



WHITE PAPER
PROPRIETARY ORGANIC CHEMICAL AND PROCESS ENGINEERED FOR THE TREATMENT AND
BENEFICIAL REUSE OF BIOSOLIDS

TO: Brady Lessard
Economic Development Director
City of Sanford, Florida

FROM: David Clark
CEO

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RE: Wastewater Treatment Issues in the City of Sanford

MSDS is pleased to present MT3.0™ and our latest addition MT5.0™, both Patent Pending and is a proprietary organic chemical and process engineered for the treatment and beneficial reuse of biosolids, ensuring zero environmental impact. MT3.0™ and MT5.0™ is formulated to generate a True, EQ, and odor-free Class A biosolid. The chemical reactions between MT3.0™, MT5.0™ and biosolids produces a filter cake that is free of PFAS and PFOS, pathogen- and virus-free, with an organic material reduction exceeding 40%. Furthermore, the resulting filter cake is devoid of heavy metals and suitable for beneficial reuse

The following **analytical reports** detail the exceptional outcomes achieved through the application of MT3.0 to biosolids:

ANALYTICAL REPORTS:

Initial Fecal Coliform Levels

For reference, Class A Biosolids have fecal coliform levels less than 1000 MPN, while Class B Biosolids exceed 1000 MPN. The initial raw biosolids at the Washingtonville WWTP had a fecal coliform level of 38,730 MPN, which is typical for many WWTPs, often exceeding 30,000 MPN.

Fecal Coliform - Starting Point Before Application of MT3.0™ at Washingtonville WWTP

<https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:1b132af9-89b2-47c4-96c8-bf5c56d633f9>

Fecal Coliform - After Application of MT3.0™ at Washingtonville WWTP
Results - Fecal Coliform Reduction

The results demonstrate a total reduction in fecal coliform levels post- MT3.0™ treatment:

- Before MT3.0: 1,986 MPN
- After 10 minutes: 10 MPN
- After 20 minutes of mixing: <1 MPN

<https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:f5194e9b-e953-4377-a136-a511a4566812>

Metals Discharge Lab Results

<https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:dc0703a4-53f3-4a05-ba43-e6a9ac19d2e1>

Environmental Impact - Metals Discharge

The findings indicate "No Environmental Footprint" regarding the effluent discharge of metals.

PFOS and PFAS Bonds Broken

The results below indicate that four samples, encompassing all variations of Microbial TEA, were analyzed. Notably, sample #1 Soil significantly exceeded our expectations by demonstrating complete bond disruption.

<https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:84a81b66-7d9b-474d-9752-a040a0914849>

OVERVIEW

MSDS has compiled a comprehensive overview of biosolids gasification, addressing the challenges associated with heavy metals and organic materials within biosolids, and highlighting the advantages of our MT3.0™ pretreatment technology. The integration of MT5.0™ further expands our capabilities, enabling access to all aspects of beneficial reuse. Gasification is a key focus in this context as a recipient of our treated biosolids, reflecting the current operational model. We believe there is a perfect synergy between our two processes, which significantly enhances our adaptability to various treatment facilities.

1. Overview of Biosolids Gasification

Gasification is a thermochemical process that converts carbon-rich materials, such as biosolids, into a clean, combustible fuel gas called syngas. Unlike incineration, gasification operates in a controlled, high-temperature, limited-oxygen environment and involves four primary stages: drying, pyrolysis, combustion, and reduction.

2. Problem Definition: Heavy Metals and Organic Materials in Biosolids

Heavy Metals: Biosolids often contain heavy metals like cadmium, lead, mercury, chromium, copper, nickel, arsenic, and zinc, primarily from industrial discharges and municipal wastewater. These metals pose environmental contamination risks, complicate waste disposal, and can damage gasification equipment.

Organic Materials: Biosolids comprise natural organic compounds (carbohydrates, proteins, lipids) and synthetic organic compounds. While gasification is designed to convert organic matter into syngas, the specific composition of organics significantly impacts reaction mechanisms, syngas quality, and the formation of problematic byproducts like tars.

3. Benefits of Eliminating Heavy Metals and Organics Pre-Gasification

Enhanced Syngas Quality: Removing heavy metals and reducing organic material improves syngas yield, heating value, and hydrogen content, leading to more efficient energy recovery.

Expanded Use of Biochar: Heavy-metal-free biochar has diverse applications, including soil amendment, water filtration, carbon sequestration, and as a component in building materials.

Equipment Protection: Reducing heavy metals prevents damage to gasification equipment and minimizes maintenance issues.

Environmental Impact: Pretreatment significantly reduces air pollution and greenhouse gas emissions, diverting waste from landfills and producing fewer pollutants compared to combustion.

4. MSDS Environmental's MT3.0™ Solution

Our proprietary MT3.0™ wastewater treatment compound acts as a pre-gasification step, offering substantial advantages:

Significant Reduction in Emissions and Waste: MT3.0™ treats biosolids at their source, achieving a 90% reduction in organic and solid material. This prevents harmful gases from forming and creates a cleaner feedstock for gasification.

Improved Gasification Efficiency: The microbial pretreatment process breaks down recalcitrant lignin, increasing the availability of cellulose and hemicellulose for gasification, leading to more efficient thermal conversion.

Cleaner Syngas Production: MT3.0™ substantially reduces tar formation, resulting in cleaner syngas suitable for engines, turbines, or downstream chemical synthesis.

Enhanced Syngas Composition: The pretreatment enriches syngas with valuable components, such as biohydrogen.

This approach offers a cost-effective and sustainable solution for producing clean energy and valuable chemical products from waste biomass. By utilizing industrial and domestic waste as a microbial source, it promotes a circular economy and reduces operational expenses.

SUMMARY

Integration of MT3.0™ and Gasification technology establishes a closed-loop system for converting solid waste into energy. This initiative represents a practical application, designed to recycle biosolids and produce renewable fuel while minimizing environmental impact.