



Water: Manage Your Business through the Ebbs and the Flows

Todd Webster, Envirogen Technologies, Inc.
Glenn Wensloff, Elutriate Systems

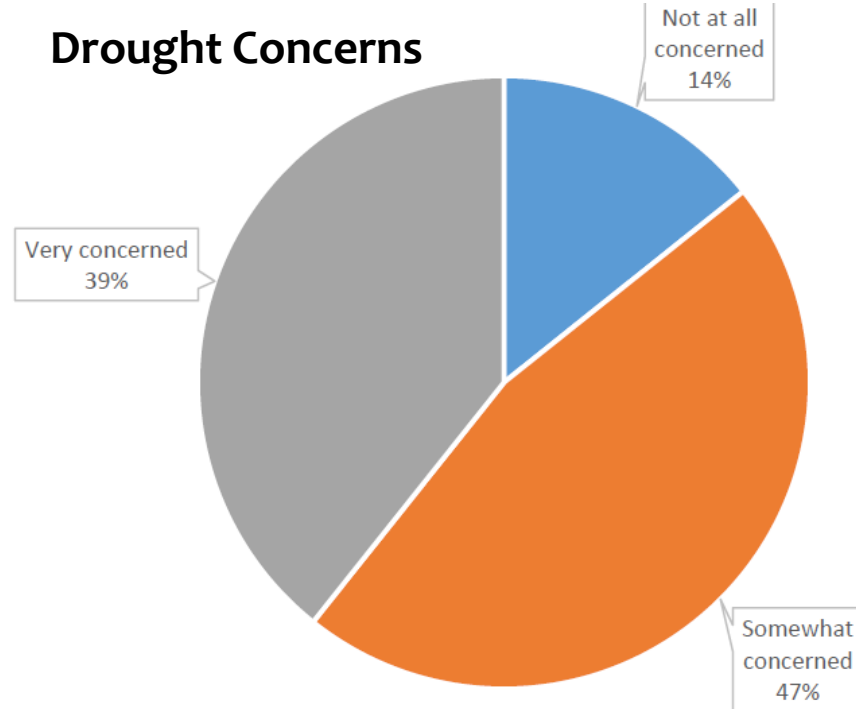


Current Craft Beverage Concerns

• Impediments to Growth

Issue
Access to capital
Land/space/available real estate
Distribution
Water/wastewater management
Availability/price of inputs/materials
Permits/local regulation
Marketing
State/federal regulation
Taxes

Drought Concerns

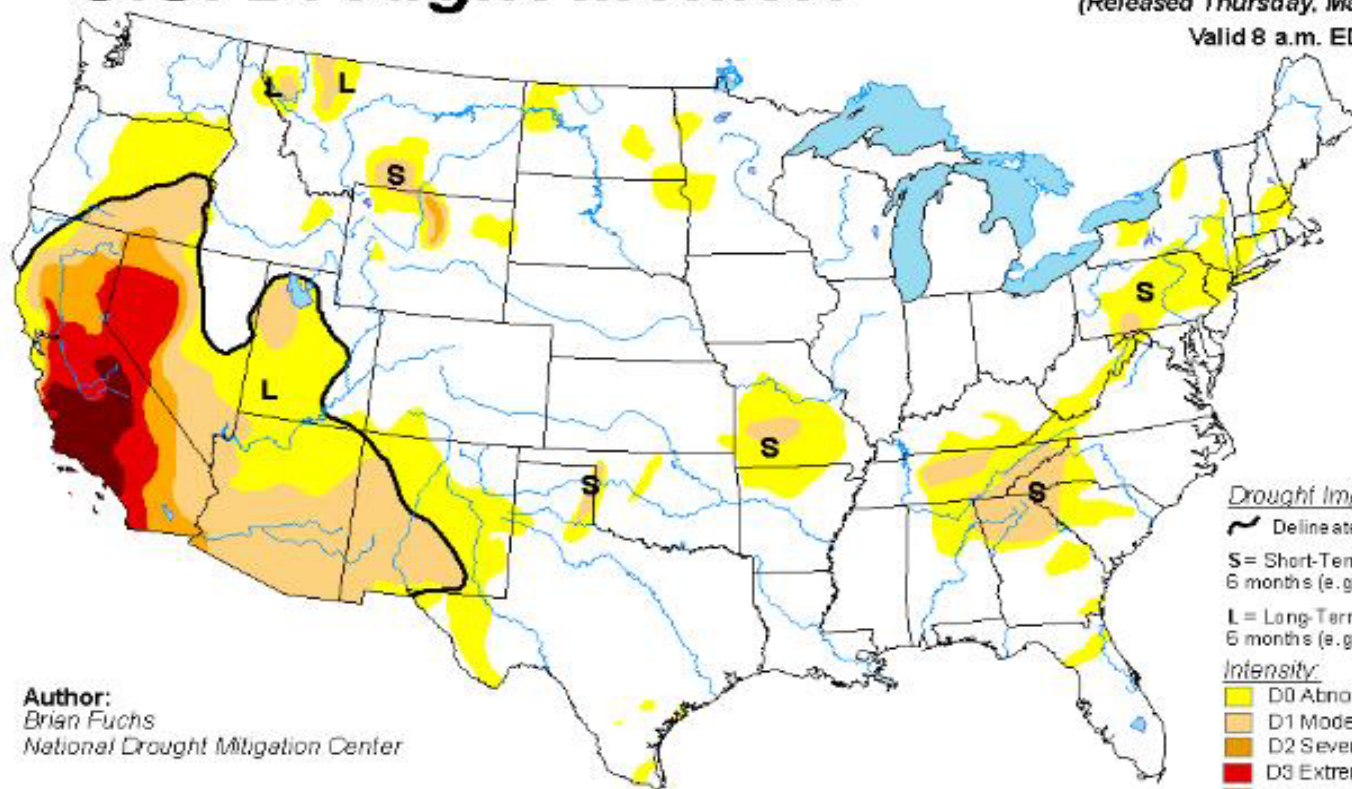


Source: National University System Institute of Policy Research, San Diego Craft Brewing Industry: 2016 Update

Current Water Situation in the United States

U.S. Drought Monitor

May 10, 2016
(Released Thursday, May 12, 2016)
Valid 8 a.m. EDT



Drought Impact Types:

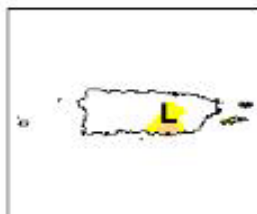
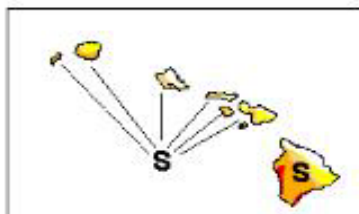
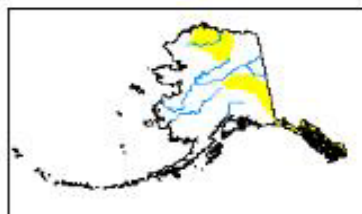
- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

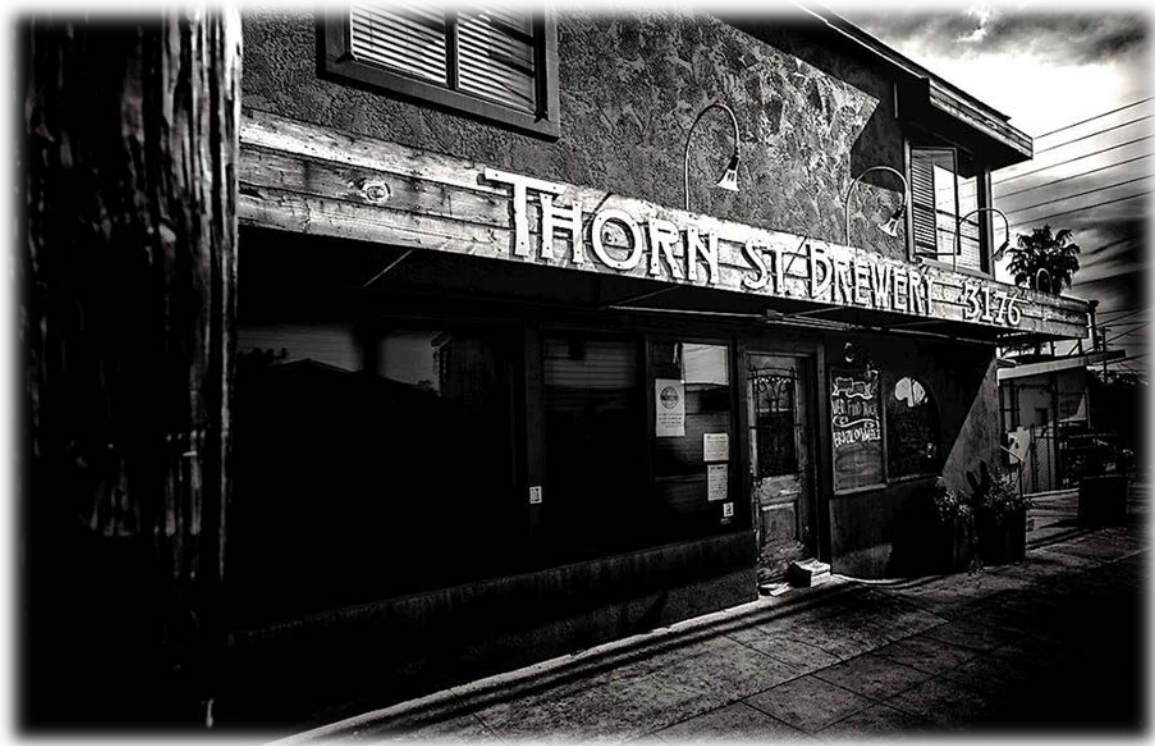
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brian Fuchs
National Drought Mitigation Center



<http://droughtmonitor.unl.edu/>

Craft Brewery Considerations

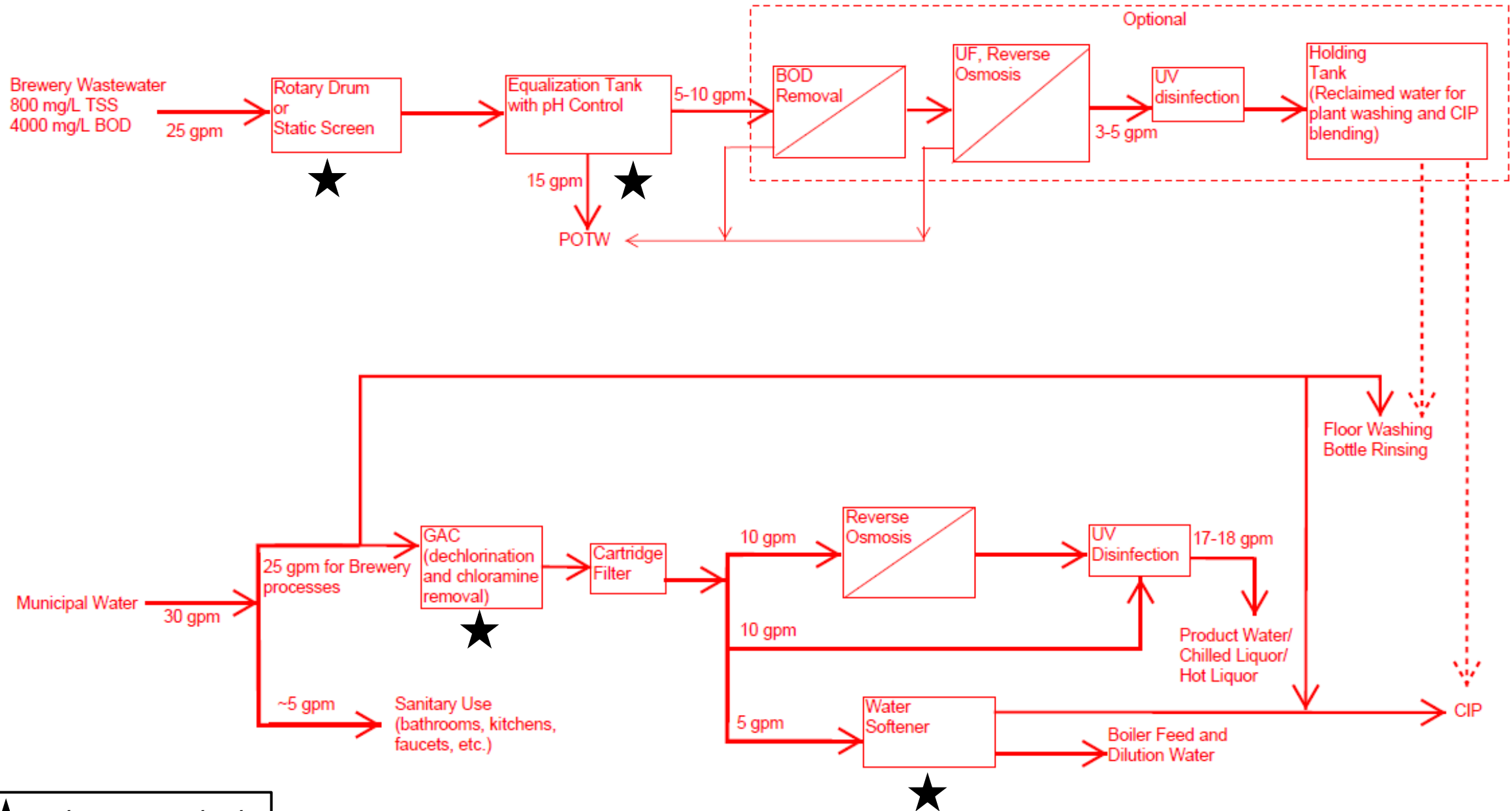


Craft Brewery Considerations of Water Issues

- Similar to other craft beverage subsectors
- Geography dependent
 - Availability, quality, and cost of water
 - Availability and cost of wastewater treatment
 - Equivalent Residential Units (ERU)
 - 10,000 bbls/yr = 1000 homes
- Improving product quality
- Growth and expansion versus efficiency
- Ultimate return/value on capital investment
- Financial, environmental, social nexus



Typical Craft Brewery Water and Wastewater Considerations



Craft Brewery Water Treatment Equipment



What Do the Statistics Show?

- US West Coast breweries of production capacity of 50,000 bbls/yr or more
 - 26 breweries: AZ, CA, CO, OR, WA
 - Almost all perform some pH control as needed before discharge of wastewater effluent
- 5 breweries: On-site biological wastewater treatment
- 5 breweries: Considering on-site biological wastewater treatment
- Threshold for on-site biological treatment: Production capacity of greater than 100,000-150,000 bbls/yr



What Else Do the Statistics Show?

Parameter	Typical Range
Water to Beer Ratio (bbl/bbl)	4 - 13
Wastewater to Beer Ratio (bbl/bbl)	3 - 10
Wastewater to Water Ratio (bbl/bbl)	0.60 – 0.90
Biochemical Oxygen Demand (mg/L)	2000 - 5000
Total Suspended Solids (mg/L)	600 - 2000
Flow (\$/1000 gal)	3.00 – 10.00
BOD surcharge (\$/lb)	0.20 – 0.60
TSS surcharge (\$/lb)	0.11 – 0.60

Source: Brewer's Association Benchmarking Study (2016)

Typical Regulations: BOD= 200 mg/L, TSS= 250 mg/L

Good Operating Practices

- Sustainability begins from Day 1... not at some later time
- Follow simple to more complex pathway: Reduce, Reuse, Recycle
- Conduct water and wastewater audit



Water and Wastewater Considerations

Water and Wastewater

- Education: Set Standard Operating Practices (SOPs)
- Sub metering

Water

- Minimize leaks
- Turn off water when not in use- Cut-off nozzles
- Process Integration and Automation (i.e., timers, CIP)
- Low-flow faucets, toilets
- Rainwater collection and reuse

Wastewater

- Add tankage to release loads during off-peak hours
- Segregation
 - Malt husks, spent grain, hops - Animal feed component.
Bread, cookies, dog treats
 - Wet and dry yeast, trub - Animal feed component



Winery Considerations



Winery Considerations of Water Issues

- **Effluent Characteristics**
- **BOD (Biological Oxygen Demand): 7,500 ppm
(Pure Wine, 16% alcohol, 160,000 ppm)**
- **pH 4-12**
- **TSS Total Suspended Solids: 100-5,000 ppm**
- **TDS Total Dissolved Solids: 200-4,000 ppm**
- **Nitrate, Nitrite, Ammonia, Sodium, Chlorine**

Waste Water Treatment Methods

- Discharge to city Sewer directly, easiest, costly hook up fees
- To city Sewer with treatment, costly hook up fees
- To Septic/Leach Line System, distribution not much treatment
- To Waste Water Ponds, Facultative, Odors Sludge build up, Wetlands
- To Waste Water Ponds, W/ fine bubble diffuser systems to Bio Reactor, BOD Treatment
- To Membrane Bio Reactor, BOD treatment, smaller footprint
- Don't discharge, operate in a closed loop, MBR, RO, new development

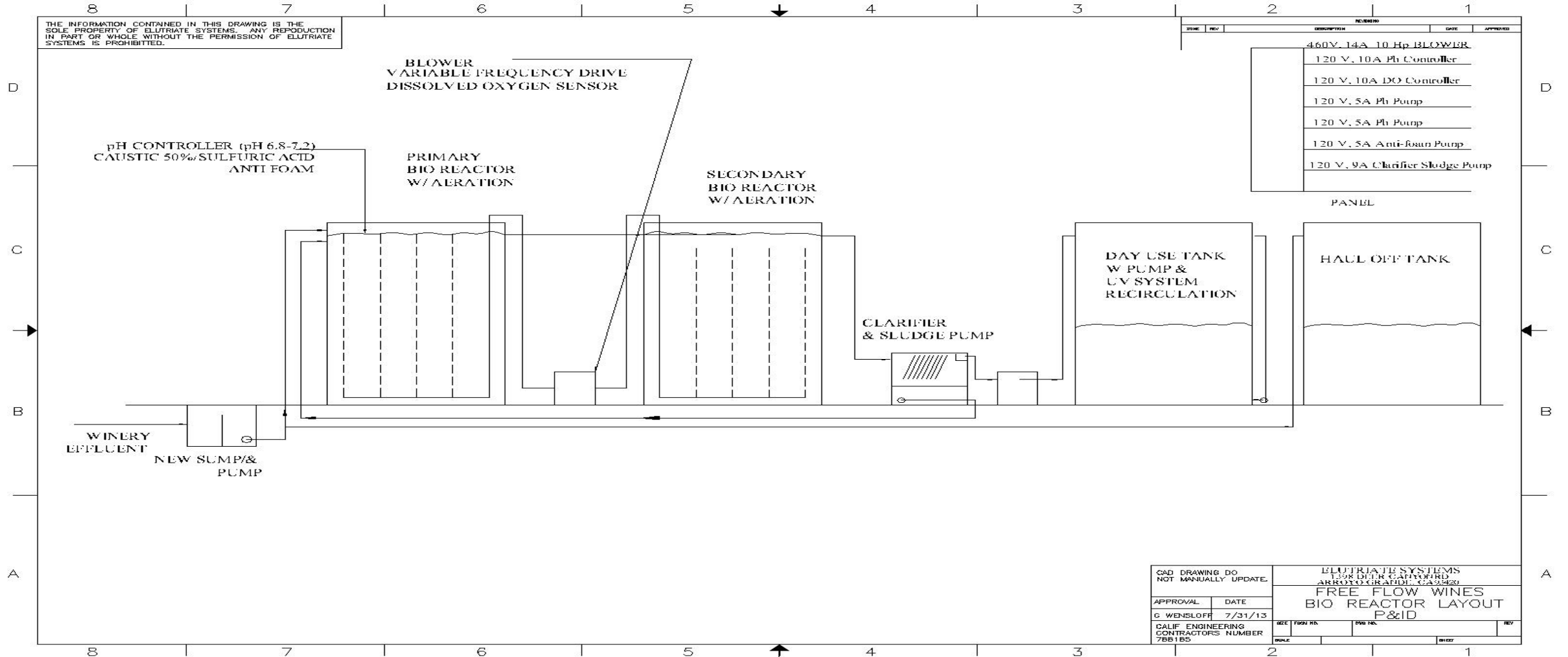
Optimize Waste Water Cost & Hook up Fees

- **Water like all other aspects to your operation can be optimized**
- **Similar to optimizing rent, labor rates, use of power electricity & gas**
- **Not only in quantity required, but also in treatment costs**
- **And also amount to be reused**
- **Hook up fees are based upon volume used and volume discharged**

Examples of Winery Waste Water Treatment Systems



P&ID for a Typical Winery or any High BOD effluent



Conclusions

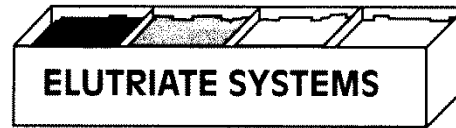
- All sectors face water and wastewater issues
- Understand and assess the quality of:
 - water and wastewater
 - product
- Work closely with the City, Water Providers, and Wastewater Facility Management
- Proactive decisions will pay dividends now, and more so later
- Take incremental steps to reach objectives
- Reactive position will tend to be more costly



For more information, please contact:

Todd Webster, twebster@envirogen.com, (619)887-1385

Glenn Wensloff, elutriatin@aol.com, (209)603-7350



AN ENGINEERING FIRM SPECIALIZING IN THE DESIGN,
INSTALLATION, CHEMICALS AND SERVICE OF WASTEWATER SYSTEMS

