

IMPROVEMENT OF ANAEROBIC DIGESTION AND DEWATERABILITY BY ULTRASONIC DESINTEGRATION

Kleinsteinbach WWTP, Germany



I. Brief snapshot of the plant	
Design capacity	32,000 PE
Actual loading	28,100 PE
Biological wastewater treatment	<ul style="list-style-type: none"> • Primary sludge treatment • Denitrification • Chemical Phosphor elimination • Secondary settling stage
Sludge treatment	<ul style="list-style-type: none"> • Primary sludge: ~ 45 m³/d • Thickened waste activated sludge: ~ 35 m³/d
Separate waste activated sludge thickening	<ul style="list-style-type: none"> • Separate filter band thickening of waste activated sludge (~ 10 h/d)
Anaerobic sludge stabilization	<ul style="list-style-type: none"> • 1 mesophilic digester, anaerobic (1,000 m³) • HRT: 12.5 days
Biogas production	<ul style="list-style-type: none"> • Specific biogas production: 200 L/kg VT_{in} • 50% of the CHP capacity used
Degradation of volatile solids (VS)	<ul style="list-style-type: none"> • 40% (as per cent of dry solids)
Digested sludge dewatering	<ul style="list-style-type: none"> • Chamber filter press
Sludge disposal	<ul style="list-style-type: none"> • Incineration • Costs: 75€/t

II. Objective of the ultrasound disintegration
<ul style="list-style-type: none"> • Increase biogas production • Improve volatile solid degradation • Improvement of dewaterability for the reduction of disposal costs

III. Preliminary trial of the ultrasound disintegration system

- Test phase of five month (March 2009 – August 2009)
- 50% of the TWS flow was treated with 1 ULTRAWAVES US unit 5 kW, operating 8 hours per day

IV. Results

- Degradation of the volatile solids was improved from 30 to 60 %
- 28% increase in biogas production
- Improvement of dewaterability from 31 to 36%

V. Payback time

Based on these results, the payback time for the ultrasound installation is calculated with 2 years.

V. Full-scale installation

In September 2009 the ULTRAWAVES ultrasonic system was implemented on the WWTP.

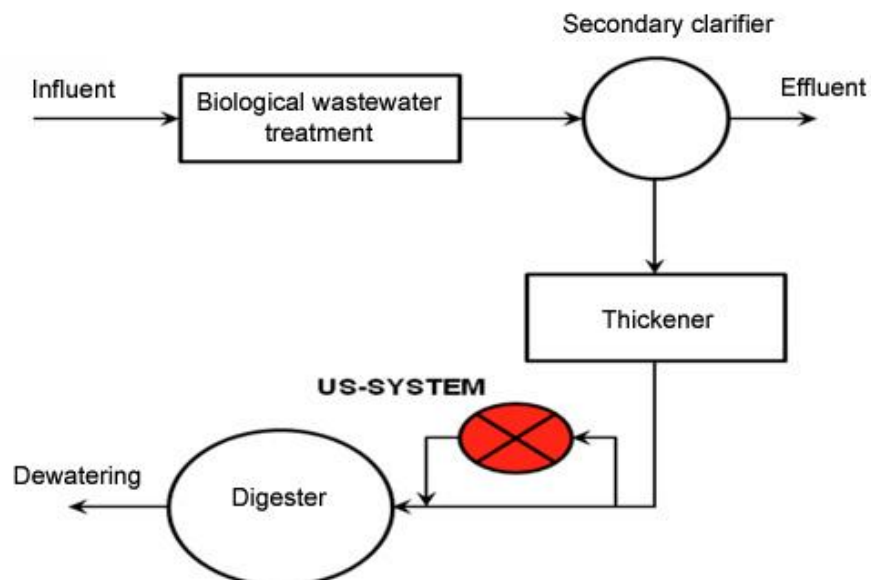


Figure 1: Scheme of the sludge treatment on the WWTP Kleinsteinbach

Volatile Solids in digested sludge, WWTP Kleinsteinbach

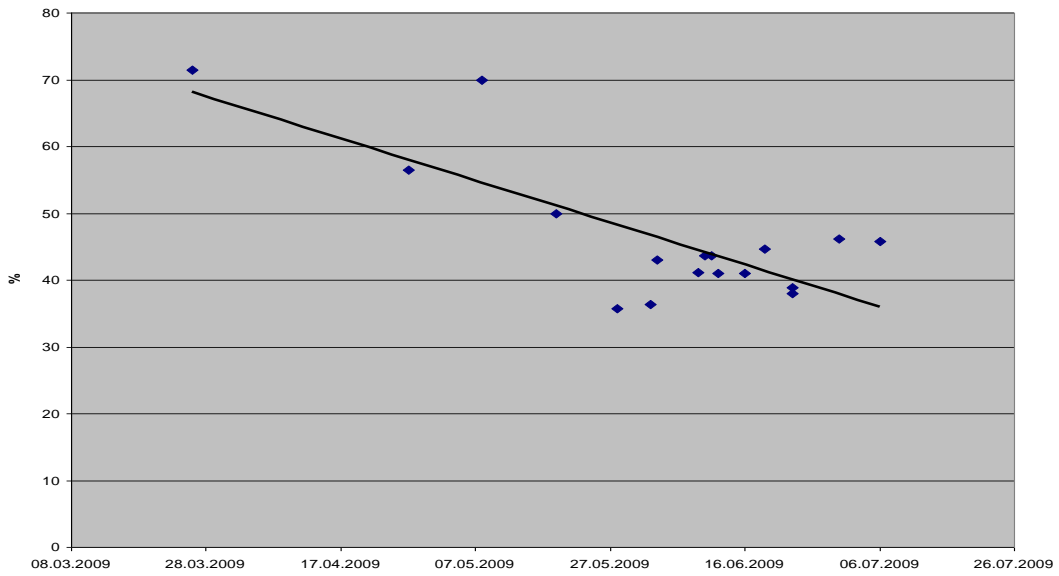


Figure 2: Volatile solid in digested sludge.

Specific biogas production, WWTP Kleinsteinbach

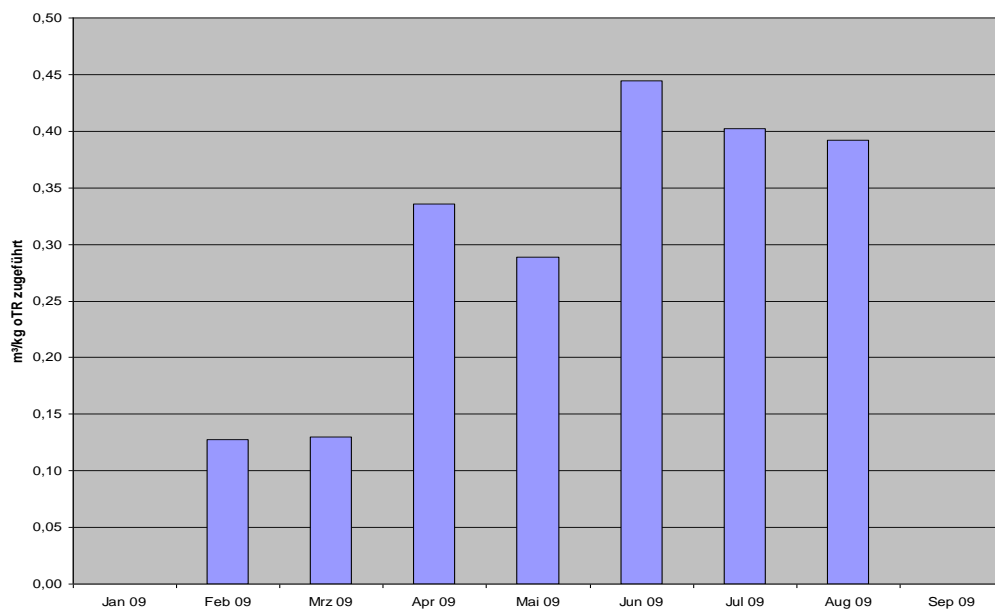


Figure 3: Specific biogas production January 09 – September 09

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