

Wastewater Loading Reduction Kerry Ingredients

Simone Richardson

Advisors: Matt Domski and Laura Babcock

Minnesota Technical Assistance Program



UNIVERSITY OF MINNESOTA

Driven to DiscoverSM

Company Overview

- Food ingredients and flavors
- Headquartered in Ireland



Rochester Facility - 2004

- Fermentation, spray drying, powder blending, and packaging
- Natural flavors, enhanced textures, extended shelf life
- Ready-to-eat meals, sauces, dressings, dairy products, bakery products, fermented meats

Motivations for Change

- Reduce wastewater loading
 - High BOD
 - Out of spec pH

Reasons for MnTAP Assistance

- Investigate sources of low pH
- Determine major contributors to high BOD
- Consider water conservation throughout plant
- Make recommendations for reducing wastewater loading

Approach

- Monitored cleaning processes
- Observed plant processes that send wastewater to drain
- Talked with operators and staff
- Developed ideas for improvement

Determining Opportunities for Improvement

- Process observations and notes
- Previous observations from Kerry staff
- Measurements which suggested greatest contribution to wastewater loading

pH

Opportunity: CIP systems

- Clean equipment between product runs
- Chemicals cause pH spikes
- Major contributors: evaporator, sterilizer, and large spray dryer



CIP systems

- Solution:
 - Modify CIP recipes, timing of each cycle
- Savings:
 - Reduce pH excursions
 - Save chemicals
 - \$550/year

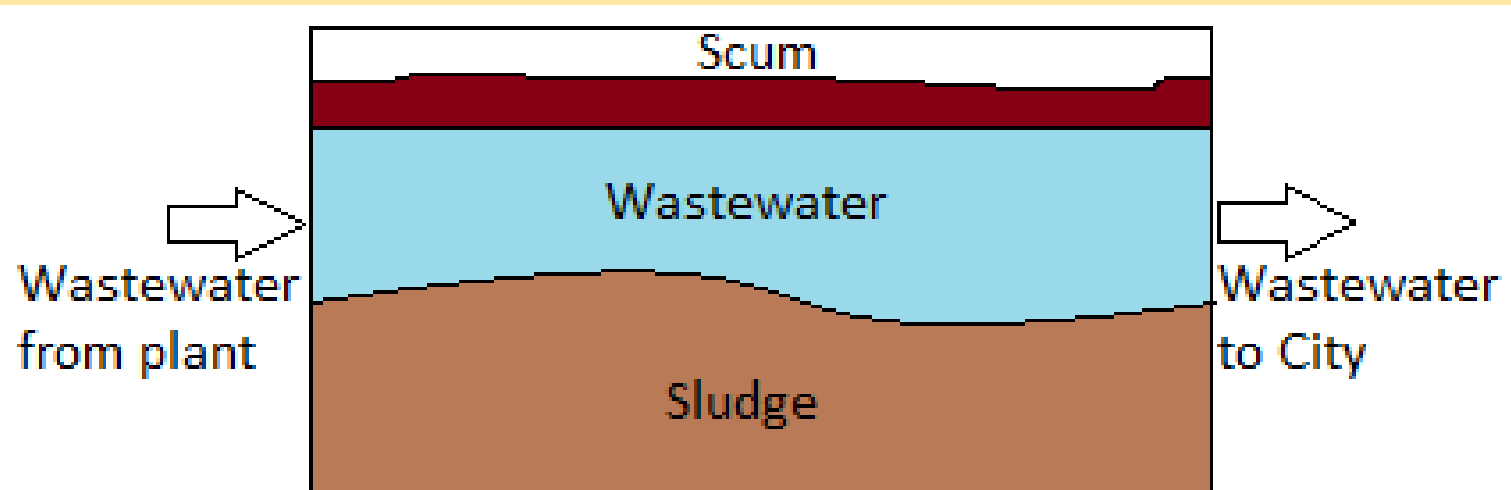
pH

Opportunity: Sewer pit

- Collects wastewater from the plant before sent to the City of Rochester
- Current residence time of 20 minutes
- Not enough time for chemicals to mix

Sewer pit

- Solution:
 - Clean out sewer pit
 - Increase residence time to 2-6 hours
- Savings:
 - Reduce pH violations



BOD

Opportunity: Wet packaging

- Product loss
 - Fall off conveyor
 - Leaking bags
 - Weight
- Bags get emptied down the drain



Wet Packaging

- Solution:
 - Add catch pans
 - Install new conveyor
 - Regular maintenance checks on packaging equipment
- Savings:
 - Over 7,000 lbs of solids
 - Over 34,500 lbs of product
 - \$41,400/year

BOD

Opportunity: Spray Dryers

- During CIPs, built up product gets washed down the drain
- Contributes to BOD in wastewater

Spray Dryers



- Solution:
 - Divert first rinse of CIP
 - Add filter sock
- Savings:
 - Divert rinse: 74,500 lbs, \$26,300
 - Filter sock: 13,500 lbs, \$4,800
- Consider:
 - Additional hauling costs per year: \$17,000

Water Conservation

Opportunity: Fix water leaks

- Measured/documentated various leaks in plant

Gallons of water/year

CIP 1	CIP 2	Sterilizer – running	Sterilizer – idle	Centrifuge	Large dryer	Total
213,000	102,200	404,700	59,600	14,000	150,000	943,500

- Savings:
 - 943,500 gallons of water/year
 - Hundreds of gallons of chemicals/year



Successful Process Changes

Recommendation	Waste/ energy reduced (per year)	Savings	Payback period	Status
pH control				
Optimize CIP processes	Reduce pH violations	\$550	Immediate	Recommended
Clean out sewer pit	Reduce pH violations	Unknown	Unknown	Partially Implemented
BOD reduction				
Modify wet packaging line	7,000 pounds of solids	\$41,400	3-6 months	Recommended
Divert dryer rinse	74,500 pounds of solids	\$26,300	Needs further investigation	Needs further analysis
Attach filter sock	13,500 pounds of solids	\$4,800	2.5 months	Needs further analysis
Water Conservation				
Repair water leaks	943,500 gallons of water	\$5,800	Unknown	Partially Implemented

Additional/Future Ideas

Centrifuge

- Solution:
 - Divert effluent to silo
- Savings:
 - 22,500 pounds of solids/year
 - \$8,700/year

Dry packaging

- Solution:
 - Add catch pans
 - Vacuum
- Savings:
 - Decrease BOD
 - 5-10 lbs/day
 - \$1,000/year

Personal Benefits

- Real-world engineering experience
- Food industry environment
- Communication skills
- Independence
- Confidence



Questions?

