> _____</p>	<p><b>Process LOG</b></p>  <p><b>Chemical Indicator</b></p>
<p><b>BATCH NO:</b> _____ <b>DATE:</b> _____ <b>TIME:</b> _____ <b>WEIGHT:</b> _____ <b>OPERATOR:</b> _____</p>	<p><b>Process LOG</b></p>  <p><b>Chemical Indicator</b></p>



# WASTE REFUSAL NOTICE

## ANNEX 1 WASTE REFUSAL NOTICE

Date & Place: .....

Waste Producer Name: .....

Address of the Generator: .....

Waste Carrier Name (if different than above): .....

Address of the Carrier: .....

Vehicle type used: .....

Vehicle Registration Number: .....

Remarks:

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The above stated notices are presenting potential hazard for transport or are potential hazards for damaging of the HCW treatment equipment. Due to the above stated reasons the waste can not be accepted without previous improvement or reparation of the above stated difficulties.

HWO

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- ▶ Used in case the CTP operator notices problems with the waste
- ▶ A visual inspection of the waste contents will be carried out to ensure that wastes not acceptable for the sterilisation process (chemicals, toxins, pharmaceuticals etc) are not present
- ▶ All cases of non conforming waste will be reported to the HWO so they can assess the situation
- ▶ Any waste that can not be accepted will be rejected and this will be recorded
- ▶ The record must be signed by the HWO