

23rd Annual RAM/SWANA

Conference & Show



Liberty Paper Inc.

Solving Operational Problems with Anaerobic Digestion

A black and white photograph of a paper mill. A large roll of paper is being processed by machinery. The roll is mounted on a central shaft and is being unwound. The machinery is made of metal and has various components, including a large gear and a smaller gear. The background shows the industrial structure of the mill, with pipes and beams. The text "KONEGRANES" and the number "201" are visible on a part of the machinery.

Liberty Paper Inc.

- ▶ Linerboard and Coated Products Manufacturer
- ▶ Operates year round
- ▶ 150 employees
- ▶ Owned by Liberty Diversified

100% Recycled Cardboard Used to Make New Linerboard

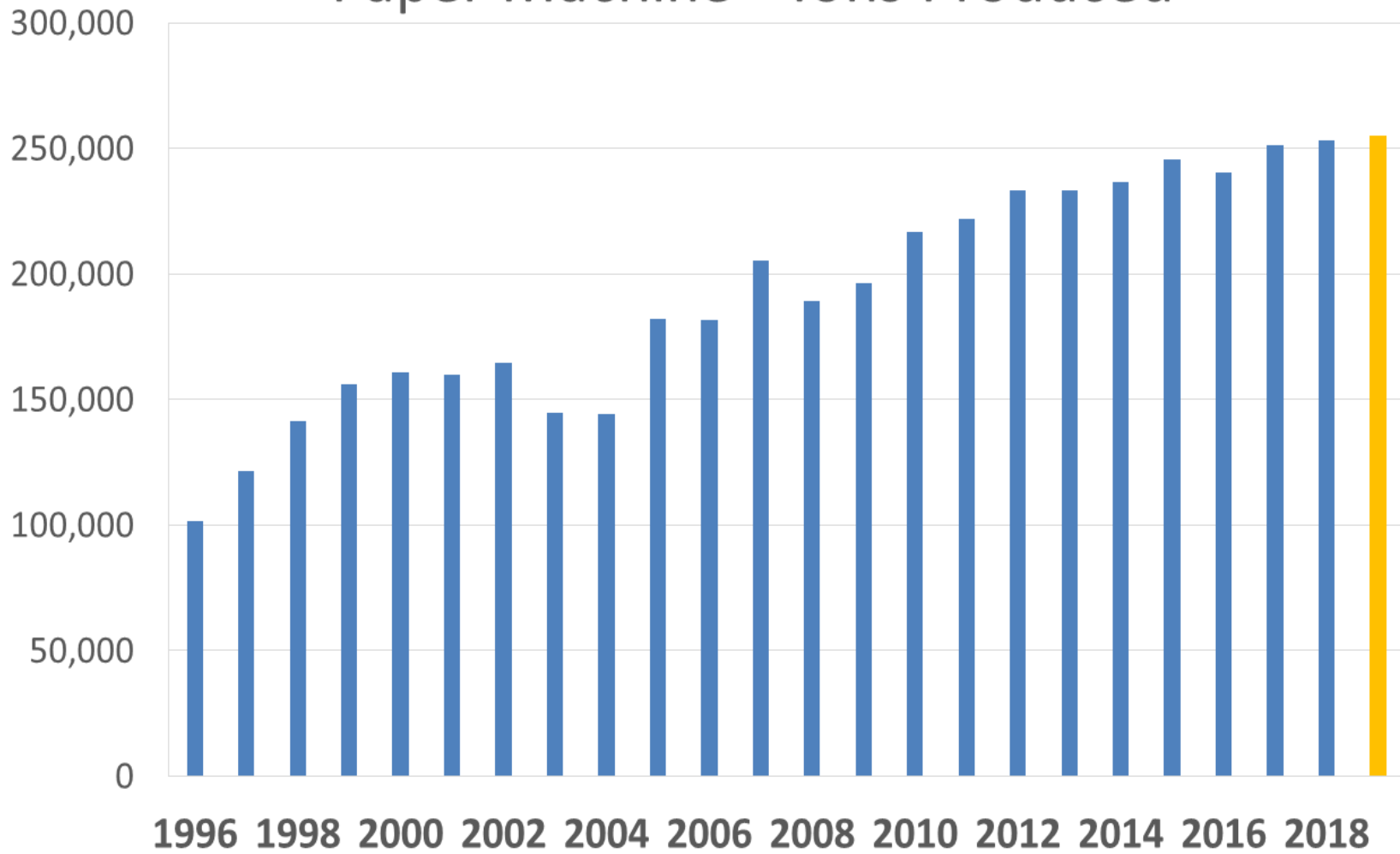


50 semi-loads per day =
250,000 new wet tons of product
per year

1995 Paper Machine Startup



Paper Machine - Tons Produced



Impact of Increasing Production

- ▶ Wastewater flows from LPI to City of Becker for Final Treatment
- ▶ BOD issues at Becker City Treatment Plant
- ▶ Papermill reduced wastewater flow
 - ▶ Excess wastewater was trucked to MCES
 - ▶ 5000 gal wastewater truck/hour for 2 years
 - ▶ \$250K/month trucking and disposal cost
 - ▶ Justification for Anaerobic solution

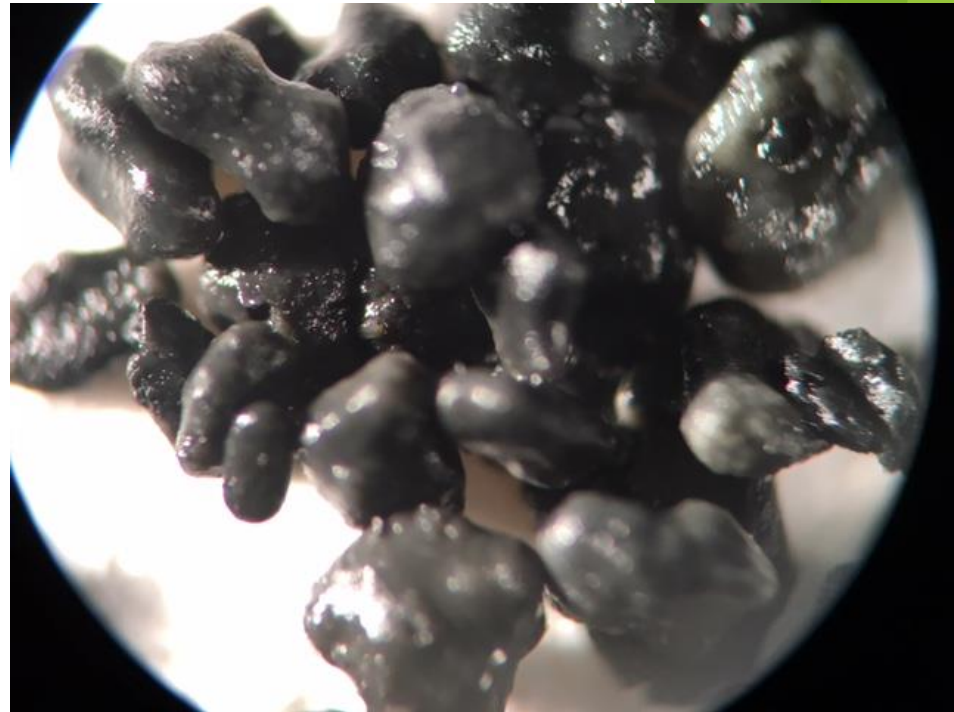
2012 Anaerobic Treatment Plant

- ▶ Anaerobic Low Solids Reactor
- ▶ \$12MM Capital Investment
- ▶ Papermill wastewater is the feed
- ▶ High water cleanliness (90% BOD reduction)
- ▶ Methane production

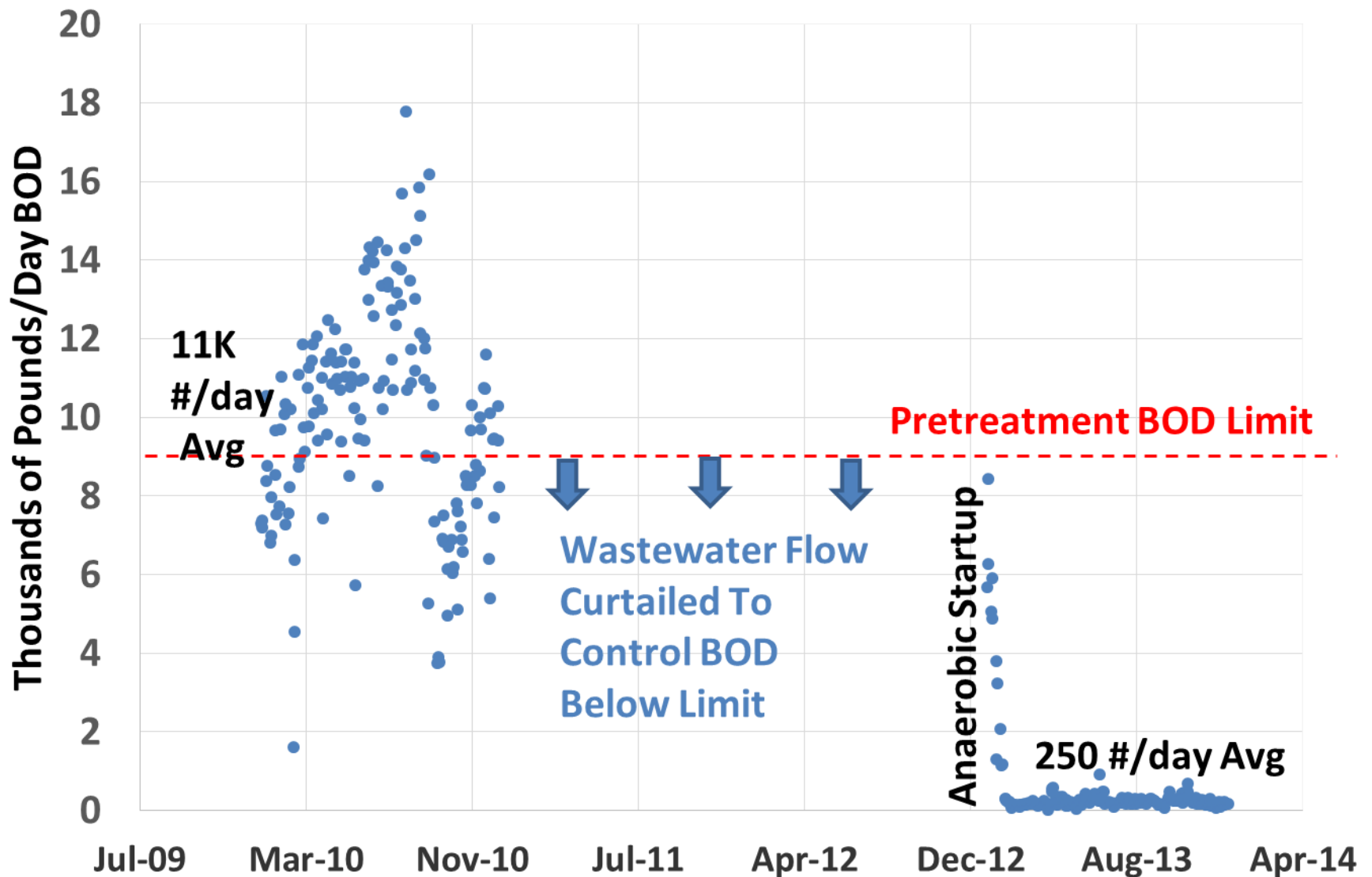


Anaerobic Digestion

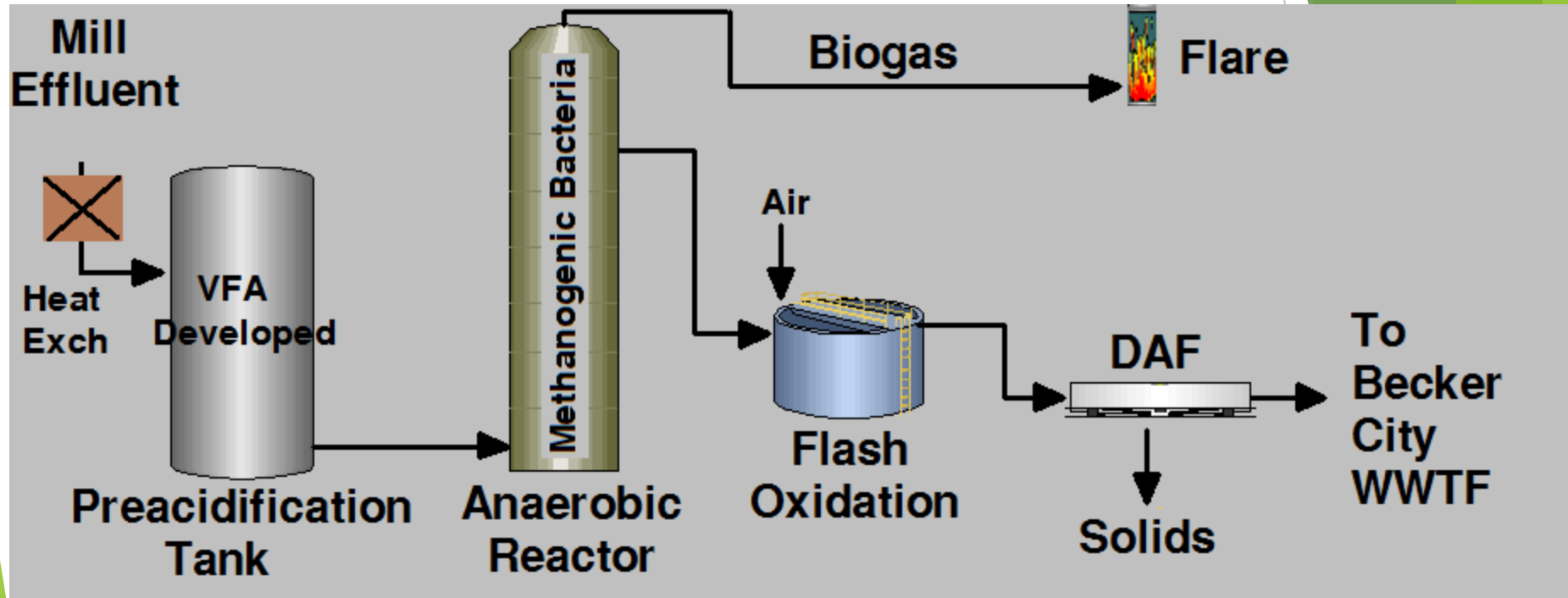
- ▶ Anaerobic bacteria breaks down the contaminants
- ▶ Consumes waste and releases methane biogas



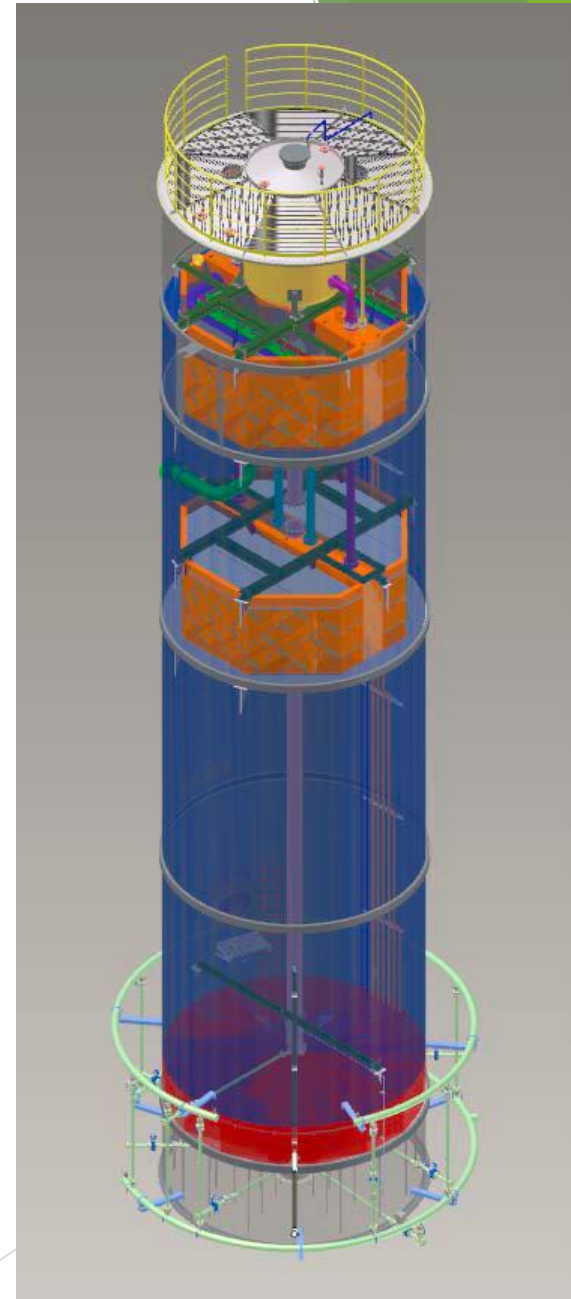
Liberty Paper BOD Pounds/day Discharge



Anaerobic Process Diagram



Voith-Meri Anaerobic Upflow Reactor



Anaerobic Bacteria Cost

- ▶ Granular Sludge Bacteria - \$1/gallon delivered
- ▶ Need suppliers and customers for this business to succeed
 - ▶ You will lose biomass
 - ▶ You will make biomass

Biogas

- ▶ 50-70% Methane CH_4
- ▶ 30-50% Carbon Dioxide CO_2
- ▶ 0.5 - 2% Hydrogen Sulfide H_2S
 - ▶ Corrosion and safety
- ▶ Siloxane
 - ▶ Found in many consumer products
 - ▶ Builds up on electrical generation equipment



Researching Biogas Options

- ▶ CHP Engine
- ▶ Microturbine
- ▶ RNG (renewable natural gas)

Biogas to fuel

125 cfm biogas =
625 gallons of gas/day
equivalent



CR65 MicroTurbine



Startup/Operational Issues

- ▶ Freezing of outdoor piping
- ▶ H₂S safety issues and corrosion
- ▶ No excess sludge customer
- ▶ Sludge quality degraded over time
 - ▶ Nutrient deficiency
 - ▶ Mixing deficiency

Calcium Carbonate Scale Issues

Layer
of Scale



Treatment plant success

- ▶ 90% BOD contaminant reduction
- ▶ Trucking cost eliminated
- ▶ No more issues at the City

Strong relationship with the Becker Facility

Won 2 major Industry Awards in the Midwest
for improving the environment

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