Phosphorous and Water Reductions at Minnesota Speciality Yeast LLC.

Matthew Landauer

MnTAP Advisor: Daniel Chang

Company Supervisor: Scott Sederstrom

UNIVERSITY OF MINNESOTA

Driven to Discover℠

MnTAP

Company Background

https://goo.gl/maps/75WBDbcHjQCVSuhUA

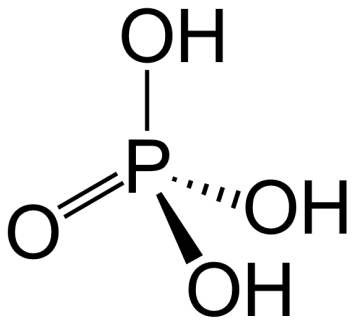
Minnesota Specialty Yeast (MSY)

- Purchased by Lallemand in 2019
- Novel Yeast Production
- 7.5 millions tons of yeast cream annually

Project Overviews

Phosphorous Reduction

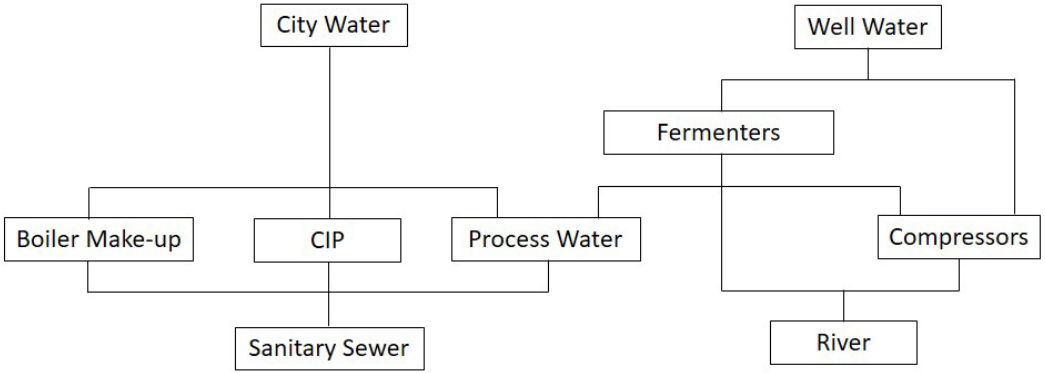
- **700,000 lbs used in 2019**
- **10,000 lbs sewered**



Curbing Water Usage

- **1.8 million GPD of Well Water**
- **450 million gallons in 2019**
- **Primary use for Fermenter Cooling**

Water Flow Path



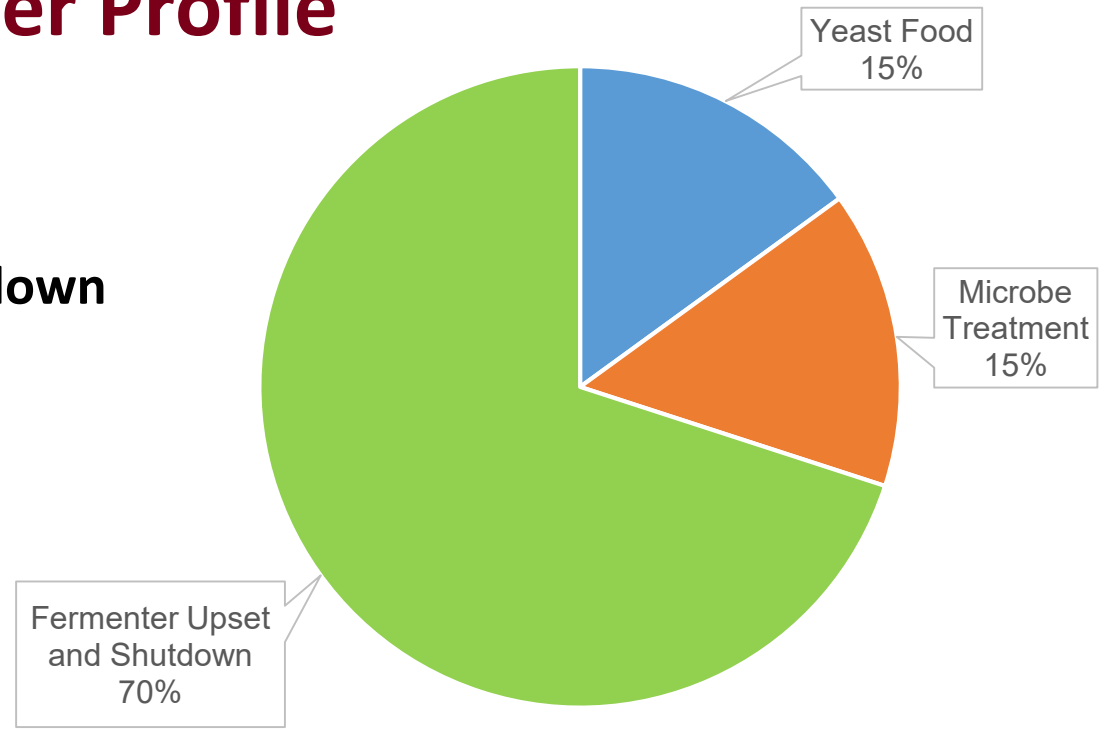
Pipe Tracking and Metering

- **Primary to Fermenters**
- **Mix for Compressors**
- **Spent for Process Water**
- **CIP, Other Heat Exchangers**

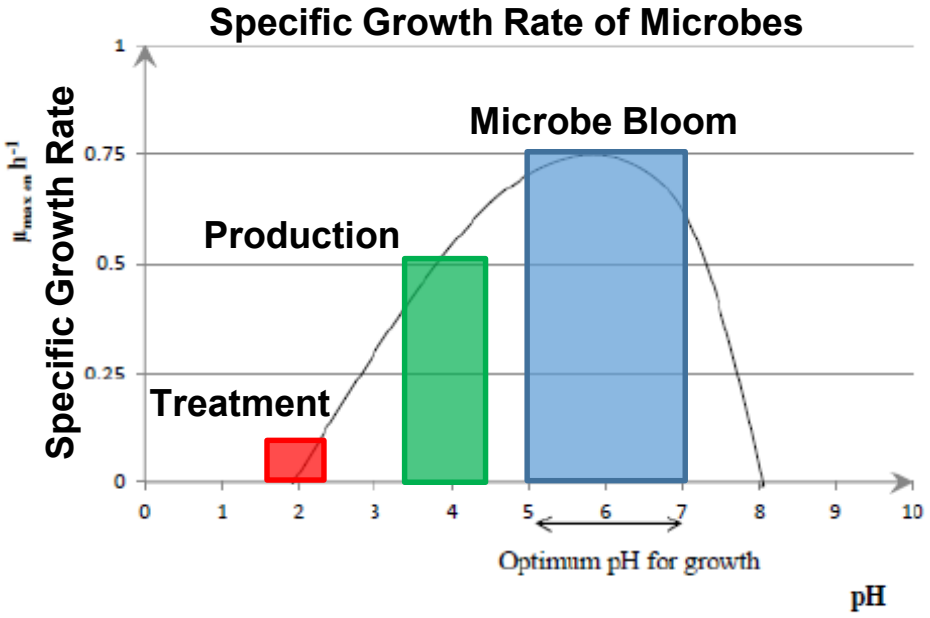
Phosphorus Sewer Profile

Tracking Phosphorus Usage

- **Fermenter Upset, Shutdown**
- **Yeast Food Source**
- **Microbial Treatment**



Phosphoric Acid in Microbe Treatment



pH and Microbes

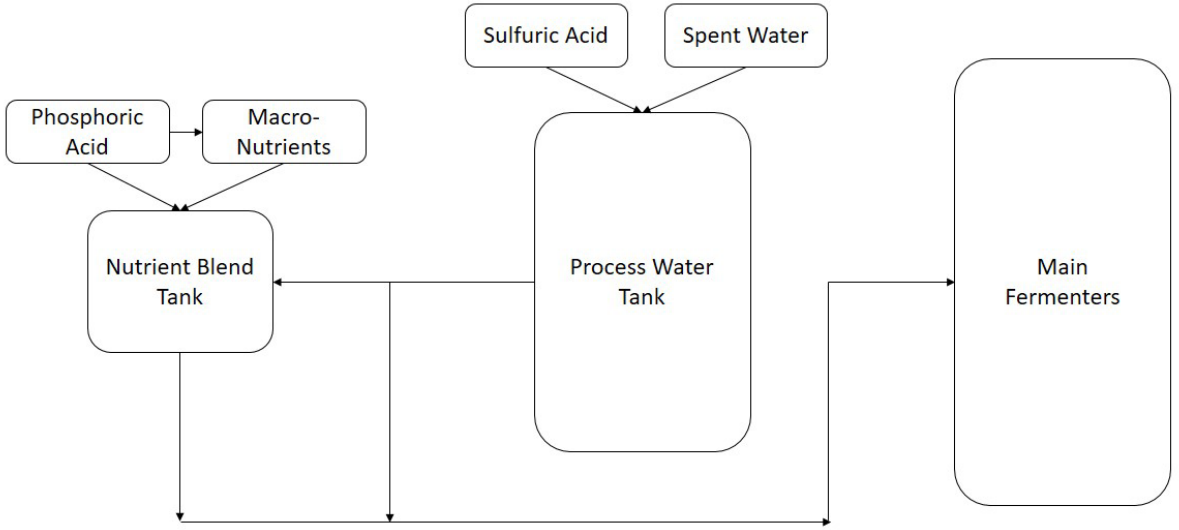
- **Microbes "best" at 6 pH**
- **Production at 4 pH**
- **Treatment at 2 pH**
- **Phosphoric Acid used to decrease pH**

https://www.researchgate.net/figure/Description-curve-of-pH-effect-on-specific-growth-rate-for-bacteria_fig1_236896643

Primary Recommendation

Microbial Treatment

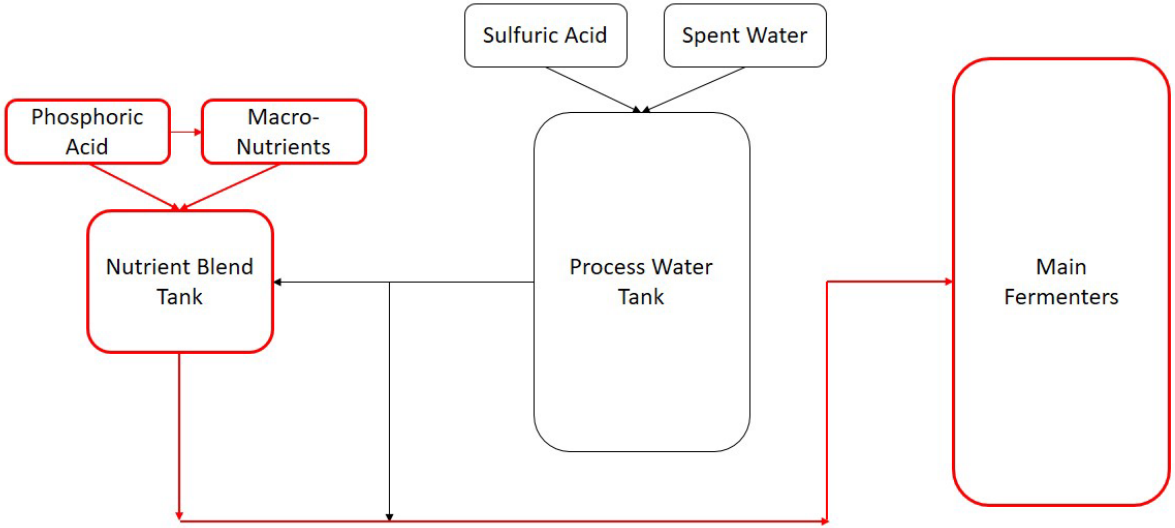
- **2.0 pH stream**
- **Phosphoric Acid**
- **Sulfuric Acid**



Phosphoric Acid Flow Path

Phosphoric Acid

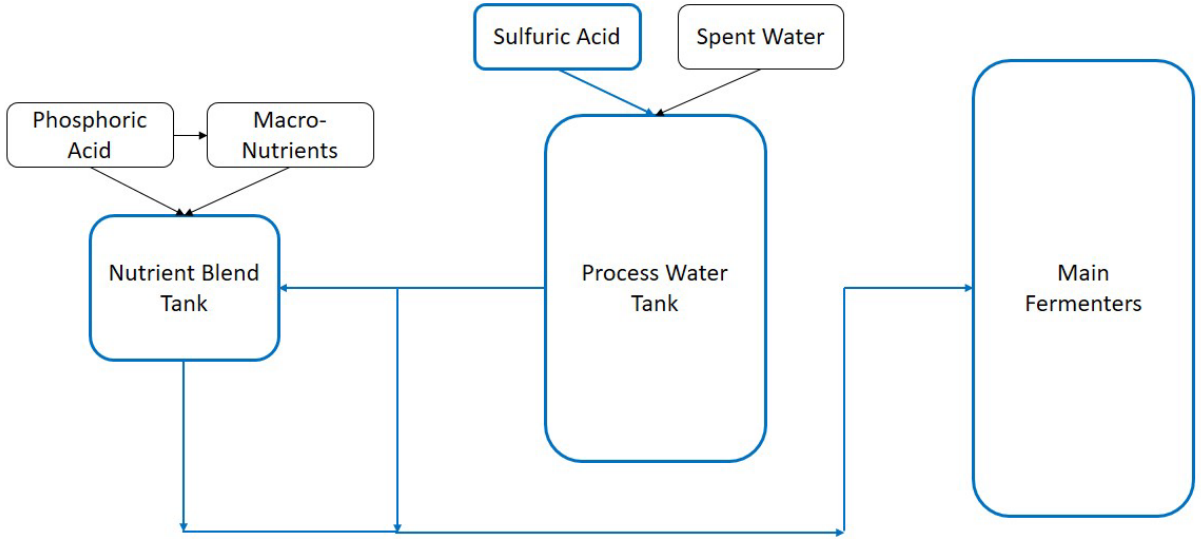
- **Blend Tank**
- **Macronutrients**



Sulfuric Acid Flow Path

Sulfuric Acid

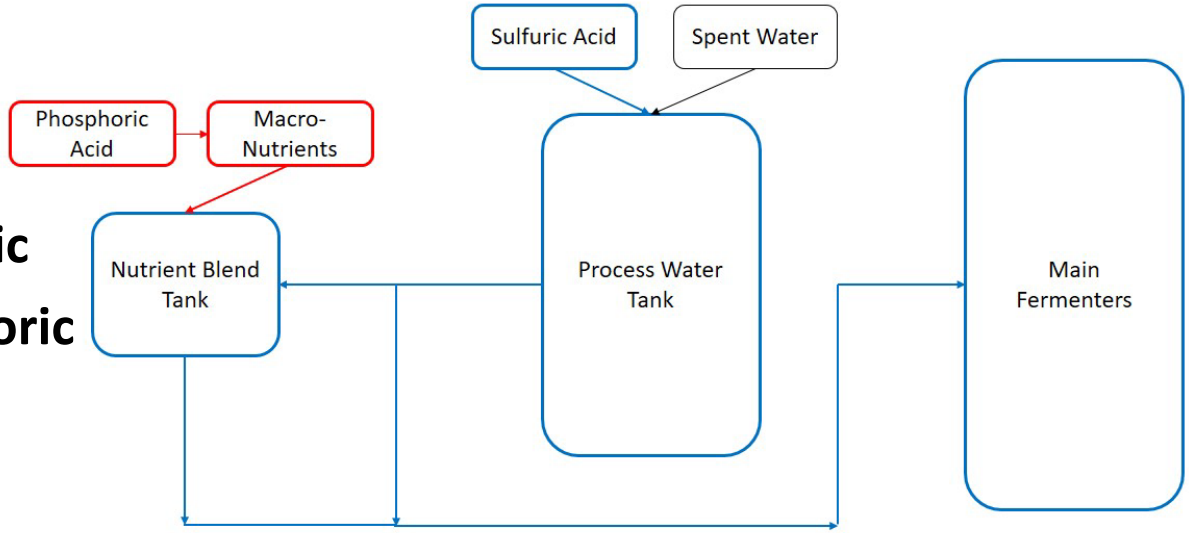
- **Treated Water**
- **Main Component**



Prioritizing Sulfuric Acid

New Process

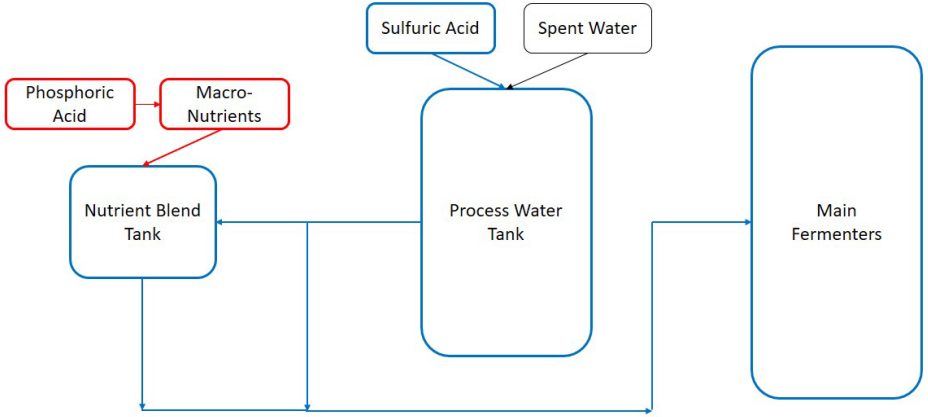
- **Increase Sulfuric**
- **Maintain Phosphoric**
- **Save 25 lbs Phosphoric**



Benefit Breakdown

Monetary and Environmental Savings

- **Savings from Sewer Charge**
- **15% reduction into sewer**
- **No capital cost**



Recommendation	Annual reduction	Total cost	Annual savings	Payback period	Status
Sulfuric Acid for pH Drops	1,040 lbs Phosphorus	$0	$6,500	Immediate	Implementing

Solutions

Recommendation	Annual reduction	Total cost	Annual savings	Payback period	Status
Sulfuric Acid for pH Drops	1,040 lbs Phosphorus	$0	$6,500	Immediate	Implementing
Process Water Control	145gal sulfuric acid	$0	$420	Immediate	Implementing
Softened Water for Boiler	1,340,000gal water, 3,900 therms	$100	$7,500	5 days	Recommended
Boiler Preheat with Process Heat	3,900therms	~$2,500	$3,300	~9 months	Recommended
Reduce Centrifuge CIP Rinse Times	480,000 gal water	$1,500	$4,300	4 months	Recommended

Anecdote

New Process, Existing Systems

- Lower Capital Costs
- In-house Testing

Personal Benefits

- Apply course knowledge
- Open mind to Information


Questions?
UNIVERSITY OF MINNESOTA
Driven to Discover℠
MnTAP
UNIVERSITY OF MINNESOTA