

Research Grant from the Michigan Grape and Wine Industry Council awarded to 5 Lakes Energy  
791N6600209

January – September 2016

## **Pilot Measurement of Water Use in Wineries**

**Final Report** - September 15, 2016

### **Goals and Objectives:**

Statement of Work

1. Reduce the cost of installing and using flow meters to track winery discharge flow rates
2. Consolidate information for wineries about types of flow meters, monitoring systems and BMPs.
3. Establish a benchmark for winery wastewater discharge for wineries to use during interaction with DEQ and to implement water conservation strategies
4. Educate wineries and their staff about implementing cost effective conservation strategies.

### **Activities/ Timeline:**

Research the different flow meters available to wineries to measure effluent flow from winery operations – January to August 2016

Review guidance documents regarding winery wastewater discharge monitoring from other wine regions – April to August 2016

Develop a water management handout for Michigan wineries - posted at <http://5lakesenergy.com/mi-sustainable-wines/>

Engage technical experts from Washington State (Shaila Cook – environmental engineer) and Michigan (Erin Gerber from Lakeshore Environmental Inc.) to consider suitable flow meters for use by Michigan wineries – January to August 2016

Communicate with industry members of the Sustainability Steering Committee and the Research and Education Committee of the Michigan Grape and Wine Industry Council – April to August 2016

### **Results:**

Research from other regions provides benchmarks for water use for typical winery operations (see resources) but each winery will need to gather specific information about its particular situation. Water use in the wine industry is frequently represented as a ratio between gallons of water used to produce a gallon of wine. Data from other North American wine regions indicate that this ratio can be anywhere from 2.9:1 (2.9 gallons of water used to produce one gallon of wine) up to 8:1.

Water flow through Michigan wineries varies throughout the year and from winery to winery due to several factors:

1. Winery layout including plumbing systems, CIP (clean in place) system for tank washing

2. Degree of separation of water for non-winemaking uses (eg. Tasting room, lodging, kitchens, staff facilities)
3. Operational season – eg. Crush, bottling
4. Size of winery

This makes it challenging to find one meter that can be recommended for installation at several Michigan wineries in a pilot situation. The high cost of effluent flow meters remains a challenge for the industry. Some wineries have chosen to adopt other means to estimate wastewater volumes, such as measuring inflow volume by winemaking operation and developing models to project monthly discharge volumes. For example, if hoses are the only point of use throughout the production area, simple hose meters can be used (\$100-\$300 each).

Erin Gerber from Lakeshore Engineering compiled some information (see Appendix) comparing several flow meters that may be applicable for monitoring winery wastewater volumes. All of the meters identified have some limitations, which adds to industry reluctance to purchase meters that may not provide the desired data. The effluent meters range in price from \$2000 to \$11,000.

Erin Gerber arranged for a technical representative from Greyline Instruments, Inc. ( Mike Ballard ) to visit Chateau Chantal (Brian Hosmer) on July 13, 2016 to discuss one winery's particular situation and test some potential meters. Greyline was able to provide a summary of options available for this application, however no one meter was selected as the "perfect" meter for this application. Cost of equipment and installation remained a concern, with no available written guarantee of function in this special application.

#### **Resources:**

**Washington State** WineryWise Water Management Checklist (2012)

<http://www.winerywise.org/files/Winerywise%20%20Water%20Management.pdf>

**California** Comprehensive Guide to Sustainable Management of Winery Water and Associated Energy (2008) <http://www.wineinstitute.org/winerywaterguide>

[http://www.sustainablewinegrowing.org/webresource/4/Water\\_Resources.html](http://www.sustainablewinegrowing.org/webresource/4/Water_Resources.html)

**Guide for Small Wineries-** California

[http://www.sustainablewinegrowing.org/docs/CSWA\\_Sustainable\\_Water\\_Management\\_Guide\\_for\\_Small\\_Wineries.pdf](http://www.sustainablewinegrowing.org/docs/CSWA_Sustainable_Water_Management_Guide_for_Small_Wineries.pdf)

Monitoring and Reporting Program No. R1-2002-0012 For General Waste Discharge Requirements for Discharges of Winery Waste to Land

[http://www.swrcb.ca.gov/northcoast/publications\\_and\\_forms/available\\_documents/general\\_winery\\_wdr/pdf/050102generalmrforwineries.pdf](http://www.swrcb.ca.gov/northcoast/publications_and_forms/available_documents/general_winery_wdr/pdf/050102generalmrforwineries.pdf)

Case Study: California

<http://www.flowcontrolnetwork.com/case-study-california-winery-achieves-green-wastewater-process-with-submersible-pump-setup/>

Evaluation of constructed wetland treatment performance for winery wastewater

<http://www.ncbi.nlm.nih.gov/pubmed/14587952?dopt=Abstract>

Winery and distillery wastewater treatment by constructed wetland with shorter retention time

<http://www.ncbi.nlm.nih.gov/pubmed/20453335>

**British Columbia** – Sustainable Practices for B.C. Wineries (2016)

<http://www.winerywise.org/files/Winerywise%20%20Water%20Management.pdf>

**Michigan DEQ Guidance** for the Design of Land Treatment Systems Utilized at Wineries (2015)

[http://www.michigan.gov/documents/deq/wrd-groundwater-p22-winery-wastewater\\_507849\\_7.pdf](http://www.michigan.gov/documents/deq/wrd-groundwater-p22-winery-wastewater_507849_7.pdf)

**Lakeshore Environmental Inc.** - A Study on the Effectiveness of Onsite Wastewater Treatment Systems for Michigan Wineries (2015)

<http://www.lakeshoreenvironmental.com/wp-content/uploads/2015/07/Final-Report-Winery-Study-791N4300099-FINAL.pdf>

### **Conclusions:**

In August 2016, after reviewing the information gathered in the resource review phase of the project and the field meeting at Chateau Chantal, Linda Jones and Liesl Clark from 5 Lakes Energy recommended that the project be revised to eliminate the purchase of several flow meters for use by Michigan wineries, as initially envisioned as part of this project. The high cost of meters and inaccurate results that may be obtained from their use prompted the project team to recommend that other approaches to addressing the challenges of winery wastewater management may be more beneficial to the industry.

### **Recommendations:**

With input from the Michigan Grape and Wine Industry Council, 5 Lakes Energy recommends that information regarding winery wastewater management be developed for both existing and start-up wineries to help wineries identify the best monitoring programs for their particular facility and production volume growth projections. This work to develop information bulletins can be completed as

part of the Council’s USDA Specialty Crop Block Grant on Sustainable Wines: Education and Outreach. One handout has been completed and another is in development for start-up wineries. The current SCBG grant will conclude on March 31, 2017.

5 Lakes Energy also recommends that if the Michigan Grape and Wine Industry Council wishes to continue to pursue the identification of one or more suitable meters to measure effluent flow at wineries, that a technical expert be engaged directly by the Council and a larger budget for the project may be required.

**Budget:**

**Summary:**

	Original Proposal	Actual Expenditures
Salaries and Wages	\$8,700	\$3,180.30
Materials and Supplies	\$5,800	\$0
Travel	\$500	\$0
<b>TOTAL</b>	<b>\$15,000</b>	<b>\$3,180.30</b>

Budget was spent on time for 5 Lakes Energy to coordinate discussions with Erin Gerber (Lakeshore Environmental Inc.), Shaila Cook (State of Washington – winery environmental consultant) and steering committee members, gather and summarize outcomes from these discussions and develop one handout for the industry. Ms. Gerber and Ms. Cook charged fees for their participation in this project.