Ø ZDHC

Pilot Study:

Dissolved Pulp Guidelines

Enhancing Sustainable Chemical Management in Dissolved Pulp Facilities

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Background

Dissolved pulp is a critical feedstock for the production of Man-Made Cellulosic Fibres (MMCFs), serving as an upstream process in MMCF manufacturing. Like MMCF production, the dissolved pulp process is highly reliant on the use of chemicals, making chemical management a key focus area for sustainable production.

In 2018, ZDHC expanded its Roadmap to Zero Programme to include MMCFs, marking the programme's first fibre production segment. The publication of the ZDHC Dissolved Pulp Guidelines V1.0 represents a significant step further down the MMCF production chain, aligning with ZDHC's 'end-to-end' approach to sustainable supply chain management.

Building on the foundation of the ZDHC MMCF Guidelines V2.2, the ZDHC Dissolved Pulp Guidelines V1.0 aims to enhance transparency and promote responsible production practices across the entire MMCF supply chain; from wood sourcing to MMCF production.

This document is a key initiative by ZDHC to address the critical aspects of chemical use, recovery and discharge in wood-based dissolved pulp manufacturing, supporting sustainable and responsible practices within the industry.

Before initiating the full-scale implementation of the guidelines, ZDHC conducted a pilot project with select dissolved pulp facilities. During the pilot, participating facilities worked with ZDHC to evaluate their current chemical management practices, identify gaps and gather actionable insights to ensure practical applicability for industry-wide adoption.

Objective

The primary objective of this pilot study is to assess the alignment of selected pulp facilities with sustainable chemical management practices as outlined in the ZDHC Dissolved Pulp Guidelines V1.0 and to identify actionable opportunities for improvement. Specifically, the pilot aims to:

- **Assess Conformance**: Determine the level of conformance with the ZDHC Dissolved Pulp Guidelines V1.0 across the selected pulp facilities.
- **Identify Gaps**: Identify any gaps in current chemical management practices in relation to the requirements in ZDHC Dissolved Pulp Guidelines V1.0.
- **Gather Insights**: Collect detailed insights into each facility's current practices, identify where improvements are required and how facilities can prepare and demonstrate their performance once the actual implementation starts.

Methodology

The methodology for conducting the pilot study involved the following steps:

1. **Survey Design**: A comprehensive survey was developed based on the specific requirements of the ZDHC Dissolved Pulp Guidelines V1.0. It was designed to assess various aspects of sustainable chemical management including Input feedstock sourcing, chemical consumption and chemical recovery as well as environmental impacts in terms of wastewater and air emissions.
2. **Facility Selection**: Six pulp facilities were selected for participation in the pilot study as detailed in the 'requirements for participation'. These facilities were chosen to provide a representative sample of the various pulping processes and geographical locations.
3. **Data Collection**: The survey was shared with the six selected pulp facilities. Each facility was asked to complete the survey and provide relevant documentation to support their responses. The documentation included, among other items, forestry certification, feedstock sourcing policies, SOPs, legal permits, internal chemical process flow diagrams, recovery records and calculations, ETP diagrams, internal or external wastewater and air emission reports.
4. **Data Analysis**: The responses and supporting documents were reviewed and analysed internally to assess each facility's conformance with the ZDHC Dissolved Pulp Guidelines V1.0. The analysis focused on identifying areas where facilities met or exceeded the guidelines as well as areas where improvements were needed.

Purpose

The purpose of this pilot study is to:

- **Benchmark Conformance:** The pilot will establish a benchmark for conformance with the ZDHC Dissolved Pulp Guidelines V1.0 within the dissolved pulp industry, using the selected facilities as a representative sample. This includes checking whether the guidelines are stringent yet realistic, with the aim of continuously driving the industry towards improved impacts.
- **Support Industry Adoption and Implementation**: The pilot will provide valuable insights and feedback to both the participating facilities and the broader dissolved pulp and MMCF value chain, facilitating the adoption and implementation of sustainable chemical management practices. This is with the aim to help pulp facilities plan the implementation of the guidelines and prepare themselves to effectively meet the necessary requirements.
- **Promote Environmental Sustainability**: The pilot will contribute to the effort of promoting sustainability in the dissolved pulp industry by encouraging facilities to adopt best practices in chemical management and reduce their environmental impact.

Pilot Participation Requirements

Eligibility Criteria:

- Conformance with local legal regulations (not verified).
- Active participation in the ZDHC Roadmap to Zero Programme.
- Willingness to provide detailed records and documentation.

Expectations:

- Completing the survey thoroughly and accurately.
- Providing relevant documentation to support responses (e.g., feedstock certification records, chemical usage and recovery records, internal or external wastewater and air test reports).
- Availability for follow-up questions or clarification during the data analysis phase.

Sustainable Chemical Management Requirements

Pulp facilities should implement a system to meet the following requirements under Sustainable Chemical Management (SCM).

INPUT MANAGEMENT	
Input Feedstock Sourcing	Facilities should meet one or more requirements for input feedstock as below: A. Conduct a Canopy-style verification audit to assess the risk of sourcing from ancient and endangered forests and other controversial sources. B. Source inputs certified by the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC). C. Ensure transparency throughout the value chain through a proper chain of custody system that includes, but is not limited to, blockchain-based traceability or the use of traceability tools, e.g. FSC Trace. D. To encourage circularity and reduce reliance on virgin wood, facilities could increase the amount of alternative fibre feedstock they source. This includes, but is not limited to, pre- and post-consumer textile waste and agricultural waste.
Input Chemical Management	Facilities should: A. Monitor and record chemicals used in dissolved pulp production, including chemicals used for cooking and bleaching. B. Calculate the consumption of each chemical per air-dry tonne of pulp to meet the maximum allowable consumption.
PROCESS MANAGEMENT	
Chemical Recovery	Facilities should implement chemical recovery processes and initiate the following actions under process management: A. Maintain a detailed record of chemical recovery activities and calculations based on the type of pulping process. B. Meet the chemical recovery requirement as per the guidelines.
OUTPUT MANAGEMENT	
Wastewater	A. Conformance with local regulations: Facilities are expected to meet local wastewater parameter regulations mandated by local legal authorities to ensure that their discharged wastewater does not compromise the quality of the receiving environment. B. Wastewater testing and reporting ● Test wastewater according to the parameters and limit values given in the guidelines through ZDHC Approved Wastewater Testing Laboratories. (Accredited third-party labs were utilised for the pilot.) ● Calculate load-based wastewater parameters, where applicable. C. Sludge management

	• Meet the local regulations for sludge testing (if any) and disposal. • Report the major sludge disposal pathway used by them as per the pathways detailed in the guidelines.
Air emissions	A. Conformance with local regulations • Have a valid licence to operate. • Quantify, track and report emissions of all parameters, consistent with applicable local regulations (not verified). B. Air emission testing and reporting <u>For load-based air emissions:</u> 1. Monitor and measure the Total Suspended Particles/dust, SO_2 as S, NOx as NO_2, TRS as S. 2. Calculate and report load-based air emissions of these parameters in kilograms per air-dry tonne (kg/ADT) of pulp produced. <u>For ambient air emissions:</u> 1. Monitor, measure and report the following ambient air emission parameters SO_2, NO_2, $PM_{2.5}$, PM_{10} outside the facility.

Performance Metrics

Facility	PERFORMANCE METRICS				
	INPUT		PROCESS	OUTPUT	
	Feedstock Sourcing	Chemical management	Chemical recovery	Wastewater	Air emissions
Facility A					
Facility B					
Facility C					
Facility D					
Facility E					
Facility F					

High Performance	Meets or exceeds 80% of the requirements
Moderate Performance	Meets more than 50% but less than 80% of the requirements.
Low Performance	Meets up to 50% of the requirements.

Key Findings

The participating facilities showed an encouraging level of conformance with sustainable chemical management requirements as outlined in the guidelines. As project partners, they were instrumental in identifying areas for improvement to align more closely with the ZDHC Dissolved Pulp Guidelines V1.0.

- **Opportunities for Advancement:**
    - Wastewater Management: While most facilities meet several standards, there is an opportunity to consistently improve performance in wastewater testing to fully achieve the requirements.
    - Air Emissions: Enhancing the management of load-based air emissions presents a clear opportunity for improvement and demonstrates the facilities' potential to further reduce environmental impacts.
- **Positive Steps in Chemical Recovery:**
    - The implementation of chemical recovery processes across facilities is a strong foundation for sustainable practices.
    - To build on this progress, facilities can adopt a more structured approach to recordkeeping. Maintaining detailed and systematic records of recovery percentages will enable better tracking, reporting and continuous improvement.
    - Current practices for tracking chemical procurement and usage are already in place, which positions the facilities well to enhance the level of detail and organisation in their reporting.

Recommendations

- It is recommended that pulp facilities establish a more structured and standardised record-keeping system for documenting chemical recovery percentages.
- Regular monitoring and reporting of wastewater quality should be implemented to ensure facilities meet foundational requirements and continuously improve.
- For load-based air emissions, it is crucial that facilities adopt more stringent control measures to reduce emissions. This may involve the installation of advanced air pollution control technologies, such as scrubbers or electrostatic precipitators, as well as the adoption of best practices in process optimisation to minimise emissions at the source.
- Facilities should establish a comprehensive monitoring and reporting system for air emissions by reviewing the best available technologies, which will allow for better tracking of emission levels.

Conclusion

The pilot study has provided valuable insights into the current practices of participating pulp facilities, identifying both areas of conformance and opportunities for improvement in sustainable chemical management as outlined in the ZDHC Dissolved Pulp Guidelines V1.0.

While satisfactory levels of conformance were observed in several aspects, the study also highlighted critical areas requiring attention, particularly in wastewater performance and load-based air emissions management. This underscores the need in these areas for enhanced focus and systematic improvements .

The guidelines have demonstrated their potential to effectively drive the dissolved pulp sector toward improved sustainable chemical management practices. By addressing the gaps as identified, participating facilities can make meaningful progress in aligning with these standards.

In conclusion, the pilot both validated the relevance of the guidelines and provided actionable recommendations to help facilities enhance their overall environmental performance.

Acknowledgements

We extend our sincere gratitude to all participating pulp facilities for their invaluable co-operation and commitment throughout this pilot study. Their willingness to engage in this process, provide detailed insights and share critical data has been instrumental in advancing our understanding of sustainable chemical management practices within the industry.