

# Industrial Wastewater Management Guide

## **BATTERY RECYCLING INDUSTRIES**

Kampala Pollution Control Task Force





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

The objectives of the Guide are:



**To help better understanding of the need for wastewater management and the associated benefits.**



**To provide battery recycling facilities with a reference tool for managing wastewater.**



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

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 battery recycling 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

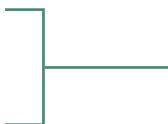
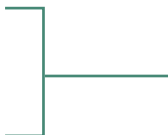
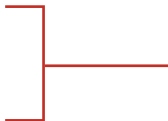
Toxic pollutants in wastewater contaminate surface water and ground water, and may end up in the food chain, exposing people to serious public health issues.

## 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.

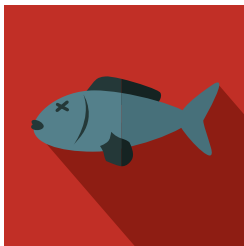
In many cases pollutants in wastewater represent wasted raw materials. When properly handled, these can be recovered and reused leading to cleaner wastewater and cost savings on materials for companies.

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.





Almost all the surface and ground water In Kampala is polluted and the city's inhabitants are therefore exposed to serious health risks associated with water pollution. According to Ministry of Health and KCCA, the recent outbreak of typhoid was partly due to polluted surface and ground water.



If not properly treated, wastewater from battery recycling may contain lead (Pb). Lead in water bodies such as lakes and rivers may enter the human food chain through bioaccumulation in vegetables, meat and especially fish exposed to polluted water. In humans, lead affects the brain and central nervous system and may cause coma, convulsions and even death. In children, exposure to lead may additionally cause mental retardation and behavioral disruption.

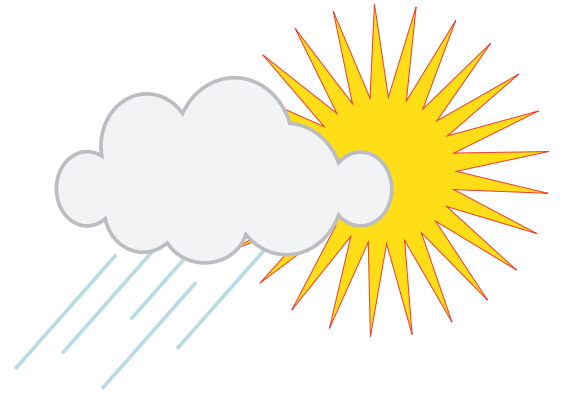


In 2011, Crown Beverages Ltd invested \$ 18,495 (about UGX 47.2M) to procure and install a 114,000 litre tank for water harvesting. As a result, the company reduced annual tap water consumption by 4,433,000 litres, saving over \$5,400 (about UGX13.7M) annually)



In 2010, Leather Industries of Uganda in Jinja invested \$50,000 (about UGX125M) to install a chrome recycling plant. The recycling plant treats the wastewater and discharges the chrome into a regeneration tank from where it is pumped back into the factory for reuse. As a result, the wastewater discharged from the factory is now almost free of chrome and the company has saved over 40% on chrome costs.

# What to avoid



## LACK OF PROTECTION FROM SUN AND RAIN

UV rays and water may damage the battery casings

→ Leaking battery acid

## BATTERIES NOT PROPERLY STACKED

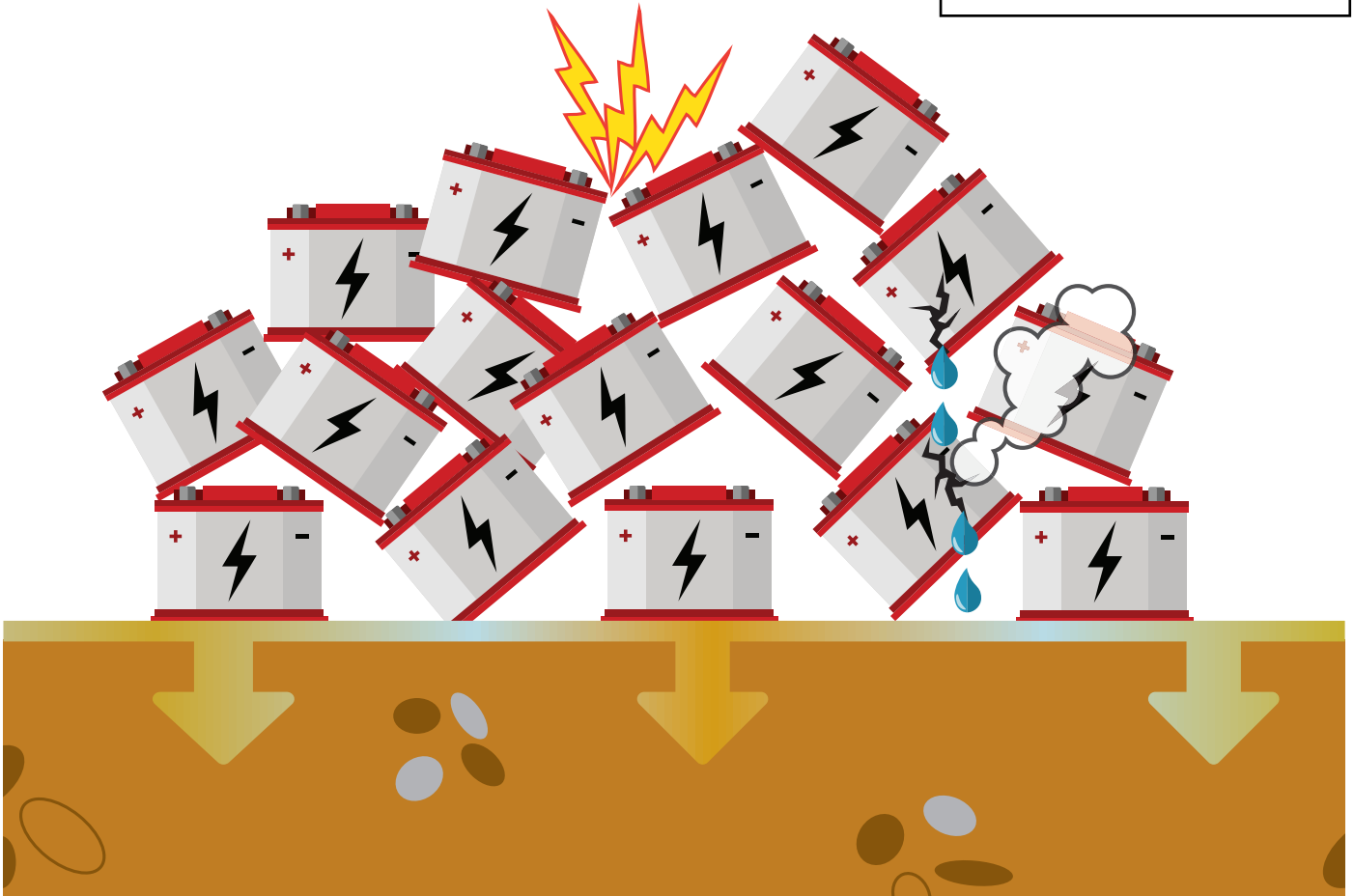
May cause arcing (sparks) between battery terminals

→ Risk of fire and/or damage

## DAMAGED AND UNDAMAGED BATTERIES STORED TOGETHER

Leaking acid from damaged batteries may leak onto undamaged batteries

→ Corrosion and additional leakages



## BATTERIES NOT STORED ON IMPERMEABLE GROUND COVER

Leaking battery acid seeps into the groundwater

→ Public health issues

## BATTERIES NOT STORED IN LEAK-PROOF CONTAINER

Battery acid and lead particles may leak into the environment

→ Environmental damage

## 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.

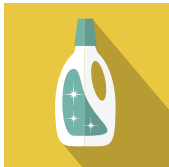
### 2 | Ensuring wastewater is as clean as possible

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



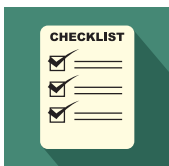
Use pre-clean and dry cleanup methods before wet cleaning. This reduces the volume of water used and the volume of wastewater generated.



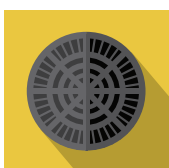
Use the minimum amount of cleaning agents and detergents. This saves on the costs of cleaning agents in addition to minimizing the amount of cleaning agent pollution in wastewater.



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.



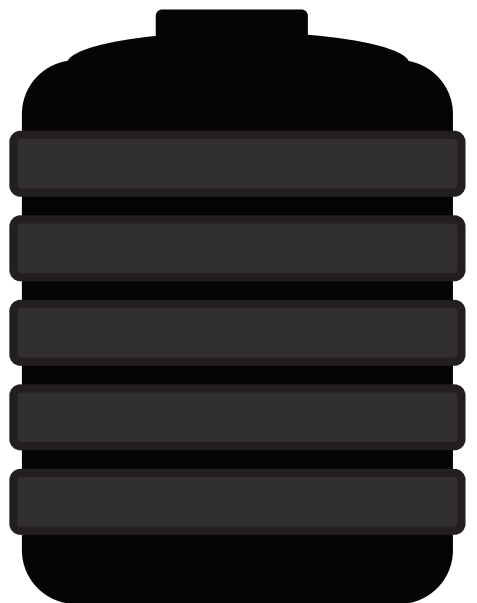
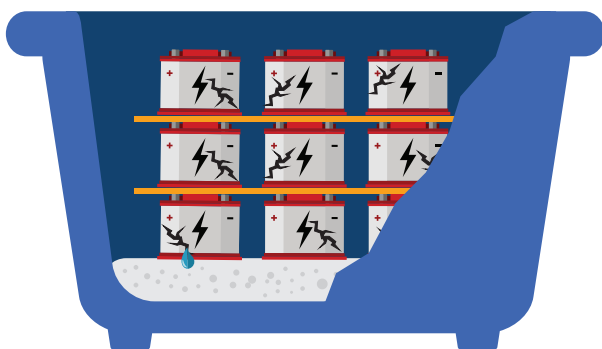
Fit drains with screen and/or traps to prevent solid materials from entering the effluent system.

# 2 | BEST PRACTICE AND WASTEWATER TREATMENT



The battery storage area should have an impermeable ground cover, preferably acid resistant concrete, to retain any leakage.

Ensure leakages are directed to a collecting container, along with rain water and water from cleaning and/or washing.



Store leaking batteries separate from non-leaking ones in a leak-proof container on top of a layer of baking soda or lime. Do NOT add the baking soda or lime directly to the battery case because the acid in the cracked battery may react and splash, causing acid to be spilled.

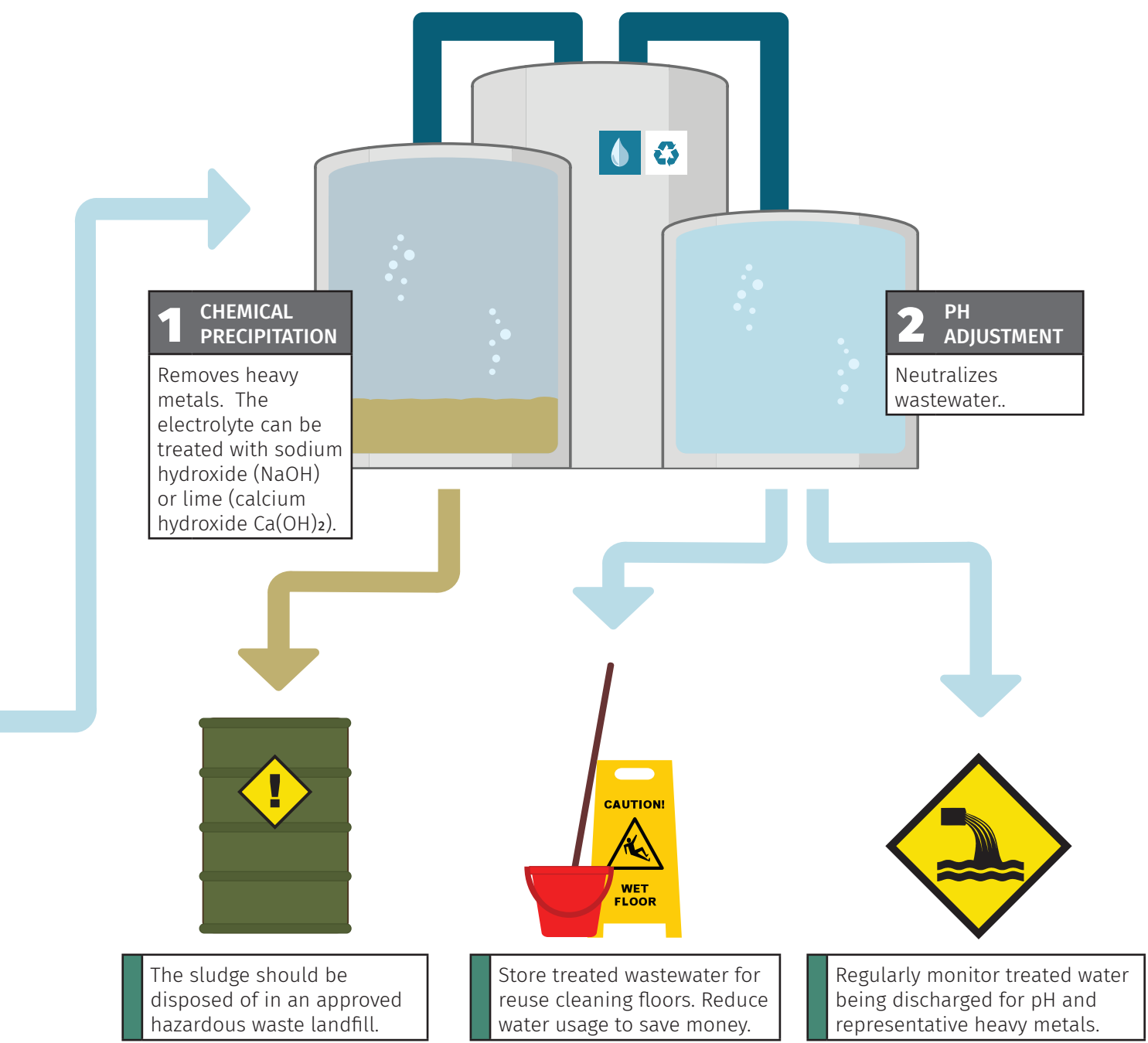
All collected wastewater should be sent to the treatment plant for treatment prior to reuse or discharge.



## EVERY BATTERY RECYCLING 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. 



# Wastewater regulations

Battery recycling firms should be aware of and comply with the following legal requirements regulating the treatment of wastewater.

Permit/License/Certificate	Law/Regulations	Fee (UGX)															
<b>EIA Certificate of Approval</b> (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: <table border="1"> <tr> <td>&lt;50M</td> <td>250,000</td> </tr> <tr> <td>50M-100M</td> <td>500,000</td> </tr> <tr> <td>100M-250M</td> <td>750,000</td> </tr> <tr> <td>250M-500M</td> <td>1,000,000</td> </tr> <tr> <td>500M-1B</td> <td>1,250,000</td> </tr> <tr> <td>1B -5B</td> <td>2,000,000</td> </tr> <tr> <td>&gt;5B</td> <td>0.1% of the project cost</td> </tr> </table>		<50M	250,000	50M-100M	500,000	100M-250M	750,000	250M-500M	1,000,000	500M-1B	1,250,000	1B -5B	2,000,000	>5B	0.1% of the project cost
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>5B	0.1% of the project cost																
		Note: The developer also incurs costs for consultant who carries out an EIA															
<b>Pollution License</b> (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	50,000														
		License fee	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	650,000														
		Annual discharge fees	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	50,000														
		License fee	200,000														
<b>License to Transport Waste</b> (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	50,000														
		License fee	100,000														
		Note: If transportation is outsourced, the cost depends on negotiation with the transporter															
<b>Suitability of Premises Certificate</b>	<ul style="list-style-type: none"> <li>Public Health Act</li> </ul>	Fee	300,000														
<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 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)  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  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  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
Kampala Capital City Authority (KCCA)	Apply to KCCA for certification  KCCA inspects and makes a decision	One (1) calendar 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 battery recycling 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  Small - up to \$2600 Medium - up to \$3800 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 256068

### 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

## Hazardous Waste Disposal Facilities

### EnviroServ Uganda

Website: [www.enviroserv.co.za](http://www.enviroserv.co.za)  
Email: [jenniferb@enviroserv.co.za](mailto:jenniferb@enviroserv.co.za)  
Tel: +256 712 644 955 (Mobile)  
Tel: +256 312 314 391/2/3 (Office)

### Luwero Industries

Website: [www.luweroindustries.com](http://www.luweroindustries.com)  
Email: [info@luweroindustries.com](mailto:info@luweroindustries.com)  
Tel: +256 39 221154,  
Fax: +256 39 280152

### Epsilon Uganda

Website: [www.epsilonafrica.com](http://www.epsilonafrica.com)  
Email: [epsilonugandalimited@gmail.com](mailto:epsilonugandalimited@gmail.com)  
Tel: +256 414 252076  
Tel: +256 312 514790

## 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.**



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

Paint Industries  
Soft Drink Industries  
Textile Industries  
Dairy Industries  
Garages  
Abattoirs  
Steel Rolling Mills

