

# Industrial Wastewater Management Guide for **TEXTILE INDUSTRIES**

Kampala Pollution Control Task Force





This Wastewater Management Guide provides facility owners, workers, and lead agencies and others with practical information about mitigating water pollution from textile industries.

The objectives of the Guide are:



**To provide textile industries with a reference tool for managing wastewater.**



**To help textile industries with a better understanding of the need for wastewater management and the associated benefits.**



**To provide key information on the existing institutional and legal framework as well as best practices for cleaner production and resource recovery and reuse optimization.**

There are many different wastes produced by the textile industry sector, many of which are hazardous. This Guide outlines how the various laws apply to each of these and how to best manage them.

This Guide has been developed in close consultation with key stakeholders and, through review of relevant literature regarding industrial best practices and cleaner production. In addition, formal and informal technical discussions with members of the Kampala Pollution Control Task Force (PTF) have been used to generate expert opinion on wastewater management for the textile industrial sub-sector.

The preparation of the Guide has been supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Reform of the Urban Water and Sanitation Sector Programme (RUWASS) as well as the International Water Stewardship Programme (IWaSP), implemented by GIZ on behalf of German Development Cooperation and DFID.

# Why wastewater management?

## It's the law

Proper management of wastewater is required by law. Failure to comply with regulatory and legal requirements may lead to fines and/or other penalties.

(See page 10)

## It's better for the environment

Toxic pollutants released in wastewater cause damage to the environment, affecting plant and animal life.

## It's better for public health

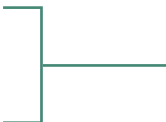
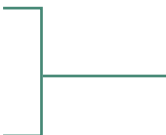
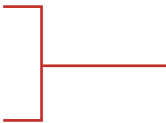
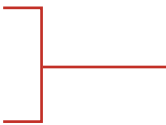
Toxic pollutants in wastewater contaminate surface water and ground water, and may end up in the food chain, exposing people to serious public health issues.

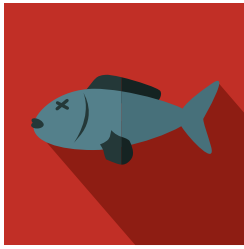
## It makes financial sense

Water is a resource like any other, and therefore has an associated cost. The more water used, the higher the costs. By reducing the amount of water used, and by recovering and reusing water wherever possible, companies can save money and be more competitive.

In many cases pollutants in wastewater represent wasted raw materials. When properly handled, these can be recovered and reused leading to cleaner wastewater and cost savings on materials for companies.

Reducing the pollution load in water sent for treatment by NWSC will reduce the cost of treatment. This may in turn translate into reduced costs of water procured from NWSC.





When released into water sources, organic based dyes from textile industries reduce light penetration and oxygen exchange, and lower levels of dissolved oxygen in the water body. This may kill or drive away fish. The reduced fish catch in Lake Victoria's Murchison Bay may partly be attributed to pollution and especially pollution from decomposable wastes.



Releasing heavy metals, which are contained in some dyes and pigments, into water bodies leads to pollution of water bodies and their bioaccumulation in fish, which may end up in the human food chain. In human beings, some heavy metals attack the brain and central nervous system to cause coma, convulsions and even death, and some are known to cause cancer.



In 2011, Crown Beverages Ltd invested \$18,495 (about UGX 47.2m) to procure and install a 114,000 litre tank for water harvesting. As a result, the company reduced annual tap water consumption by 4,433,000 litres, saving over \$5,400 (about UGX13.7m) annually.



For example, since 2010, Leather Industries of Uganda's investment in cleaner production to prevent pollution and reduce resource consumption has led to a savings of \$2.2m (about UGX7.5b) against investment of \$1.7m (about UGX5.6b), which represents a healthy return of 130% over six years.

# What to avoid

## MANUAL BLEACHING AND DYEING PROCESSES

Increased spillage and waste requiring additional cleaning.

→ More wastewater generated

## POOR PRODUCTION PRACTICE

Incorrect colour mixes NOT reused or properly disposed of.

→ Resources wasted

## IMPROPER CHEMICAL STORAGE

Damage to containers causing leakages and spillages.

→ Environmental damage and public health risks



## POOR MAINTENANCE

Dripping taps and leaking valves create unnecessary waste

→ More wastewater generated

## IMPROPER CLEANING METHODS

Manual cleaning using basic equipment

→ More water and cleaning agents used

## GROUND COVER NOT IMPERMEABLE

Dyes and chemicals mix with water and seep into the groundwater

→ Pollution & public health issues

## POOR CHEMICAL USE

Non-optimal or wrong quantities of chemicals used

→ More pollutants in wastewater

## EFFECTIVE WASTEWATER MANAGEMENT RELIES ON A TWO-STAGE APPROACH

### 1 Reducing the amount of wastewater generated

Making processes more efficient and reusing water wherever possible will lead to an overall reduction in the amount of wastewater generated.

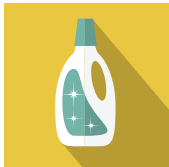
### 2 Ensuring wastewater is as clean as possible

Ensuring end-of-pipe wastewater is properly treated and meets effluent discharge standards will lead to a reduction in toxins entering the environment.

## 1 STEPS TO REDUCE WASTEWATER GENERATION



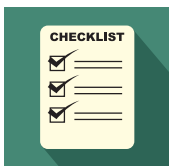
Use pre-clean and dry cleanup methods before wet cleaning. This reduces the volume of water used and the volume of wastewater generated.



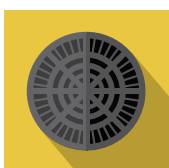
Use the minimum amount of cleaning agents and detergents. This saves on the costs of cleaning agents in addition to minimizing the amount of cleaning agent pollution in wastewater.



Avoid use of wastewater streams as a transport medium. Transfer solids and particulate matter by mechanical means.



Ensure employees are trained and aware of how to minimize water usage and wastewater generation.



Fit drains with screen and/or traps to prevent solid materials from entering the effluent system.

# 2 | BEST PRACTICE AND WASTEWATER TREATMENT

Reduce spillages, wastage and inefficiency by replacing manual systems with automated processes and cleaning equipment.

Reuse chemicals where possible. Investigate which chemicals can be reused or recycled. Caustic soda, for example, can be recaptured from the mercerizing process through evaporation.

Replace harmful chemicals with less damaging substitutes such as phosphate-free detergents and make use of environmentally friendly chemical application techniques like spot application of solvents.

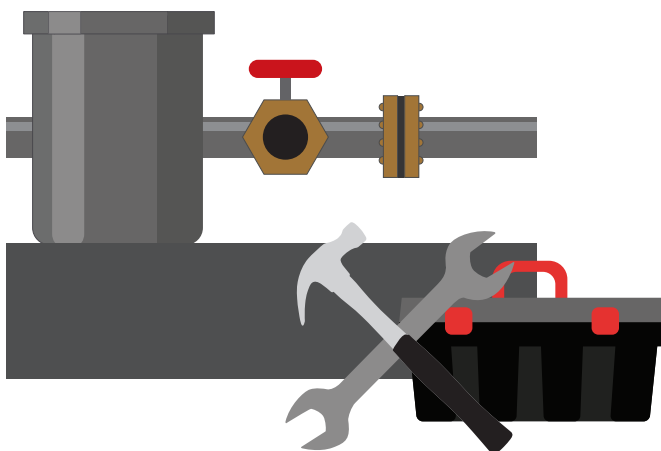


Reduce water consumption by adopting measures such as pressure jet batchwise rinsing and counter current rinsing.

The work area should have an impermeable ground cover, preferably concrete, to retain any leakage.

Water from boilers, cooling processes and final rinses can be re-used for cleaning purposes or make-up water for the dye bath.

Ensure all water from textile processes and cleaning is directed to a collecting container.



Implementation of strict housekeeping measures such as plugging leakages, checks on running taps and the installation of water meters are examples of simple water conservation strategies.



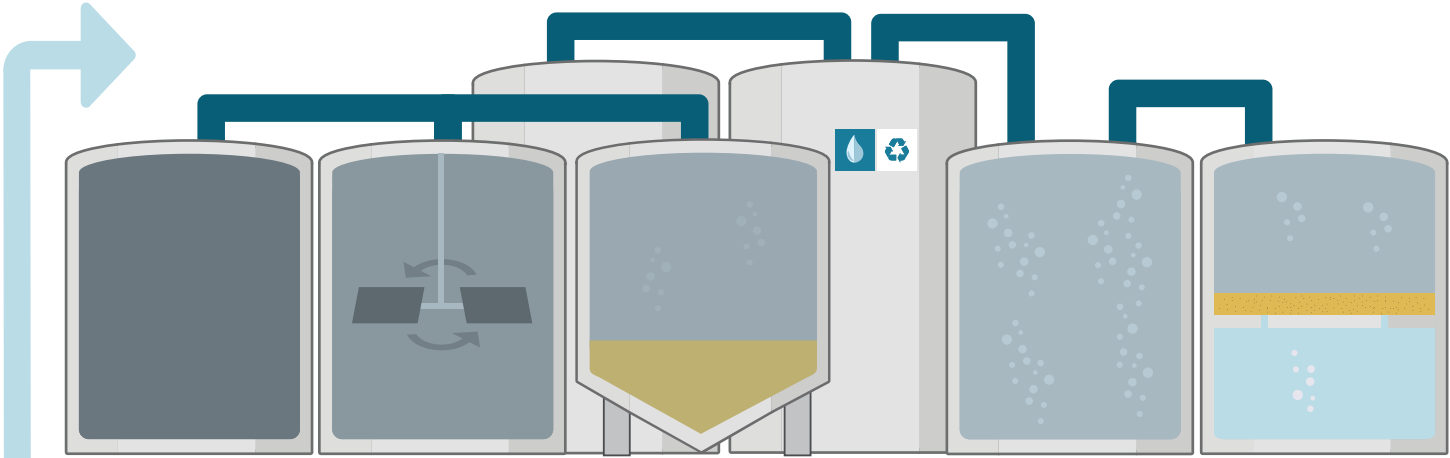
All collected wastewater should be sent to the treatment plant for treatment prior to reuse or discharge.



## EVERY TEXTILE INDUSTRY FACILITY SHOULD HAVE AN EFFLUENT TREATMENT PLANT

Treat all wastewater leaving the facility, including water collected after washing and cleaning.

Small and affordable effluent treatment plants can be assembled using locally available equipment. 



**1 EQUALIZATION**  
Uniformization of influent pH, concentration and temperature.

**2 PHYSIO-CHEMICAL TREATMENT**  
Coagulation and flocculation

**3 SEDIMENTATION**  
Removes suspended solids from wastewater.

**4 BIOLOGICAL TREATMENT**  
Aerobic and anaerobic

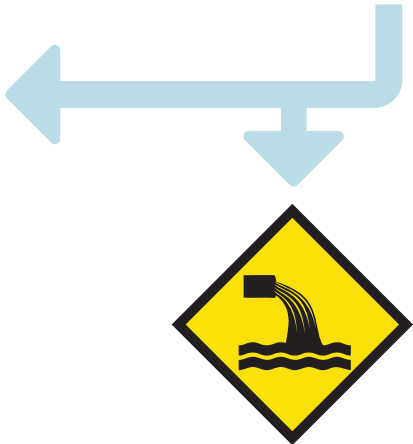
**5 DISINFECTION & FILTRATION**  
Removes any remaining bacteria from water making it ready for reuse or discharge.



The sludge should be disposed of in an approved hazardous waste landfill.



Treated wastewater that has been disinfected and filtered can be reused for cleaning floors and some processes. Reduce water usage to save money.



Regularly monitor treated water being discharged for pH and representative heavy metals.

# Wastewater regulations

Textile industry firms should be aware of and comply with the following basic legal requirements for the operations with a special focus on waste and wastewater.

| Permit/License/Certificate   | Law/Regulations  | Fee (UGX)  |  |
|--|--|--|--|
| <b>EIA Certificate of Approval</b><br>(for new, expansions or refurbishments)                                    | <ul style="list-style-type: none"> <li>National Environment Act Cap 153</li> <li>National Environment (Impact Assessment) Regulations, 1998</li> </ul>   | If project/business cost is:   |  |
|  |  | <ul style="list-style-type: none"> <li>&lt;50M</li> <li>50M-100M</li> <li>100M-250M</li> <li>250M-500M</li> <li>500M-1B</li> <li>1B -5B</li> <li>&gt;5B</li> </ul> | <ul style="list-style-type: none"> <li>250,000</li> <li>500,000</li> <li>750,000</li> <li>1,000,000</li> <li>1,250,000</li> <li>2,000,000</li> <li>0.1% of the project cost</li> </ul> |
| Note: The developer also incurs costs for consultant who carries out an EIA                                      |  |  |  |
| <b>Pollution License</b><br>(for activities polluting the environment in excess of standards)                    | <ul style="list-style-type: none"> <li>National Environment Act Cap 153</li> </ul>   | Determined in accordance with Polluter Pays Principle  |  |
| <b>License to Own and Operate a Wastewater Treatment and Disposal Plant</b>                                      | <ul style="list-style-type: none"> <li>National Environment (Waste) Management Regulations, 1999</li> </ul>  | Application fee<br>License fee   | 50,000<br>300,000  |
| <b>Wastewater Discharge Permit</b>   | <ul style="list-style-type: none"> <li>The Water Act, Cap 152</li> <li>The Water (Waste Discharge) Regulations SI 152-1</li> </ul>   | Permit processing fees<br>Annual discharge fees  | 650,000<br>depend on volume and the biological and physiochemical quality of waste   |
| The charges range from 500,000 to 13,000,000 and are calculated based on the criteria set out in the regulations |  |  |  |
| <b>License for Waste Storage</b>   | <ul style="list-style-type: none"> <li>National Environment (Waste) Management Regulations, 1999</li> </ul>  | Application fee<br>License fee   | 50,000<br>200,000  |
| <b>License to Transport Waste</b><br>(this can be outsourced to licensed waste transporters)                     | <ul style="list-style-type: none"> <li>National Environment (Waste) Management Regulations, 1999</li> <li>Basel Convention on Trans-boundary movement of wastes, in case the batteries are imported</li> </ul> | Application fee<br>License fee   | 50,000<br>100,000  |
| Note: If transportation is outsourced, the cost depends on negotiation with the transporter                      |  |  |  |
| <b>Approval for Discharge into NWSC Sewerlines</b>   | <ul style="list-style-type: none"> <li>National Water and Sewerage Corporation Act, 1995</li> </ul>  | 80% of water bill<br>If not NWSC customer, water consumption is estimated  |  |

| Issuing Authority  | How to Apply  | Validity   |
|--|---|--|
| National Environment Management Authority (NEMA)   | Carry out an EIA (EIA conducted by certified EIA practitioners)<br><br>Submit to NEMA for consideration   | Has no validity period but it is subject to implementation of the project starting within five (5) years from the date of issuing an EIA certificate of approval |
| Pollution Licensing Committee (PLC) - NEMA   | Apply to PLC through NEMA as a secretariat with documents indicating the characteristics and quantity of wastewater that will be discharged   | Validity period – determined by the discharge i.e. how long will the facility require before rectifying the problem  |
| Pollution Licensing Committee (PLC) - NEMA   | Carry out an EIA and obtain an EIA Certificate of Approval<br><br>Apply to PLC through NEMA as a secretariat and attach the plant designs   | One (1) year   |
| Directorate of Water Resources Management (DWRM) - Ministry of Water and Environment (MWE) | Install a wastewater treatment plant<br><br>Start operations, and then: apply to Director, DWRM   | Permit duration between one (1) year and three (3) years   |
| Pollution Licensing Committee (PLC) – NEMA   | Apply to PLC through NEMA as a secretariat  | One (1) year   |
| Pollution Licensing Committee (PLC) - NEMA   | Apply to PLC through NEMA as a secretariat  | One (1) year   |
| National Water and Sewerage Corporation (NWSC)   | Must first pre-treat wastewater to meet standards for discharge into sewer lines, apply for approval from sewerage department or water quality management department, NWSC for connection | Open   |

## Periodic checks

Periodic checks and audits form an important part of a strategy to identify inefficient use of resources, inadequate management of waste, and opportunities for improvement. Increasing the efficiency of the utilization of resources, and reducing and avoiding the generation of pollutants is integral in protecting and improving the environment, ensuring the health of human beings, promoting sustainable development, and generating economic benefits to businesses.

Below is a summary of periodic checks that may be applicable for textile industries.

### MANDATORY CHECKS

| Type                                  | Responsible institution                            | Frequency | Fees  | Procedure   |
|---------------------------------------|--|-----------|---|---|
| <b>Compliance Environmental Audit</b> | National Environmental Management Authority (NEMA) | Annual    | No NEMA fees, only the Environmental Auditor needs to be paid | Engage a NEMA certified Environmental Auditor. (List available from NEMA) |

### RECOMMENDED CHECKS

| Type  | Responsible institution                 | Frequency            | Fees  | Procedure   |
|---|---|----------------------|---|---|
| <b>Adoption of Cleaner Production Practices</b> | Uganda Cleaner Production Centre (UCPC) | As and when required | UCPC fees depend on the size of the enterprise<br><br>Small - up to \$2600<br>Medium - up to \$3800<br>Large - up to \$6600 | Contact UCPC for more information   |
| <b>Self-Internal Audits</b>                     | Firm/NEMA                               | As and when required | Environmental Auditor fees - depend on the magnitude of work  | Engage a NEMA certified Environmental Auditor. (List available from NEMA) |

### National Environment Management Authority (NEMA)

Website: [www.nemaug.org](http://www.nemaug.org)  
Email: [info@nemaug.org](mailto:info@nemaug.org)  
Tel: +256 414 251068

### Directorate of Water Resources Management (DWRM) - Ministry of Water and Environment (MWE)

Website: [www.mwe.go.ug](http://www.mwe.go.ug)  
Tel: +256 414 505942

### Kampala Capital City Authority (KCCA)

Website: [www.kcca.go.ug](http://www.kcca.go.ug)  
Email: [info@kcca.go.ug](mailto:info@kcca.go.ug)  
Tel: +256 204 660800

### National Water and Sewerage Corporation (NWSC)

Website: [www.nwsc.co.ug](http://www.nwsc.co.ug)  
Email: [info@nwsc.co.ug](mailto:info@nwsc.co.ug)  
Tel: +256-313 315 100/312-260 414/5

### Uganda Cleaner Production Centre (UCPC)

Website: [www.ucpc.co.ug](http://www.ucpc.co.ug)  
Email: [ucpc@ucpc.co.ug](mailto:ucpc@ucpc.co.ug)  
Tel: +256 414 287938

## Licensed Waste Handlers

A full list of licensed waste handlers is available from NEMA. It can be downloaded from the NEMA website by going to <http://nema.go.ug/index.php/enviromental-mgt-complaine/waste-handlers> and clicking on “Click here to download full document”.

For further information or enquiries call the NEMA Hotline on any of the following numbers:

+256 414 251064

+256 414 251065

+256 414 251068

## Kampala Pollution Control Task Force

The Kampala Pollution Control Task Force (PTF) was formed with support from the GIZ RUWASS Programme. It comprises of Kampala Capital City Authority (KCCA), the Ministry of Water and Environment's Directorate of Water Resource Management (DWRM), the National Environmental Management Authority (NEMA), and National Water and Sewerage Corporation (NWSC). Uganda Manufacturers Association (UMA) and Uganda Cleaner Production Centre (UCPC) were also brought on board to enhance the engagement of the industrial sector through a Public-Private Dialogue (PPD) regarding Cleaner Production and improved resource recovery and reuse efficiency, with a focus on water, waste and energy optimization.

Key priorities of the task force include the following:

- **Information exchange and collaboration among key government institutions including: DWRM, KCCA, NEMA, NWSC to jointly engage the public and private sector about legal provisions and regulations on wastewater discharge and pollution control.**
- **Launch campaigns to enhance compliance to DWRM/NEMA permit regulations regarding wastewater discharge.**
- **Conduct joint industrial assessments and disseminate pollution monitoring information to the public and private sector.**
- **Engage potential priority polluters and the private sector in general in a dialogue with the public sector through the Kampala Public – Private Wastewater Dialogue on wastewater management and pollution control to increase awareness and trust.**

For more information please visit the PTF webpage at:

<http://www.kcca.go.ug/pollution-control-task-force>



Also available in this series are Industrial Wastewater Management Guides  
for the following industries:

Battery Recycling Industries  
Paint Industries  
Soft Drink Industries  
Dairy Industries  
Garages  
Abattoirs  
Steel Rolling Mills

