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

The objectives of the Guide are:

- To provide steel rolling mills with a reference tool for managing wastewater.
- To help 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.

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 steel rolling mills 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 Initiative (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.
Heavy metals associated with steel rolling mills may contaminate surrounding soils and run-off may wash away these heavy metals into water bodies. Heavy metals in soil and water may be uptaken by plants and other animals and may end up in the human food chain thereby affecting public health.

The Ministry of Water and Environment’s Department for Water Resources Management (DWRM) reported increased loads of heavy metals in Lake Victoria’s Murchison Bay which is a threat to public health as most heavy metals are known to cause cancer, brain damage and kidney damage among other effects.

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

INEFFICIENT CLEANING METHODS
Wet cleaning used when dry cleaning alternatives are available.
➡ More wastewater generated

SCRAP NOT STORED UNDER COVER
Metals are exposed to rain and other elements.
➡ Contamination of storm water

WASTE PRODUCTS NOT RECYCLED
Slag from smelting not reused for landfill or road construction.
➡ Recycling opportunity wasted

SCRAP NOT STORED ON IMPERMEABLE GROUND COVER
Metal particles seep into the groundwater
➡ Public health issues

NO METAL REGENERATION
No investment in capturing and reusing metals and other inputs from waste sludge
➡ Inefficiency & financial loss
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.
Prepare a plant wide water recycling plan to maximize efficiency of water use.

Install adequate oil interceptors in the drainage system.

Dry techniques for removal of dust from plant equipment and premises should be used where possible.

Install adequate oil interceptors in the drainage system.

Cooling water should be recycled within the process and should never be allowed to join the effluent stream.

Reduce effluent volume and minimize contaminant loading of the waste streams through optimization of metal cleaning process (scales, organic contaminants and rust removal).

Rinse water, contaminated storm water and waste water from wet cleaning should be collected.

Rinse water, contaminated storm water and waste water from wet cleaning should be collected.

Recover process inputs wherever possible. For example, rinse water from acid pickling should be directed to an acid regeneration plant.

All collected wastewater should be sent to the treatment plant for treatment prior to reuse or discharge.
EVERY STEEL ROLLING MILL SHOULD HAVE AN EFFLUENT TREATMENT PLANT

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

- **Chemical Precipitation**: Removes heavy metals.
- **pH Adjustment**: Neutralizes wastewater.
- **Sedimentation**: Removes suspended solids from wastewater.
- **Disinfection & Filtration**: Removes any remaining solids from water making it ready for reuse or discharge.

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

Store treated wastewater for reuse cleaning floors. Reduce water usage to save money.

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

Small and affordable effluent treatment plants can be assembled using locally available equipment.
Steel rolling mills should be aware of and comply with the following basic legal requirements for the operations with a special focus on waste and wastewater.

<table>
<thead>
<tr>
<th>Permit/License/Certificate</th>
<th>Law/Regulations</th>
<th>Fee (UGX)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EIA Certificate of Approval</strong></td>
<td>• National Environment Act Cap 153</td>
<td>If project/business cost is:</td>
</tr>
<tr>
<td>(for new, expansions or refurbishments)</td>
<td>• National Environment (Impact Assessment) Regulations, 1998</td>
<td>&lt;50M: 250,000</td>
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<td></td>
<td></td>
<td>50M-100M: 500,000</td>
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<td></td>
<td></td>
<td>100M-250M: 750,000</td>
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<tr>
<td></td>
<td></td>
<td>250M-500M: 1,000,000</td>
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<td></td>
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<td>500M-1B: 1,250,000</td>
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<td></td>
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<td>1B -5B: 2,000,000</td>
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<tr>
<td></td>
<td></td>
<td>&gt;5B: 0.1% of the project cost</td>
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<td></td>
<td></td>
<td>Note: The developer also incurs costs for consultant who carries out an EIA</td>
</tr>
<tr>
<td><strong>Pollution License</strong></td>
<td>• National Environment Act Cap 153</td>
<td>Determined in accordance with Polluter Pays Principle</td>
</tr>
<tr>
<td>(for activities polluting the environment in excess of standards)</td>
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<td></td>
</tr>
<tr>
<td><strong>License to Own and Operate a Wastewater Treatment and Disposal Plant</strong></td>
<td>• National Environment (Waste) Management Regulations, 1999</td>
<td>Application fee 50,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>License fee 300,000</td>
</tr>
<tr>
<td><strong>Wastewater Discharge Permit</strong></td>
<td>• The Water Act, Cap 152</td>
<td>Permit processing fees 650,000</td>
</tr>
<tr>
<td></td>
<td>• The Water (Waste Discharge) Regulations SI 152-1</td>
<td>Annual discharge fees depend on volume and the biological and physiochemical quality of waste</td>
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<td></td>
<td></td>
<td>The charges range from 500,000 to 13,000,000 and are calculated based on the criteria set out in the regulations</td>
</tr>
<tr>
<td><strong>License for Waste Storage</strong></td>
<td>• National Environment (Waste) Management Regulations, 1999</td>
<td>Application fee 50,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>License fee 200,000</td>
</tr>
<tr>
<td><strong>License to Transport Waste</strong></td>
<td>• National Environment (Waste) Management Regulations, 1999</td>
<td>Application fee 50,000</td>
</tr>
<tr>
<td>(this can be outsourced to licensed waste transporters)</td>
<td>• Basel Convention on Trans-boundary movement of wastes, in case the batteries are imported</td>
<td>License fee 100,000</td>
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<tr>
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<td>Note: If transportation is outsourced, the cost depends on negotiation with the transporter</td>
</tr>
<tr>
<td><strong>Approval for Discharge into NWSC Sewerlines</strong></td>
<td>• National Water and Sewerage Corporation Act, 1995</td>
<td>80% of water bill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If not NWSC customer, water consumption is estimated</td>
</tr>
<tr>
<td>Issuing Authority</td>
<td>How to Apply</td>
<td>Validity</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>National Environment Management Authority (NEMA)</td>
<td>Carry out an EIA (EIA conducted by certified EIA practitioners)</td>
<td>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</td>
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<td></td>
<td>Submit to NEMA for consideration</td>
<td></td>
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<tr>
<td>Pollution Licensing Committee (PLC) - NEMA</td>
<td>Apply to PLC through NEMA as a secretariat with documents indicating the characteristics and quantity of wastewater that will be discharged</td>
<td>Validity period – determined by the discharge i.e. how long will the facility require before rectifying the problem</td>
</tr>
<tr>
<td>Pollution Licensing Committee (PLC) - NEMA</td>
<td>Carry out an EIA and obtain an EIA Certificate of Approval</td>
<td>One (1) year</td>
</tr>
<tr>
<td></td>
<td>Apply to PLC through NEMA as a secretariat and attach the plant designs</td>
<td></td>
</tr>
<tr>
<td>Directorate of Water Resources Management (DWRM) - Ministry of Water and Environment (MWE)</td>
<td>Install a wastewater treatment plant</td>
<td>Permit duration between one (1) year and three (3) years</td>
</tr>
<tr>
<td></td>
<td>Start operations, and then: apply to Director, DWRM</td>
<td></td>
</tr>
<tr>
<td>Pollution Licensing Committee (PLC) – NEMA</td>
<td>Apply to PLC through NEMA as a secretariat</td>
<td>One (1) year</td>
</tr>
<tr>
<td>Pollution Licensing Committee (PLC) - NEMA</td>
<td>Apply to PLC through NEMA as a secretariat</td>
<td>One (1) year</td>
</tr>
<tr>
<td>National Water and Sewerage Corporation (NWSC)</td>
<td>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</td>
<td>Open</td>
</tr>
</tbody>
</table>
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 steel rolling mills.

### MANDATORY CHECKS

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

### RECOMMENDED CHECKS

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

National Environment Management Authority (NEMA)
Website: www.nemaug.org
Email: info@nemaug.org
Tel: +256 414 251068

Directorate of Water Resources Management (DWRM) - Ministry of Water and Environment (MWE)
Website: www.mwe.go.ug
Tel: +256 414 505942

Kampala Capital City Authority (KCCA)
Website: www.kcca.go.ug
Email: info@kcca.go.ug
Tel: +256 204 660800

National Water and Sewerage Corporation (NWSC)
Website: www.nwsc.co.ug
Email: info@nwsc.co.ug
Tel: +256-313 315 100/312-260 414/5

Uganda Cleaner Production Centre (UCPC)
Website: www.ucpc.co.ug
Email: 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-complaince/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
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
- Textile Industries
- Dairy Industries
- Garages
- Abattoirs