



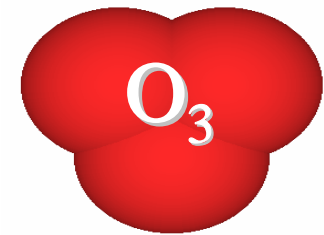
# The Use of Aqueous Ozone in the Beer and Wine Industry

Presented by Cameron Tapp

**ClearWater Tech, LLC**  
Ozone Generators for Water & Air Purification



# Cold Ozone-Enriched Water



- Ozone is not stored - It's generated on-site as needed
- Ozone is powerful - Microorganisms can't build up an ozone tolerance
- Ozone is environmentally friendly - Used properly cannot endanger the environment
- Ozone is safe - Reverts to oxygen before entering sensitive settling ponds
- Ozone is clean - Leaves no chemical by-products or residual to spoil product quality

# Chemical Sanitation



- Hazardous Material - Special handling & storage requirements
- Variable Effectiveness - Organisms can become tolerant and less effective
- Environmentally unfriendly - Ground water contamination, chemical off-gas
- Collateral Damage - Beneficial bacteria in leech fields or settling ponds can be killed

# Hot Water Rinse

- Cost:
  - To produce heat
  - Wear and tear on equipment
- Time
  - To produce heat
  - To reduce heat
- Safety:
  - Dangerous for workers



# Cold Water Advantages

- Saves heating costs
- Instant “ON” saves time
- No cool down - saves time
- Gentle on equipment surfaces



# THE PRODUCT - BEER



- 9th largest brewery in U.S.
- Largest "Craft Beer" producer in USA
- Employs 150 people at its plant in Chico, CA

# THE CHALLENGE

- Achieve  $\geq 3$  log reduction in mold, yeast (saccharamyces) and enterobacteria counts in rinse water
- Reduce wear on fermentation tanks caused by chemicals
- Improve safety reduce cost of chemical handling
- Save money over time by minimizing manpower and chemical costs

# Previous technologies caused problems or had proven ineffective

## Chlorine Dioxide-

- Pitted the stainless steel fermentation tanks
- Can impart a change in product flavor - even at low levels in rinse water
- Safety issues associated with Chemical handling, levels in rinse water

## Paracetic Acid:

- Inconsistent sanitation results
  - Caused by off-gassing of H<sub>2</sub>O<sub>2</sub> in paracetic acid compound when the lines are depressurized.
- The H<sub>2</sub>O<sub>2</sub> in paracetic acid compound reduced shelf life of product “significantly”

## Iodophore - An iodine compound used for sanitizing :

- Iodine can pit fermentation tanks and degrade soft rubber materials in combination with other cleaning agents
- Risk to product flavor



# THE OZONE SOLUTION

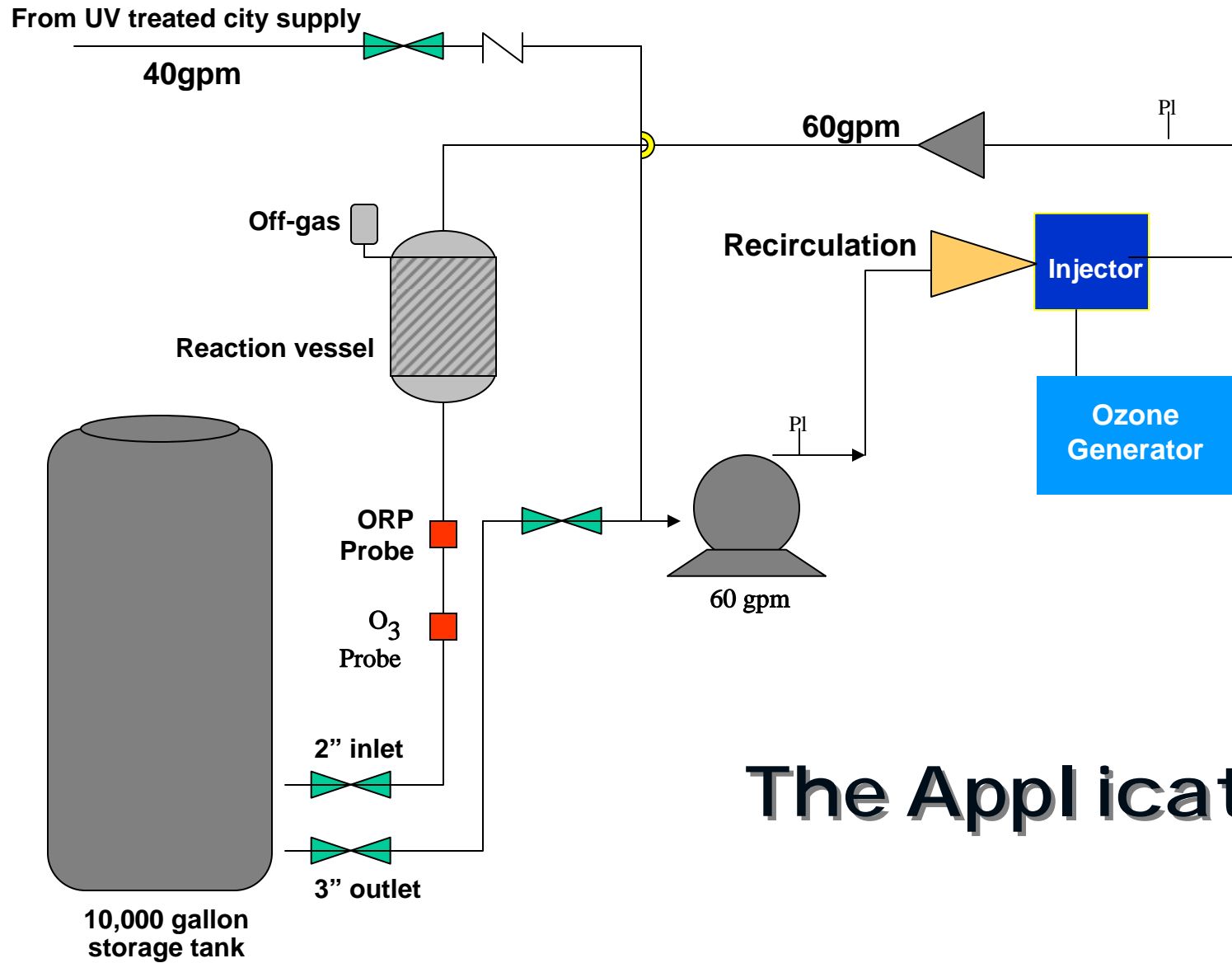


Ozone system installed to serve the brewery's plant-wide sanitary rinse water system

1. Bottle rinsers/pre-filler
2. Plant wash down
3. Rinsing fermentation tanks
  - Pre-rinse with municipal water
  - Final rinse with ozonated water

# System Parameters

- Incoming municipal water has pH of 7.6 and a chlorine residual of 0.08 to 0.1 ppm
- Applied ozone dosage rate of approx. 3.3 ppm in the sidestream
- Target ozone residual level in the storage tank is 1.0 ppm



# The Application

# The Results... Seven years and Counting

- Maintaining  $\geq 3$  log reduction in mold, yeast and bacteria counts
- Maintaining consistent 1.0 ppm dissolved ozone in storage tank
- Eliminated wear on fermentation tanks and other stainless steel parts
- Reduced chemical handling
- No risk to product flavor
- Sierra Nevada finds ozone system reliable and easy to maintain

# THE PRODUCT - WINE



**Tobin James Winery - Paso Robles, CA**  
Barrel Washing

# THE CHALLENGE

## microorganisms of concern



### Acetobacter spp. (bacteria):

- Converts ethyl alcohol into acetic acid (volatile acidity)
- Strong off-odor (ethyl acetate) found on grapes, in cellars, on equipment, in wood of used wine barrels

### Brettanomyces spp. (wild yeast)

- Found on grapes and in wine, “Mousy” and “metallic” off-flavor
- Difficult to eliminate once embedded in cooperage
- Contamination concern during bottling of low alcohol, slightly sweet wines (risk of secondary fermentation)



# The Ozone Solution

Ozone is a biocide effective against:

- Fungi (yeast, mold and their spores)
- Protozoa (including cysts)
- Bio-Film
- Bacteria
- Virus



# Locations to Use Ozone

Ozone can be utilized throughout wineries and breweries using a stationary Clean In Place (CIP) system or a Mobile Wash Cart.

- Rinsing fermentation tanks
- Cruncher / Auger
- Transfer lines
- Bottle rinse
- Barrels
- Equipment pads / floor drains
- Plastic totes





# The Savings

## Example of ROI

**\$32,500 in annual savings**

by reducing hot water use 50%.

Calculations: (Assuming a 260 days of operation per year)

Gallons x 8.33 x Temp Rise (°F) = BTU

BTU/100,000 = 1 Therm

1 Therm = 29.3 kWh

$25,000 \times 8.33 \times 120 / 100,000 \times 1.0 = \$250/\text{Day}$



# Conclusion

Ozone is a logical choice for sanitation in breweries and wineries due to:

- No risk to product taste
- Ozone is generated on-site / - no transportation or handling issues
- Cost Savings - lower chemical costs, less wear on stainless equipment
- Proven track record - ozone has been successful in these applications for over 20 years
- A natural sanitizer for a natural product

*“No modern beer or wine producer would be without an ozone system”.*

*Jeff Poe, Wine Maker Tobin James*

**Thank You**

