

Water Conservation Efforts Throughout the Brewery



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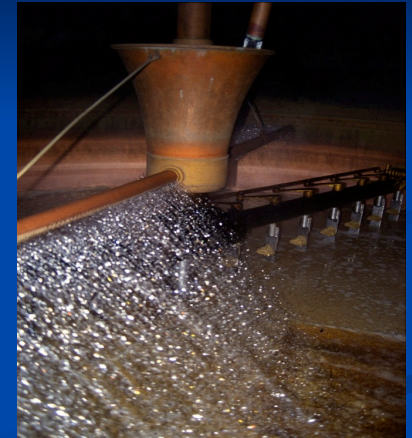
NW MBAA

Sierra Nevada Brewing Co.

4/26/2013

Brewery, Taproom, and Big Room

- Water Source and Utility Company relationship.
- Water Audits Throughout the Company.
- Water Usage Measurement.
- Success Stories.
- Future Plans.



Butte County, Ca. Water Source

- Underground Aquifer Source.
- Utility is Cal Water.
- Cal Water responsible for chlorination and overall water quality.
- SNBC is Cal Water's largest customer in Butte County.
- Close relationship between the two parties, including partnering on conservation efforts.

Employee Education

- Periodic employee training and awareness sessions with the Water Service Group.
- Familiarize employees with the company measurement matrix.
- Have the utility company relate home usage and billing to brewery usage and billing.
- Management support is important for success.



Water Audits Presently in Place At SNBC

- Plant-wide CIP Audits.
- Plant Sanitation Audits.
- Fuel Cell Energy/Solar Audits.
- East and West Brewhaus Audits.
- Cooling Tower Audits.



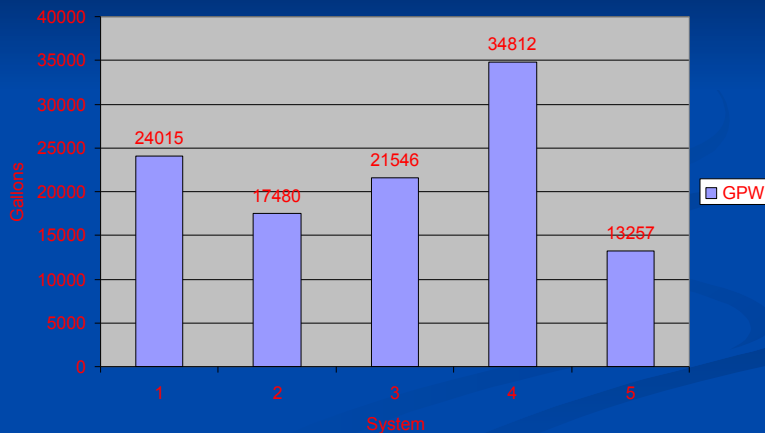
Clean In/Out of Place Audits



- City Water Flow Meter installed on the supply side of the main CIP area
- Water use totals are captured by individual CIP system.
- Automatic programs adjusted to realize water savings.

CIP System Water Tracking

Weekly Average Water Usage Per CIP System



Clean In/Out of Place Audits

- Burst rinsing incorporated, depending on spray device.
- Reduced “feed” tank volumes, both detergent and acid. (Up to 50 gall./CIP).
- For COP, incorporated test strips or pH strips for more accurate rinses. (25 gall.).
- Complete rebuilds of any system over 7 years to alleviate leaks. (YTD).



Plant Sanitation Audits

- Study the habits of our plant cleaning crew.
- Eliminate open ended hoses. Use spray guns instead. (3 gpm instead of 15 gpm).
- Incorporate “Water Brooms” to use on flat surfaces and roof tops. (5 gpm / 15 gpm).
- Truck wash uses pressure washer instead of hoses. (5 gpm / 15 gpm).



Fuel Cell Energy/Solar Audits

- RO feed to the Fuel Cells monitored for over-use/leaks.
- Waste heat captured as condensate and sent back to the boiler system. (15% of the boiler make up).
- Solar arrays monitored for performance and pressure washed only when performance drops below 90%.



East and West Brewhaus Audits

- CIP Systems optimized similar to above, including system re-build.
- Wort cooler CIP isolated from the wort line and run more often for increased efficiency and less CIP water usage.
- Steam from kettles sent to a condenser to heat incoming city water for service use.

Cooling Tower Audits.

- Flow meters installed on the makeup and bleed lines of 10 towers.
- Monitor cycling for best practice.
- Share loading between systems.
- Scheduled clean-outs for better performance.



Cooling Tower Audits



- Analyze makeup versus blow down ratio.
- Evaluate current chemistry treatment.
- Establish medium between the two.

Cal Water Audit Assistance



- SNBC Taproom Audit.
- SNBC “Big Room” Audit.
- SNBC Employee Training Session.

Taproom/Big Room Audit

- Cal Water uses third party source for audits.
- Data collected during the onsite inspection and subsequent interviews with site staff.
- All equipment and plumbing fixtures are inventoried for water use.
- Recommendations detailed by water savings amount and ROI.

Water Use Categories



- Kitchen Water – 73.4%
- Sanitary Water Use – 22.8%
- Janitorial Water Use – 3.1%
- Irrigation – 0.2 %

Taproom/Big Room Audit Results

- Replace Bathroom Faucet Aerators – 208,692 gallons/yr. Immediate payback.
- Retrofit flush valve toilets w/ updated flush handles – 76,296 g/yr. 0.7 year payback.
- Install Air-Cooled Ice Machine – 834,768 g/yr. 1.5 year payback.
- Replace Pre-Rinse Spray Valves – 261,052 g/yr. Immediate payback.

Water Purification Process

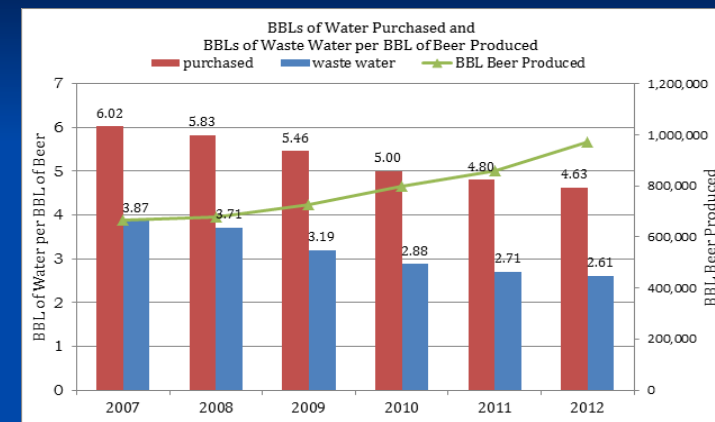
- Plant designed to handle all brewing process waste.
- Large EQ Tank prior to the anaerobic reactor.
- Reactor reduces COD loading by 75-80%.
- ADG is captured and burned as fuel on-site.
- Reactor effluent feeds aerobic digester.
- Periodic sludge removal and compost.
- Aerobic COD reduction at 95%.

Water Usage Measurement Matrix

- Monthly measurement of the amount of beer packaged compared to the total city water supply. (2013 goal is 4.25).
- Monthly measurement of the amount of beer packaged compared to the total water treated. (2013 goal is 2.75).



Beer to Water/Wastewater



Completed Conservation Projects



- Dry Chain Lube in Bottling (Potential 1M gallon savings per year).
- Filler Vacuum Pump and Rinsers Water Recovery. (Potential 1M gallon savings per year).
- CIP Water Reduction.

Future Conservation Projects

- Optimization of Deaerated Water Process.
- Reducing Water Tank Overflows Utilizing Level and Timing.
- Dry Chain Lube in the Racking Area.



Future Conservation Projects

- Elimination of tank fills to evacuate CO2 after beer processing.
- Rinse return to CIP system for re-use in other processes.
- Hot sanitation water returned to service water tank.

Future Conservation Projects

- Reduction of cooling tower water supply by 40%
- Reduction of cooling tower blow down discharge by 60%
- Goals to be achieved by optimization of chemistry and on-board set points.



In Closing

- Look at “low-hanging fruit first”.
- Refer to the local water utility company for ideas/suggestions.
- Educate employees, with the help of the local water utility company.
- There are many opportunities in the brewery for big ticket savings ideas.



Thanks

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