# **IMPACT**

# Minnesota Technical Assistance Program

## 2019 Annual Report





Submitted to the Minnesota Pollution Control Agency Original Publication: March 2020

# About MnTAP

The Minnesota Technical Assistance Program (MnTAP) is an outreach and assistance program at the University of Minnesota, School of Public Health, Division of Environmental Health Sciences. MnTAP helps Minnesota businesses and organizations develop and implement tailored solutions that prevent pollution at the source, maximize efficient use of resources – including water and energy – reduce costs, and improve public health and the environment.

Realizing a need for waste reduction and pollution prevention assistance, the Minnesota legislature amended the Waste Management Act in 1984 to "provide for the establishment of technical and research assistance for generators of hazardous and industrial waste in the state." The Minnesota Toxic Pollution Prevention Act, enacted by the legislature in 1990, directed the Minnesota Office of Waste Management to "establish a pollution prevention assistance program" for all persons in the state using, generating, or releasing toxic pollutants, hazardous substances or hazardous wastes. Today, the Minnesota Pollution Control Agency (MPCA) supports this assistance with funding to the University of Minnesota, School of Public Health to support MnTAP efforts across the state. MnTAP has leveraged direct funding to win additional competitive grant funding totaling 33% of the FY2019 budget.

Pollution prevention technical assistance is customized for businesses through site visits, student internships, the Minnesota Materials Exchange, workshops and website resources. Since MnTAP's inception in 1984, staff members have

- Conducted over 4,850 site visits at facilities throughout the state
- Provided solutions saving businesses \$54.3 million in first year savings through avoided costs
- Helped businesses avoid regulatory burdens and reduce their environmental impact

Savings resulting from MnTAP assistance can be reinvested by businesses for improvements, expansions and new jobs while supporting local economies, preserving Minnesota's natural resources and promoting regional public health.

### MnTAP Staff Members



Front: Carol Wiebe, Nathan Landwehr, Laura Babcock, Shelly Ring, Alaina Ryberg
Middle: Frank Strahan, Daniel Chang, Matt Domski
Back: Paul Pagel, Brent Vizanko, Jon Vanyo, Jane Paulson, Michelle Gage

Not shown: Taylor Borgfeldt, Karl DeWahl, Joshua Kirk



Laura Babcock, PhD Director

**Taylor Borgfeldt** Pollution Prevention Specialist

**Daniel Chang** Associate Engineer

Karl DeWahl, CEM Senior Team Leader (Retired)

Matt Domski Waste Prevention Specialist

**Michelle Gage** Engineer, Risk Assessment Specialist

Joshua Kirk Associate Engineer

Nathan Landwehr Waste Prevention Specialist/ Intern Program Administrator

### Paul Pagel, CEM

Senior Engineer/ Intern Program Coordinator

Jane Paulson Senior Engineer

**Alaina Ryberg** Website Designer

Francis Strahan IT Supervisor

Jon Vanyo, CEM Engineer

**Brent Vizanko** Associate Engineer

Carol Wiebe Communication Specialist

© 2020 Regents of the University of Minnesota. All rights reserved. The University of Minnesota is an equal opportunity educator and employer.

### **Director's Note**

### **Technical Assistance Delivered Across Minnesota**

			<b>.</b>
lah	le	ot	Contents
IUN	10	<b>U</b> 1	Contents

Director's Note 3	
MnTAP Impact 4	
Executive Summary 5	

#### **MnTAP Activities**

Onsite	Assistance	6
--------	------------	---

#### Grant-Funded Projects List ......9

Energy Reduction in Wastewater ......10

HAP and VOC Air Emission in Phillips ......11

Safer Products: North Minneapolis .....12

Sustainable Spirits ...... 12

TCE Alternatives Project......14 Nutrient Optimization in

Wastewater Treatment....15

Upstream Nutrient Reduction......16

Electrification of Transport Refrigeration Units ......17

Energy Efficiency in Drinking Water ......18

Safer Dry Cleaning...... 19

### **Director's Note**

MnTAP celebrated a milestone anniversary in 2019 - **35 years** of providing high quality technical assistance to industrial facilities across Minnesota! Celebrating MnTAP's past



achievements, looking forward to projects designed to help Minnesota businesses improve their environmental and sustainability performance along with designing an anniversary logo dotted the highlights for the year. Outcomes include, assistance provided to over 400 organizations across the state with 124 site visits to 78 unique facilities. Fifty-five facilities have implemented 95 MnTAP recommended process changes and realized reductions total over 29.5 million gallons of water, 507,000 pounds of waste, 6.1 million kWh and 55,000 therms of energy. Combined, these reductions are saving companies \$1.1 million annually.

### Highlights of MnTAP's efforts in 2019 include:

- Completed a three year outreach to businesses in the Phillips Communities, Minneapolis to implement emission reduction and less hazardous chemical use in foundry, automotive repair, janitorial, child care and restaurant sectors. Safer products implemented at small businesses in this community reduced 3,800 lbs hazardous materials, 1,000 lbs VOCs and 540 lbs HAPs.
- Developed a cohort approach to training wastewater treatment operators on identifying and implementing energy efficiency actions at wastewater treatment facilities.
- The 2019 MnTAP Intern Program supported 16 student projects engaging 44 companies and 6 funding partners to make recommendations for waste, water and energy efficiency with an **economic value of nearly \$2.4 million when fully implemented.**

MnTAP continues to contribute to Minnesota's economic well-being by reducing waste at the source and training the next generation of engineers through the MnTAP Intern Program and student research projects. This report is an attempt to share stories about the value found in the wide-ranging projects MnTAP staff supported in 2019. The companies and organizations engaged in these projects are making their businesses more resilient by reducing waste, optimizing processes and saving money. This is good business for Minnesota. We thank our clients, partner organizations and sponsors for the opportunity to work with them in 2019, and we look forward to serving YOUR business in 2020.

### Laura Babcock Director, Minnesota Technical Assistance Program

### MPCA's Long Term Goals

#### Water

- Pollution to Minnesota surface waters and groundwater is reduced or prevented.
- Reduce chloride entering surface water
- Achieve wastewater pollutant reduction goals and maximize cost effectiveness of public infrastructure investment

#### Land

- Solid waste is managed to conserve materials, resources and energy
- Reduce food waste from businesses by generating less and rescuing and recycling more

#### Air

- Ensure ambient air quality is better than air quality standards and benchmarks
- Improve air quality in population centers.
- Reduce Minnesota's GHG emissions from transportation

### MnTAP Contributes to Minnesota's Economic Well-Being

MnTAP Impacts 2015-2019							
Number of Companies Assisted 1,488							
Water Deduction (rel)	Recommended	641,000,000					
Water Reduction (gal)	Implemented	183,700,000					
Floatric Energy Deduction (1/)/(1)	Recommended	37,400,000					
Electric Energy Reduction (kWH)	Implemented	18,300,000					
Masta Daduatian (llas)	Recommended	15,300,000					
Waste Reduction(Ibs)	Implemented	3,600,000					
	Recommended	1,600,000					
Gas Energy Reduction (therms)	Implemented	620,000					
CoatSovinzo	Recommended	11,500,000					
Cost Savings	Implemented	5,600,000					





2019 Outcomes								
	Waste			Energy		Water	Savings	
Activity	Air Emissions (lbs)	Hazardous Waste (lbs)	Non-Hazardous/ Solid Waste (lbs)	Electric (kWh)	Gas (therms)	(Gallons)	(\$)	
Site Visits	43,400	109,000	64,000	836,000		121,000	\$90,000	
Interns	400	51,000	235,000	5.3 million	55,000	29.4 million	\$1,030,00	
Materials Exchange			4,100					
TOTALS	.\$ 506,900		6.1 million	55,000	29.5 million	\$1,120,000		

2019 Outputs						
Technical Assistance Activity	2017 Results	2018 Results	2019 Results			
Contacts (calls/emails/meetings)	599	991	1,198			
Requests for Assistance	41	85	92			
Total Staff Site Visits (unique facilities)	113 (69)	110 (74)	124 (78)			
Student Interns	17	14	16			
Materials Exchanges	77	91	210			
Events and Presentations	53	44	40			
Publications	45	46	30			
MnTAP Website Unique Visits	65,400	35,000	40,000			

### **MnTAP** Activities

### **On-Site Assistance**

#### 2019 Outputs

124 on site visits 78 unique facilities 92 requests for assistance

#### 2019 Outcomes

507,000 lbs waste plus 250,000,000 lbs non-compliant water discharge 29.5 million gallons water 6.1 million kWh 55,000 therms \$1,120,000 annual savings

### What they said...

"For 35 years, Minnesota businesses and industrial facilities have benefited from the creative solutions found by MnTAP's talented group of engineers, scientists and interns. Their partnership has been instrumental in helping MPCA achieve our goals of conserving resources, preventing pollution and strengthening Minnesota's economy." - Mark Snyder, **Pollution Prevention** Coordinator, MPCA

#### 2019 Goals

Conduct 5,000 site visit hours at 100 different facilities to identify opportunities for companies to prevent waste and pollution and conserve resources including water and energy. Support Minnesota businesses by responding to questions on waste generation and resource utilization.

#### 2019 Accomplishments

During site visits, MnTAP staff members analyze the current production situation, research possible alternatives for reduction, and complete a report with specific recommendations to the organization for material, water or energy utilization improvement. MnTAP staff made **250 recommendations with a value of \$2.58 million** for resource conservation at Minnesota businesses in 2019 from all onsite services. Of the recommendations made during **2019 engagements**, **64 (or 26%) have been implemented in the same year they were recommended**.



#### **2019 First Year Implemented Recommendations**



### **MnTAP Celebrates 35 Years of Pollution Prevention Assistance**

During 2019, Minnesota Technical Assistance Program (MnTAP) celebrated 35 years providing no-cost, confidential pollution prevention technical assistance to Minnesota businesses. In 1984, a small group formed at the University of Minnesota in the School of Public Health to promote waste minimization and pollution prevention for businesses across Minnesota in an effort to improve public health and the environment. Over the years, MnTAP staff built the foundation for strong, relationship-based technical assistance still practiced today. The hazardous material management challenges faced by businesses continue to change but maximizing resource utilization and minimizing cost always seem to make good business sense.

Over the past 35 years there have been 63 MnTAP staff members and nearly 300 MnTAP student interns. Past and present MnTAP staff and interns have worked to help Minnesota businesses create first year savings of:

- 400 million pounds of solid and hazardous waste from being generated
- 800 million gallons of water from being used unnecessarily
- \$53 million to strengthen Minnesota businesses

### **MnTAP** Activities

### **On-Site Assistance: Intern Program**

#### 2019 Outputs

16 intern projects serving 44 companies 22 company applications 159 student applications 16 articles and promotions placed externally

### What they said...

"Our MnTAP intern was truly motivated to make a difference in our plant operations. After some discussions about water savings opportunities, he investigated solutions, proposed equipment and assisted in the installation. The results were immediate savings of water and some potential projects for future implementation."

> - Mike Cloud, Engineering Manager, Ball Corporation St. Paul

### **Funding Partners**

Minnesota Pollution Control Agency CenterPoint Energy Metropolitan Council Environmental Services Clean Water Land and Legacy Amendment United States Environmental Protection Agency

Xcel Energy

Environment and Natural Resources Trust Fund



#### 2019 Goals

Place students and interns with businesses to identify and implement pollution prevention, green chemistry and energy efficiency solutions.

#### 2019 Accomplishments

#### MnTAP guided 16 intern projects in 2019.

MnTAP interns come from a variety of disciplines. In 2019, chemical, mechanical, bioproducts and biosystems, environmental engineering as well as sustainable systems management and chemistry were represented. Most interns came from the University of Minnesota - Twin Cities campus, while one came from the University of Minnesota – Duluth Campus and one came from the University of Illinois – Urbana-Champaign. This summer's projects focused on water



conservation, energy efficiency, waste reduction and alternative chemical use as shown in the chart at right.

Read more about MnTAP's intern projects in our annual program summary, Solutions: <a href="http://www.mntap.umn.edu/resources/solutions.html">www.mntap.umn.edu/resources/solutions.html</a>

### 2019 Outcomes - Intern Program Implementation

	Waste (lbs)			Enei	зy		
Project Year(s)	Air Emissions (lbs)	Hazardous Waste (lbs)	Non-Haz/ Solid Waste (lbs)	Electricity (kWh)	Gas (therms)	Water (gallons)	Savings
2015		98,500	156,100	2.0 million	238,000	15 million	\$673,000
2016		6,000	548,000	898,000	28,700	44.2 million	\$478,000
2017	4,400	39,300	344,000	1.5 million	192,000	28.1 million	\$807,000
2018	12,000	44,500	268,000	4.5 million	59,000	17.5 million	\$731,000
2019	400	51,000	235,000*	5.3 million	55,000	26 million	\$1,030,000

\* Additional 250,000,000 lbs of noncompliant wastewater reduction

### Partner Highlight: North Memorial and CenterPoint Energy

CenterPoint Energy has been a MnTAP funding partner for many years, helping make natural gas conservation intern projects a reality. In 2019 CenterPoint Energy supported an impressive boiler focused project at North Memorial Health Hospital in Robbinsdale, MN. North Memorial was looking for help with the calculations needed for a couple hefty boiler system upgrades including the installation of a smaller boiler for summer use and researching economizer configurations. The intern was able to provide concise savings estimates on these projects as well as make recommendations on insulating steam traps and fittings, decreasing steam pressure, and employing smart HVAC control of rooms throughout the hospital. In total, the intern recommended changes that could save North Memorial 281,000 therms and \$129,000 per year.

### **MnTAP** Activities

### **General Outreach & Communications**

2019 Outputs

10 MnTAP E-newsletters

415 tweets

1 Solutions intern program magazine

40 presentations and training events

3 webinars

1 radio interview

30 external publication articles

### 2019 Outcomes

22% open rate of Source E-news

22% open rate of special outreach e-mails

1 award received

### 2019 Goals

Develop and disseminate technical information for Minnesota businesses to help them implement pollution prevention and energy efficiency practices and technologies. Promote MnTAP services and results through publications and presentations.

### 2019 Accomplishments

Communication methods included electronic newsletters, targeted email campaigns, project-specific printed materials and webinars. Highlights include:

- Celebrated MnTAP's 35th Anniversary at a reception held during the annual Intern Symposium. This included a 10-minute video from Dr. William Toscano and a presentation from the MPCA, EPA, and a keynote presentation from a past intern.
- To closer follow our mission statement, the printed Source newsletter was converted to a monthly e-newsletter and is sent to almost 4,900 monthly.
- MnTAP staff presented at 40 events ranging from the Neighborhood Concerned Citizens Group about TCE to presenting at the Dakota County Master Recycler class.
- Created informational handouts in both English and Spanish to raise awareness of safer cleaning products and where to buy them for consumers in the Phillips Community.

### 2019 Online Audience

- The MnTAP website had almost 49,000 page views (every time a page is viewed) during the year, most arriving via an organic search for "technical assistance." In total, our web site had 40,000 unique page views (from the same person, on the same page, in the same session, and just counted as one). Our home page was the most often first visited page.
- Our tweet posts received over 163,000 impressions. An impression is how many times a tweet appears in someone's time-line.
- 3,940 unique visits from Twitter postings linked directly to our web site.





### Driven to Discover Campaign: Clean Water on Tap

MnTAP was honored to be a part of the University's multimedia 2019 Driven to Discover campaign. This year's campaign was to build awareness of MnTAP's and other University efforts to help preserve Minnesota's clean water resources. When towns and businesses tap MnTAP expertise, costs drop and water quality rises.

The MnTAP campaign was centered on the Glacial Lakes Sanitary Sewer & Water District (GLSSWD) project that is working to find efficient ways to reduce the "nutrient load," namely phosphorus and nitrogen from the outflow of the wastewater treatment plant. By optimizing the current wastewater facility, the water district avoids costly upgrades. In addition, the water that Minnesota sends down stream is cleaner, relieveing some of the load for communities along the length of the Mississippi river.

### 2019 Goals

Target technical assistance services to new business sectors and clients while leveraging state investment to attract additional resources for focused projects.

Project & Funding Source	Highlighted Activities	Page
Energy Reduction Training for Wastewater Treatment Plants CARD Grant MN Department of Commerce, Division of Energy Resources	Create an energy efficiency training program to meet the technical needs of small to medium sized wastewater plants. Develop a model conservation program that individual utilities can used to provide energy conservation resources to their wastewater plant customers.	10
HAP and VOC Air Emission Reduction in Phillips EPA Region 5	Encourage source reduction of air emissions from both small and large businesses in the Phillips Communities through site- based technical assistance and intern projects.	11
Safer Products: HAP and VOC Reductions from Degreasing Operations in North Minneapolis Sustainable Spirits Minnesota Pollution Control Agency Environmental Assistance Grant	Work with community partners to assist commercial and industrial businesses in North Minneapolis to reduce air emissions through adoption of less toxic, lower-emission, alternative degreasing solvents. Develop an outreach and technical assistance model to engage craft breweries and distilleries to reduce environmental impacts and production cost.	12
Industrial Water Conservation Metropolitan Council Environmental Services Water Supply Planning Unit	This project seeks to improve the efficiency of water use in industries throughout the Twin Cities area. This work is accomplished by MnTAP Interns.	13
TCE Alternatives Project MPCA - Resource Management and Assistance Division	The TCE Alternatives Project focuses on helping Minnesota businesses replace trichloroethylene (TCE) with safer, yet effective alternatives while avoiding regrettable substitutions.	14
Nutrient Optimization in Wastewater Treatment Legislative-Citizen Commission on Minnesota Resources (LCCMR)	This project seeks to improve the removal efficiency of nitrogen and phosphorus (nutrients) from wastewater treatment plants and ponds throughout Minnesota through research and intern projects.	15
Upstream Nutrient Reduction in Wastewater Treatment Legislative-Citizen Commission on Minnesota Resources (LCCMR)	The primary goal of this project is to partner with MN communities and their facilities that feed high-nutrient wastewater to treatment plants and ponds to decrease load to treatment facilities and improve outflow water quality.	16
Electrification of Transport Refrigeration Units - Reducing Air Emissions EPA Region 5	This project is a source reduction study focused on character- izing the benefits of running transportation refrigeration units (TRUs) on electricity while they are parked at the dock.	17
Energy Efficiency in Drinking Water Conservation Applied Research & Development Grant MN Department of Commerce, Division of Energy Resources	A study of municipal drinking water supply energy efficiency opportunity in a range of Minnesota facilities.	18
Safer Dry Cleaning Minnesota Pollution Control Agency	Develop an outreach and technical assistance program to engage dry cleaning facilities and facilitate the transition from PERC to less hazardous systems.	19

### Energy Efficiency Training for Wastewater Treatment Plants Conservation Applied Research and Development (CARD) Grant

### 2019 Outputs

Final Report 1 Public Presentation 1 Public Webinar

### 2019 Outcomes

32,000,000 kWh of estimated total energy savings potential in Minnesota

### Partner

Center for Energy and Environment

### Sponsors

MN Department of Commerce, Division of Energy Resources

Conservation Applied Research and Development (CARD) Grant

### **Project Overview**

The purpose of this project was to create an instructor led, cohort based energy efficiency training program for small to mid-size mechanical wastewater treatment plants across Minnesota. The training provides instruction and support for operations staff to enable them to identify and implement low and no-cost energy conservation opportunities that they can test at their facilities. Delivering this training through a cohort model is a central feature to this program to cost effectively reach more facilities across the state and build a culture of continuous energy utilization improvement.

The training consists of four modules:

- Module 1: Benchmarking and Footprinting
- Module 2: Secondary Aeration Efficiency
- Module 3: Biosolids Aeration Efficiency
- Module 4: Results and Continuous Improvement

After each module, operators will be encouraged to discuss solutions at their plants. The cohort format builds guidance and mentorship into the process, allowing operators to consult with each other and the instructor as they test and implement energy conservation opportunities.

### **Future Plans**

A logical continuation of this project would be for a group to use these training modules to start training cohorts of wastewater treatment operators and implement energy efficiency opportunities throughout Minnesota's wastewater treatment plants.



### **Cohort Preview**

A group of operators from five wastewater plants located in similar geographic locations in Minnesota will meet in one of the cohort towns. Operators will learn and discuss steps towards implementing energy efficiency opportunities. The team will then tour the local wastewater treatment plant, and as a group will talk through an implementation plan for the local facility. Operators will then return to their facilities to implement similar solutions. The full team will have a project update call after a couple of weeks to talk through the successes and barriers of this month's implementation goal. As a group, the cohort will provide guidance to operators struggling with implementation on how to overcome the barriers they are seeing. Empowered and encouraged, operators will return to finish implementation of the energy efficiency opportunities. The next month will begin the next module, and the group will meet again to focus on another energy efficiency opportunity.

### HAP and VOC Air Emissions in the Phillips Neighborhood

#### 2019 Outputs

1 intern project

11 assessments at small facilities

32 safer product substitutions

### 2018 Outcomes

5 lb VOC Reduced 105 lb HAP Reduced 1200 lb Hazardous Materials Reduced

### Sponsors

U.S. EPA, Region 5

### **Project Partners**

Hope Community Lake Street Council Franklin Area Business Association

### **Project Overview**

2019 was the final year for this 3 year project which aimed to reduce emission of hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) in the Phillips Communities of Minneapolis. The primary objective was to encourage source reduction of air emissions from both small and large businesses in the Phillips Communities through site-based technical assistance in the form of MnTAP staff assessments and MnTAP intern projects. Large businesses were engaged through MnTAP assessments and a 2017 intern project. Small businesses were engaged through intern projects with a focus on automotive repair shops in 2017, janitorial products in multifamily housing in 2018, and restaurant and child care facilities in 2019. In total, 4 large businesses and 41 small businesses participated in the project, with implemented reductions of 1,000 lb/yr VOC, 540 lb/yr HAP, 3,900 lb/yr hazardous materials, 142,000 kWh/yr electricity and annual savings of \$8,700.

### 2019 Activities

- Researched the safety and regulatory environment surrounding the use of quaternary ammonium compounds (QUATs) and bleach for sanitization and disinfection.
- Analyzed ingredients for 87 chemical products identifying HAPs, VOCs, bleach, and QUATs and recommended replacements for products that did not meet safety criteria.
- Conducted a MnTAP Intern project in the Phillips Communities focused on safer janitorial, sanitizing, and disinfection products for restaurants and childcare facilities. http://www.mntap.umn.edu/interns/pastprojects/2016-2020

### Key Findings

Bleach and QUATs are commonly used in disinfectants and sanitizers, but each are attributed to negative human health effects. Bleach is a known asthmagen, and QUATs are known endocrine disrupters, which can cause developmental problems. Hydrogen peroxide based products offer a safer option for sanitizing and disinfecting. However, the restaurant and childcare industries are highly regulated, and in some cases these regulations present barriers to making a change to safer products. For example, at this time there is no sanitizer for food contact surfaces that meets regulatory requirements and does not contain either bleach or QUATs. Cost is another barrier, as the peroxide products are often 2 to 10 times the cost of bleach. Despite these barriers, many businesses are very interested in improving worker and community health, as evidenced by the 7 companies who made the switch to eliminate a total of 1,100 lbs of bleach and QUATs from the community each year.



### Project Success: EPA Region 5 Award for Excellence

During the Minnesota Technical Assistance Program (MnTAP) 35th Anniversary celebration, Christine Anderson, Environmental Specialist and Pollution Prevention Coordinator with U.S. Environmental Protection Agency, Region 5 presented MnTAP with the U. S. Environmental Protection Agency Region 5, Regional Administrator's Award for Excellence.

This award was to recognize collaborative partnerships to reduce hazardous pollutants in the automotive sector. MnTAP has worked to develop and refine this collaborative partnership model through efforts in Duluth, Minneapolis, and with businesses throughout the Twin Cities area in order to share it with others here and throughout the country.

### Sustainable Spirits

#### 2019 Outputs

2 assessments at craft breweries

#### 2019 Outcomes

Implemented savings: 52,000 kWh energy savings 154,400 gallons of water 270 therms \$4,350 annual savings

> Recommended savings: 16,000 kWh of energy 137,000 gallons of water \$1,400 annual savings

### **Project Partners**

Ecolibrium Iowa Waste Reduction Center

> Sponsors MPCA

### 2019 Project Activities

This project included pass through funds to assist companies in implementing source reduction. Fourteen of the twenty-two recommendations made to companies were implemented using pass through funds. These funds provided LED lighting, low-flow aerators, insulation on boiler piping, and equipment to eliminate single pass cooling.

A Rapid Turnaround model was trialed with this sector as a part of this project. This model aimed to set up the next point of contact with a company within two weeks of the last contact. In the two companies using this method, implementation of pass through items was achieved in 1-3 months as opposed to 6-12 months in other cases. This is especially important for a busy business sector, like craft brewing, when owners have many tasks demanding their attention.

A white paper based on information gathered from the 2017 Fulton Brewing internship was created to inform the industry of how different parts of the brewing process contribute to wastewater loading. Yeast and trub, or the sediment formed while brewing contributes about 2/3 of the effluent load. This information was presented to brewers at the last MCES Microbrewery workshop.

### Choosing Safer Products - HAP and VOC Reductions from Degreasing Operations in a Minneapolis Community

#### 2019 Outputs

Project results and case study for Monte's Auto Repair were presented with a poster session at UROC's Community Day

### **Project Partners**

Urban Research and Outreach-Engagement Center West Broadway Business Coalition

#### **Sponsors**

MPCA Environmental Assistance Grant



### **Project Overview**

This project worked with UROC (the University's Robert J. Jones Urban Research and Outreach-Engagement Center, located in North Minneapolis), and other community partners, to assist commercial and industrial businesses in North Minneapolis to reduce air emissions through adoption of less toxic, lower-emission, alternative degreasing solvents. MnTAP identified companies using degreasing products, assessed the hazard of their current products, and provided information and samples for less hazardous alternatives.

O'Reilly Brake Cleaner Comparison						
Product	VOC Content	HAP Content				
Non-Chlorinated Brake Cleaner #72408	70%	70%				
Ultra Low VOC Brake Cleaner #46580	10%	0%				

### Project Success: Monte's Auto Repair

Monte's helped make North Minneapolis air safer by switching to a safer brake cleaner solvent that reduced VOC emissions by 86% and eliminated HAP emissions with no cost increase.

Monte opened his shop in North Minneapolis in 2012 and strives to keep repair costs low. Building relationships and trust with his customers is a very important part of providing good customer service. Their friendly staff do all types of auto repair and enjoy discussing the process with their customers.

MnTAP and Monte's worked with their current supplier, O'Reilly's Auto parts to find a safer degreasing alternative. While O'Reilly's doesn't currently carry the Ultra Low VOC Brake Cleaner #46580, they can order it from the local warehouse in Brooklyn Center and have it available for next day pick up. Monte's trialed a sample and found it performed similarly to the current product. Making this switch reduced their VOC emissions by 86% and eliminated HAP emissions with no cost increase.

### Industrial Water Efficiency

### 2019 Outputs

6 metro-area intern projects

37 proposed recommendations

4 planned recommendations

13 implemented recommendations

### 2019 Outcomes

Intern project water savings projections totaling 26,150,000 gallons

> Recommendations implemented total 12,600,000 gallons

### Sponsors

Metropolitan Council Environmental Services Water Supply Planning Unit

### **Project Overview**

MnTAP's strategic emphasis on water conservation and efficiency assistance in the Twin Cities Metro continued in 2019 with support and direction from the Metropolitan Council Environmental Services (MCES) Water Supply Planning Unit. The 2019 results from six water conservation intern projects had a projected potential savings of over 26 million gallons.

MnTAP will continue this partnership with 5 water conservation intern projects in Summer 2020.

### 2019 Project Activities

- Water conservation recommendation potential for the 6 metro interns totaled over 26,150,000 gallons of water.
- Implementation to date for the six projects has resulted in saving over 12,600,000 gallons.
- A total of nine intern projects across Minnesota in 2019 with a water efficiency emphasis.

### **Presentations and Trainings**

- Motivations and Barriers to Industrial Water Conservation Minnesota Water Resources Conference, 2019
- · Kick-start Efficient Irrigation Minnesota Efficient Irrigation Summit, 2019
- Industrial Water Conservation TURA Resource Conservation Training/ Workshop, Massachusetts, (Planned 2020)
- Industrial Water Efficiency: Solutions that benefit businesses, communities and our future workforce - American Water Works Association (AWWA) Sustainable Water Management Conference, (Planned 2020)



### **Project Success: Ball Corporation**

Ball Corporation is a global leader in innovative, sustainable metal packaging for beverage, personal care, and household products in Saint Paul. The project focused on improving systems for tracking the water usage in different segments of the plant and to reduce the total water consumption of the plant. The 2018 water consumption of the plant was approximately 26 million gallons costing the company \$250,000.

Several of the recommendations involved the reuse of treated wastewater. A system to reuse the water was present for one process, but needed to be cleaned to work properly. In a different process, a pump system was installed to begin to reuse treated wastewater. In addition, compressed air that was used to remove defective cans was replaced by much more efficient blowers.

By making these improvements, Ball Corp will save an impressive 5,733,300 gallons of water. Other recommendations identified opportunities to save 4,700,000 kWh and save \$404,000 annually in energy costs.

### **TCE Alternatives Project**

### 2019 Outputs

8 companies engaged 1 training session 34 people trained from 13 organizations 4 promotional articles

### 2019 Outcomes

3,000 lb TCE eliminated

### **Project Partners**

TURI (Toxics Use Reduction Institute), U Mass Lowell

### Sponsors

U.S. EPA, Region 5 MPCA Water Gremlin Supplemental Environmental Project (SEP)

### **Project Overview**

The goal of the TCE Alternatives project is to decrease air emissions of trichloroethylene (TCE) by working with Minnesota industries to replace TCE with safer, yet effective solvent options. MnTAP will engage Minnesota businesses currently using TCE, and assist them in identification of alternatives through solvent testing and technical assistance. Once suitable alternatives have been identified, MnTAP will provide technical assistance to support qualification and implementation activities. This project aims to identify and overcome barriers for businesses seeking to switch from TCE, and help them to avoid regrettable substitutions such as n-propyl bromide (nPB) and transdichloroethylene (tDCE).

TCE is a hazardous air pollutant (HAP), reportable under Toxic Release Inventory (TRI) and Resource Conservation and Recovery Act (RCRA), and regulated by OSHA. It contaminates soil, air, and water. It is a known human carcinogen and can affect the liver, kidneys, immune, reproductive, central nervous systems, and may affect fetal development. Continued use of TCE exposes companies to health and environmental liability, as well a risk of negative publicity. There are proposals to ban TCE use in cleaning and degreasing at the Federal and Minnesota levels.

The project is funded by a Pollution Prevention grant from the U.S. EPA through MPCA. Continuation of the project is supported with funding from the Water Gremlin Supplemental Environmental Project (SEP). Priority will be given to companies using TCE who are located within Environmental Justice communities, and in the case of the SEP funding, to companies locate within 40 miles of Water Gremlin.

### 2019 Project Activities

- Identified list of potential TCE users using a variety of sources including TRI reports, air permits, NESHAP vapor degreasers, hazardous waste information, and other sources.
- Mapped locations and identified those located within an Environmental Justice area or within 40 miles of Water Gremlin.
- Created project outreach materials and shared with over 120 companies via email. Additional phone outreach contacted another 15 companies.
- Performed assessments of TCE use at 8 companies and created sampling plans for testing at TURI.



### Project Success: TURI partnership helps MN eliminate TCE

In order to facilitate the identification of effective, safer TCE alternatives, MnTAP is partnering with experts from the Toxic Use Reduction Institute (TURI) at the University of Massachusetts Lowell. TURI has worked with dozens of companies to navigate the many options and find less hazardous cleaning processes. In their labs, TURI provides solubility testing to identify the best cleaning products and methods to meet each company's needs. Building on their vast cleaning resources, such as the Cleaner Solutions database and P2OASys, they can assess a variety of safer cleaning products and solvents. They can then add process variables such as heat, agitation, and ultrasonics to identify an effective cleaning process. When none of the usual options are effective, they can also use Hansen Solubility Parameters to identify new materials that can effectively dissolve a difficult substance.

In June 2019, TURI provided a training workshop on strategies for technical assistance for solvent replacement on the University of Minnesota campus. 34 people attended, from industry, technical assistance, and regulatory agencies. Training topics included project background, cleaning history and TCE alternatives, case studies, an overview of a site visit, an introduction to the CleanerSolutions and P2OASys Assessment Tools, and details on laboratory testing process and implementation. They also covered where and how TCE is used in a facility, how to identify and test potential alternatives, and how to avoid regrettable substitutions. Recorded modules from the training are available on the MnTAP website at <a href="http://www.mntap.umn.edu/industries/facility/machine/tcealternatives">http://www.mntap.umn.edu/industries/facility/machine/tcealternatives</a>

### Nutrient Optimization in Wastewater Treatment

### 2019 Outputs

2 Intern projects 4 Mechanical plant assessments 5 Wastewater pond assessments 1 UMN Driven to Discover Highlight 1 Newspaper article 1 Radio interview 7 Students hired

### **Project Partners**

Minnesota Pollution Control Agency Minnesota Rural Water Association City of Saint Cloud Treatment Facility Metropolitan Council Environmental Services

### Sponsors

Minnesota Environment and Natural Resource Trust Fund



Legislative-Citizen Commission on Minnesota Resources (LCCMR)

### **Project Overview**

The goal of this project is to identify and implement low and no cost strategies to reduce nutrient pollution in wastewater effluent throughout Minnesota. Nutrient pollution consists of nitrogen and phosphorus. These elements are key ingredients in fertilizer, and strongly promote the growth of aquatic plants. In excess, nutrients in the water will cause algae to outgrow the carrying capacity of the local ecosystem, resulting in an algal bloom. The algal bloom causes oxygen levels in the water body to fall to zero, choking out fish and other organisms that need oxygen to survive.

This project involves completing one-on-one assessments with Minnesota wastewater treatment plants in order to identify opportunities to implement operational changes that promote biological nutrient removal, resulting in better nutrient treatment for little cost investment. Recommendations can take an extended trialing period to implement. During 2019 several recommendations have been made at 11 facilities.

### 2019 Recommendations

- Total Recommended Savings Nitrogen (NH4N + NO3N): 157,000 lb
- Phosphorus (PO4): 10,000 lb
- Reduced Chemical Additions for Phosphorus Treatment: 5,000,000 lb
- Energy Savings: 1,123,000 kWh
- Cost Savings: \$400,000

### **Comprehensive Pond Testing**

Over the course of this project, the project team has discovered that some wastewater ponds naturally get phosphorus removal ranging from 60% to 95%, while other wastewater ponds get natural phosphorus removal ranging from 0% to 40%. The team is planning to study a few ponds from each of these categories in an attempt to learn why. If successful, the results from this testing will help operators and engineers to better understand the conditions that promote the best possible natural removal of phosphorus pollution.

### Project Success: Hutchinson Wastewater Treatment Plant



The City of Hutchinson Wastewater Treatment Plant hosted a MnTAP intern to search for opportunities to modify operations for improved treatment of nitrogen and phosphorus. The plant has two parallel treatment processes, and each was studied independently.

The first process uses an oxidation ditch to aerate and treat wastewater. The student found that by cycling aeration in the oxidation ditch, the ditch can be operated much like a sequencing batch reactor (SBR), alternating between conditions that are aerobic, anoxic, and then anaerobic. By cycling through these conditions, the plant can support microorganisms that treat for BOD, ammonium, nitrate, and phosphate. When modeled in a computer simulation, this change has the potential to save the plant an estimated 135,000 lb of ferric chloride per year, and reduces effluent nitrogen by 69,000 lb per year. Cycling the aeration equipment could also save 65,000 kWh per year in energy. This potential chemical and energy savings would total \$30,000 per year.

The second process uses a membrane bioreactor (MBR) system. Biological nutrient removal can be achieved in this system by converting an anoxic tank to anaerobic, and by converting a portion of the aerobic basins to an anoxic zone. The plant plans to start by testing oxidation ditch opportunities before pursuing opportunities in this MBR line. Estimated savings for implementing the MBR system efficiency changes includes the potential to reduce 136,000 lbs of ferric chloride per year, 40,600 lb of nitrogen, and 330,000 kWh of energy per year. The total energy and chemical savings total to \$48,000 per year.

### **Upstream Nutrient Reduction**

### 2019 Outputs

2 Site assessments Student intern project

### 2019 Outcomes

190,000 lbs BOD reduction through product recovery

250,000,000 gal pH noncompliant wastewater reduction

\$352,000 savings

### Sponsors

Legislative-Citizen Commission on Minnesota Resources (LCCMR)

### **Project Partners**

Minnesota Rural Water Association (MRWA)

### Project Background

The primary goal of this project is to partner with MN communities and their facilities that feed high-nutrient wastewater to treatment plants and ponds. Treatment plants and ponds can face great challenges in managing wastewater effluent, especially nitrogen and phosphorus. These nutrients support the growth of aquatic plants like algae. In normal amounts, this is a good thing. However, excessive nutrients can cause algae to grow at an alarming rate, resulting in algal blooms. These blooms can kill fish by consuming most of the dissolved oxygen in the water. The blooms can also produce toxins or promote bacterial growth that can make people and animals sick.<sup>1</sup>

### **Project Overview**

Building on work with Minnesota's wastewater plants and ponds to achieve nutrient removal, MnTAP's technical staff will engage businesses and organizations in communities that discharge to these plants and ponds. The results will included 5-10 business assessments, at least 2 summer intern projects and outreach to 30 or more communities on the benefits of better wastewater effluent management.

### Activities (engagement)

By the end of 2019, MnTAP strengthened connections with Minnesota communities and wastewater treatment systems to identify potential businesses for assessments and intern projects. The following activities were part of that effort:

- Outreach to more than 30 communities with wastewater treatment plants and ponds by email and phone
- Discussions with 9 communities about the benefits for treatment systems and local businesses
- 5 businesses contacted about assessment and intern project opportunities
- 1 intern project completed
- 2 intern projects in planning phase for 2020

### Plans for 2020:

- Targeted outreach and education for communities on contributing sources to wastewater nutrient
- 1-2 summer intern projects
- · At least 5 facility assessments

<sup>1</sup> www.epa.gov/nutrientpollution/problem



### Project Success: Kerry, Rochester, MN Facility

Kerry in Rochester, MN specializes in fermented and cultured ingredients. Delivering these products requires a variety of processes that can provide challenges when it is time to discharge wastewater effluent. With the help of a MnTAP intern, Kerry investigated the following opportunities to achieve cost and resource savings, as well as to minimize the facility's impact on the local treatment plant:

- Updates to process control logic to more effectively balance pH on the effluent system.
- Process scheduling improvements that helped minimize product loss and reduce biological oxygen demand (BOD) in effluent .
- Equipment upgrades and prioritization that further minimize product loss and BOD in effluent.

### Electrification of Transport Refrigeration Units – Reducing Air Emissions

### 2019 Outputs

1 published article 14 Companies contacted 2 suggestion made to reduce: 8,100 therms and 31 metric tons CO2e

### 2019 Outcomes

None yet

### **Project Partners**

CleanFuture Thermo King Second Harvest Heartland Environmental Initiative

### Sponsor

EPA Region 5

#### **Project Overview**

This project is a source reduction study focused on characterizing the benefits of running transportation refrigeration units (TRUs) on electricity while they are parked at the dock. These TRUs are a vital part of the cold storage supply chain and work to cool trucks and trailers with perishable items. The time these units spend at the dock cooling down, loading, and unloading consumes about 50% of the time that the TRU is operating and burns diesel fuel throughout. A promising study from Portland State University, completed by project partner CleanFuture, showed a payback period of less than two years for switching from diesel dock operation to electricity powered dock operation. This project aims to verify if those results translate to Minnesota and further identify ways to implement diesel fuel/emission reduction.

### **Project Activities**

2019 was devoted to gaining support, gathering data, and looking for new companies ready to upgrade to a standby electric TRU. MnTAP was able to engage two companies in the past year and has gathered important data on stationary dock time and over-the-road time.

### **Future Work**

In the second half of this two year project, MnTAP will continue to work with Minnesota companies to gather data on stationary dock time, which will inform them on potential diesel savings opportunity. The culmination of this project is an educational document that will provide a roadmap for other organizations in Minnesota to help businesses succeed in implementing e-TRU changes to their fleets. This deliverable will provide resources on company engagement, savings calculations, and where to find funding sources that have clear cut provisions for electric standby TRUs and their infrastructure.



### Partner Spotlight: Second Harvest Heartland

Second Harvest Heartland has been a helpful partner since the origin of this project. As a non-profit distributor of food to local food banks, Second Harvest operates a moderately sized fleet of trucks and trailers, most of which are equipped with a TRU. Being a non-profit means they are always looking for ways to cut costs and maximize the impact they have on the community which is where this project fits in. MnTAP has been able to collect and analyze data from three of Second Harvest's trailer mounted TRUs to determine the time each spends at the dock as well as how much time they spend on the road. It turns out that these trailers spend about 49% of their time at the dock, cooling down and loading for the day's deliveries.

This time spent at the dock translates to a couple thousand dollar savings opportunity with the help of new electric standby TRUs. This upgrade is certainly a money saver, but this transition requires upfront capital which makes the switch a little tougher to implement. MnTAP is currently working with Second Harvest to find funding for this type of upgrade to help bring their diesel use and local diesel emissions down while also saving them money year after year.

Another important partner in this project is the Bloomington-based Thermo King Corporation. Through the We Move Food initiative they donated a new trailer and electric standby TRU to Second Harvest Heartland allowing them to reap the benefits of electric dock operation

### Energy Efficiency in the Drinking Water Treatment Sector

### 2019 Outputs

26 Drinking water treatment plants contacted

15 Drinking water treatment plants interviewed

2 Vendors interviewed

### 2019 Outcomes

None yet

### Sponsor

Conservation Applied Research and Development Grant

MN Department of Commerce, Division of Energy Resources

### **Project Overview**

This one year project, funded by a Department of Commerce CARD grant, is a broad study of the drinking water treatment industry in Minnesota, targeting energy efficiency improvements. MnTAP is surveying a cross section of the state's water treatment plants as well as outside stake holders such as well drillers, engineering firms, and electric utilities, to get a clear picture of energy efficiency opportunities that exist in the state. Once surveying is complete, detailed site assessments at a select number of water utilities will help verify the savings potential estimates from the surveying process. Aggregate data from surveying and assessing will be used to help water utilities across the state save electricity, and will help electric utilities better develop rebates that will facilitate the reduction in energy in this sector.

### **Project Activities**

The work completed in 2019 focused on laying the ground work for the project, including a literature review and the interviewing of 15 drinking water treatment plants and two outside vendors.

Key findings from the interviews that can impart water supply energy savings include:

- System demand reduction
- Pump rehabilitation, replacement, upgrades, and selection
- Well rehabilitation
- Pumping energy reduction
- System leak reduction and detection
- Customer conservation

### **Future Work**

Using the data and trends developed though the interviewing process, site assessments at five or six plants will be conducted. These assessments will focus on one or two efficiency upgrades that were identified in the literature review and the interviews. These assessments will include analyses of key data and provide a deeper insight into potential energy efficiency upgrades that can impact many drinking water treatment systems throughout the state. The areas of interest will include those listed above.



### Project Success: Student Worker Takes Charge of Site Interview

The MnTAP student worker has made this project possible by helping write and compile the literature review, calling and setting up nearly all of the interviews that are so vital to the success of this project, and writing summaries of each interview. As part of this process, the student worker was asked to conduct one of the interviews with a plant operator. She stepped up to the task and delivered a thorough, comprehensive, and well received interview with a city close to her hometown. This type of leadership is just the beginning as we start the process of compiling and analyzing data.

For the next phase of the project the student worker will be helping gather data on each of the interviewed plants and work it into a form that can be used to compare each plant. With these comparisons, a determination can be made of which energy efficiency upgrades are needed, already in place, or not feasible. The student worker will continue to be an integral part of this process, helping with data analysis, data compilation, and final report write up.

### Safer Dry Cleaning

### 2019 Outputs

2 project outreach pieces

1 presentation at industry event

2 conversations with industry suppliers

25 in person visits with drycleaners

2 technical assessments conducted

### Sponsor

Minnesota Pollution Control Agency

### **Project Overview**

The focus of this project was to apply technical assistance resources to encourage dry cleaning facilities throughout Minnesota that use perchloroethylene (PERC), to switch to less hazardous alternatives. Analysis of TRI, Point Source Emission and hazardous waste data indicate the dry cleaning industry as a whole is a large source of PERC use, emissions and waste within Minnesota. Over 100,000 lb of PERC contaminated waste generated from the dry cleaning industry was reported in 2016. While the industry is generally aware of the health and environmental risks of PERC use, PERC dry cleaners tend to be small businesses. The capital needed to replace PERC equipment with alternatives can run between \$50,000 and \$100,000 which is often beyond the reach of most business owners. This project seeks to create a state wide outreach with owners to support steady replacement of dry cleaning PERC across Minnesota

### **Project Activities**

- Created a comprehensive list of dry cleaners in the state of Minnesota.
- Conducted water and energy usage assessments at two dry-cleaners.
- Created an informational flyer to distribute in-person to 15 different drycleaners around the Twin Cities metro area.
- Created a project summary and published it in the Minnesota Cleaners Association e-newsletter, through direct emails to cleaners through suppliers, in MPCA e-newsletters, and through MnTAP's e-newsletter.
- The Minnesota Daily publication interviewed MnTAP about the project and published an article on 9/11/2019. The article can be found at https://www.mndaily.com/ article/2019/09/n-umn-program-working-to-eliminate-use-of-hazardous-chemicalperc-at-dry-cleaners.
- Spoke at the Minnesota Cleaners Association Annual Conference on August 9th, 2019. MnTAP co-presented with Energy Smart on opportunities to reduce waste and conserve resources, and informed on technical and financial resources that can be used to implement change.



### **Project Success:**

Cost is one barrier to making the switch to an alternative solvent. Dry cleaners have to purchase new machines that can cost more than \$30,000 each.

"It's a lot of money for a small business in what can be seen as a struggling industry." said Nathan Landwehr, a waste reduction specialist at MnTAP who works directly with dry cleaners. To help cover these costs, some dry cleaners are able to use state loan funds and other local grant opportunities.

The goal of this project is to work with dry cleaners to identify opportunities for substitution of PERC that work for each business and align resourced to help support implementation.