# IMPACT

## Minnesota Technical Assistance Program

## 2018 Annual Report





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## About MnTAP

The Minnesota Technical Assistance Program (MnTAP) is and 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 34% of the FY 2018 budget.

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

- Conducted over 4,725 site visits at facilities throughout the state
- Provided solutions saving businesses \$53.2 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

Laura Babcock, PhD Director

**Daniel Chang** Associate Engineer

A.J. Van den Berghe, CEM Engineer

Karl DeWahl, CEM Senior Team Leader (Retired)

**Matt Domski** Waste Prevention Specialist **Michelle Gage** Engineer, Risk Assessment Specialist

Nathan Landwehr Waste Prevention Specialist/Intern Program Administrator

Mick Jost Program Coordinator (Retired)

**Paul Pagel, CEM** Senior Engineer/ Intern Program Coordinator

#### 2018 MnTAP Staff

Back row, left to right: Mick Jost, Matt Domski, Jon Vanyo, Paul Pagel, Frank Strahan, Nathan Landwher, Karl DeWahl

Front row, left to right: Carol Wiebe, AJ Van den Berghe, Peggy Bradley, Jane Paulson, Michelle Gage, Laura Babcock, Alaina Ryberg

Not picture: Daniel Chang, Brent Vizanko



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**Jane Paulson** Senior Engineer

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#### **Director's Note**

MnTAP continued to deliver high quality technical assistance to industrial facilities across Minnesota in 2018. Outcomes include, assistance provided to **338 organizations** across the state with **110 site visits to 74 unique facilities**. Seventy facilities have implemented **107 MnTAP recommended process changes** and realized reductions totaling over **26 million gallons of water, 528,000 pounds of waste, 5.1 million kWh and 59,000 therms of energy.** Combined, these reductions are **saving companies \$1 million annually.** 

#### Highlights of MnTAP's efforts in 2018 include:

- Completed a two year outreach to food processing facilities across the state conducting 6 site visits and 4 intern projects achieving **over \$200,000 in savings** from recommendations implemented to date.
- Worked with 17 businesses in North Minneapolis to identify options to **eliminate** release of 2,870 lbs of volatile organic compounds (VOCs) into the community.
- The 2018 MnTAP Intern Program supported 15 student projects engaging 32 companies and 11 funding partners to make recommendations for waste, water and energy efficiency that would **save companies nearly \$1.5 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 2018. The companies and organizations engaged in these projects are strengthening their businesses 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 2018, and we look forward to serving YOUR business in 2019.

Laura Babcock Director, Minnesota Technical Assistance Program

## Links to MPCA's Strategic Plan

#### Water

- Reduce chloride (salt) entering surface waters and groundwater
- Accelerate prioritized and targeted reductions in nutrient pollution by integrating strategies with local watersheds
- Achieve wastewater pollutant reduction goals and maximize cost effectiveness of public infrastructure investment

#### Land

- Reduce food waste from households and businesses by generating less and rescuing and recycling more
- Identify and address emerging risks by completing assessment of backlogged contaminated sites
- Prevent and reduce risks to groundwater from unlined construction and demolition landfills

#### Air

- Improve air quality in population centers
- Offset excessive emissions and advance diesel reductions via the Volkswagen settlement
- Reduce air permitting backlog
- Reduce Minnesota's greenhouse gas emissions from transportation

#### **Cross Agency**

- Incorporate strategies to address environmental justice concerns in all programs
- Increase involvement of communities in decisions and actions that affect them
- Act on opportunities to increase resilience of communities and the environment to climate change impacts

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

MnTAP Impacts 2014-2018					
Number of Companies Assisted		1,088			
Water Deduction (col)	Recommended	585,600,000			
Water Reduction (gal)	Implemented	146,300,000			
	Recommended	42,200,000			
Electric Energy Reduction (KVVH)	Implemented	11,830,000			
Wests Deduction (lbs)	Recommended	12,300,000			
Waste Reduction(Ibs)	Implemented	2,600,000			
	Recommended	1,800,000			
Gas Energy Reduction (therms)	Implemented	700,000			
Cook Souring of	Recommended	\$11,500,000			
Cost Savings	Implemented	\$4,300,000			





2018 Outcomes							
	Waste		Energy		Water	Savings	
Activity	Air Emissions (lbs)	Hazardous Waste (lbs)	Non-Hazardous/ Solid Waste (lbs)	Electric (kWh)	Gas (therms)	(Gallons)	\$
Site Visits	41,000	91,000	18,000	600,000		8.8 million	\$274,000
Interns	12,000	44,500	268,000	4.5 million	59,000	17.5 million	\$731,000
Materials Exchange			53,000				\$5,000
TOTALS	ALS 528,000		5.1 million	59,000	26.3 million	\$1.0 million	

2018 Outputs					
Technical Assistance Activity	2016 Results	2017 Results	2018 Results		
Contacts (calls/emails/meetings)	611	599	991		
Requests for Assistance	109	41	85		
Total Staff Site Visits (unique facilities)	158 (97)	113 (69)	110 (74)		
Student Interns	14	17	15		
Materials Exchanges	27	77	92		
Events and Presentations	45	56	44		
Publications	new	45	46		
MnTAP Website Unique Visits	39,302	65,400	35,000		

## **On-Site Assistance**

#### 2018 Outputs

110 on site visits 74 unique facilities 85 requests for assistance

#### 2018 Outcomes

528,000 lbs waste 26.3 million gal water 5.1 million kWh 59,000 therms \$1.0 million annual savings

#### What they said...

"MnTAP's outstanding staff of engineers, scientists and summer interns continue to find innovative ways to reduce waste and prevent pollution. Minnesota businesses and industrial facilities are fortunate to have this service available to them."

> - Mark Snyder, Pollution Prevention Coordinator, MPCA

#### 2018 Goals

Conduct site visits at 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.

#### 2018 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 **210 recommendations** with a value of over **\$1.8 million for resource conservation** at Minnesota businesses in 2018 from all onsite services. Of the recommendations made during 2018 engagements, **62 have been implemented** or 30% were recommended and implemented in the same year.



#### 2018 First Year Implemented Recommendations



#### Follow-Up: A Key Step in the Technical Assistance Process

A 2012 analysis of company implementation improvement recommendations suggested earlier and more frequent follow up conversations with clients correlated with higher implementation rates. Over the past several years, MnTAP has implemented policies and tools to improve follow up activities. **"Touch Base Tuesday" (TBT)**, dedicates one morning per month for staff to follow up with clients. Our **client management system** provides a tool to document suggestions and track results.

Professor Suvrat Dhanorkar from Penn State University, who conducted the original evaluation, analyzed MnTAP data related to follow up and implemented recommendations before and after the TBT policy. **Implementation probability is predicted to increased from 33% to 45%.** It was observed that implementation rates increased up to three times faster. Overall, remaining engaged with clients through timely follow up activities has had a significant effect on improving implementation of voluntary environmental process improvement recommendations.

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

#### 2018 Outputs

15 intern projects serving 32 companies 20 company applications 151 student applications 13 outreach/recruitment activities 16 articles and promotions placed externally

#### What they said...

"Our MnTAP intern worked diligently on investigating water savings for our hospital and provided us with opportunities we had not identified. His work with the plant staff and vendors provided us with ideas to save water through operational changes and adding equipment to our systems that had an attractive ROI. The intern's presentation to senior management resulted in funding added to next year's budget to accomplish the savings." - Bob Johnson, Manager of Engineering Services, North Memorial Health Hospital

#### **Funding Partners**

Minnesota Pollution Control Agency Center for Energy and Environment CenterPoint Energy Metropolitan Council **Environmental Services** Anoka County U. S. Environmental **Protection Agency** Franklin Energy Minnesota Energy Resources **Xcel Energy** Washington County MN Department of Corrections

#### 2018 Goals

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

#### 2018 Accomplishments

#### MnTAP guided 15 intern projects in 2018.

MnTAP interns come from a variety of disciplines. In 2018, chemical, mechanical, bioproducts and biosystems, and environmental engineering as well as environmental science, chemistry, biology and environmental geography were represented. Most interns came from the University of Minnesota, while three came from Iowa State, two from North Dakota State University, and one from the University of Alabama.





Recommendation from this summer's

projects predominantly focused on water conservation, and energy efficiency, with some focusing on solid and chemical waste reduction as shown in the chart above.

Read more about MnTAP's intern projects in our annual program summary, Solutions: http://www.mntap.umn.edu/resources/solutions

#### 2018 Outcomes - Intern Program Implementation\*

	Waste (lbs) Energy		Waste (lbs)				
Project Year(s)	Air Emissions (lbs)	Hazardous Waste (lbs)	Non-Haz/ Solid Waste (lbs)	Electricity (kWh)	Gas (therms)	Water (gallons)	Savings
2014		53,170	50,100	3.2 million	440,000	1.39 million	\$648,000
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

\*Implementation reported in listed year for intern projects from all prior years

#### Partner Highlight: Carley Foundry /Xcel Energy

Xcel Energy has been a funding partner with MnTAP for many years. In 2018 Xcel Energy encouraged and supported Carley Foundry to participate in the MnTAP Intern Program. Carley Foundry wanted to reduce their energy consumption and power demand in order to produce more environmentally responsible castings. The intern evaluated modifications to furnace temperature settings, alternatives to pneumatic cabinet coolers, and improvements to insulation and compressed air systems. Working with foundry staff and advisors, he suggested and implemented **equipment and procedure changes saving 2.3 million kWh of electricity and over \$100,000 annually.** 

## Minnesota Materials Exchange

#### 2018 Outputs

83 new organizations/ companies 240 listings 92 successful exchanges 473 new users 35,400 unique visitors

#### 2018 Outcomes

53,000 lbs waste diverted

#### What they said...

"HealthPartners frequently uses the Minnesota Materials Exchange website for our waste minimization efforts. It is our mission to improve health and well-being. We want to provide a healthier, cleaner and more livable environment for our members, patients, colleagues and future generations. The MME helps us donate and reuse these items and avoid the landfill. It is an easy to use tool that helps us to achieve our waste reduction goals." - Sam McKeough, Sustainability Coordinator, **HealthPartners** 

#### 2018 Goals

Facilitate an online business reuse network that encourages Minnesota businesses to exchange unwanted, resuable items with other businesses, reducing solid waste being sent to landfills.



#### 2018 Overview

The Minnesota Materials Exchange is a website that links organizations that have reusable goods they no longer need, to others who can use them. This free reuse network helps prevent usable materials from becoming waste and saves users money.

In 2018, MnTAP continued focusing on promotional efforts through the Materials Exchange newsletter. Ten newsletters were published over the course of the year highlighting new listings, special topics related to reuse, and promoting Minnesota businesses that specialize in secondhand goods or reuse services.

#### 2018 Exchanges

Just over 53,000 lbs of waste were diverted from landfills via exchanges, with the most weight in furniture, followed by chemicals and cleaners, medical laboratory equipment and supplies, shipping and packing material, and recycling and waste containers. The amount diverted from these categories is shown in the chart below:



To view or list items for exchange at: http://www.mnexchange.org



#### Program Success: State Prisons Crack Down on Waste Management

In the summer of 2018, a MnTAP intern was hosted by the Minnesota Department of Corrections (DoC) facility in Lino Lakes to evaluate their solid waste streams, identify opportunities to divert solid waste from the landfill, and develop procedures to improve waste management practices that could be applied to all 10 facilities across the state.

The intern developed a 55 page toolkit tailored to the DoC that outlines general best management practices for handling solid waste streams as well as practices specific to prison kitchens, warehouse buildings, industry, and administration/programming areas. Some specific practices outlined include:

- Establishing internal green teams to launch and manage sustainability projects
- Reusing packaging in shipping operations
- Standardizing waste stream accounting protocols
- Standardizing collection bins and signage
- Strategic menu planning to prioritize low-waste meals
- · Organics sorting to improve post-consumption organics recovery

## **General Outreach & Communications**

2018 Outputs 11 MnTAP E-newsletters 1 printed Source publication 391 tweets 1 Solutions intern program magazine 44 presentations and training events 2 webinars 46 external

publication articles

#### 2018 Outcomes

22% open rate of E-news

28% open rate of special outreach emails

1 award received

#### 2018 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.

#### 2018 Accomplishments

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

- A Source newsletter was sent to 4,200 people: "How MnTAP impacts Minnesota."
- Co-hosted the 2018 Minnesota Paint & Powder Coating EXPO with the Twin Cities chapter of the Chemical Coating Association International.
- 3,460 unique visits from our Twitter postings went directly to our web site.
- MnTAP staff presented at 44 events ranging from the MWOA 42st Annual Conference to the Sustainable Manufacturing Principles & Practices class at the University of Minnesota.
- 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.

#### 2018 Online Audience

- The MnTAP website had over 45,000 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 over 35,000 unique page views (from the same person, on the same page, in the same session, and just counted them as one).
- Our tweet posts received over 137,000 impressions. An impression is how many times a tweet appeared in someone's time-line.





#### **Green Partnership Award**

Each year the City of Minneapolis recognizes businesses participating in the City's Green Cost Share program that provides matching support for their efforts to reduce pollution and save energy to create a healthier place to live.

Since its inception, the Green Business program has grown from one business to 118 businesses and non-profit organizations. The program has reduced more than 70,000 lbs of pollution and 20 million lbs of Green House Gas emissions (GHGs) through the strongest local incentive program in the country to address pollution and climate change.

MnTAP is honored to be awarded one of this year's Partnership Awards for our collaboration to help Minneapolis businesses identify and quantify the environmental impacts of improvements to their operations that reduce pollution and conserve energy.

#### 2018 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.	11
Safer Products: HAP and VOC Reductions from Degreasing Operations in North Minneapolis 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.	12
HAP and VOC Air Emission Reduction in the Phillips Communities U.S. Environmental Protection Agency 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.	13
Industrial Water Conservation Metropolitan Council Environmental Services Water Supply Planning Unit	Support for 10 intern projects focused on industrial water efficiency.	
Water Efficiency in Washington County Washington County Public Health and Environment	Support an intern project focused on residential irrigation efficiencies. Develop list of best practices for water use in car washes through research and site-visits.	15
Nutrient Reduction in Wastewater Treatment Minnesota Pollution Control Agency Environmental Assistance Grant	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.	16
Food Processing: Pollution Prevention Assistance MN Pollution Control Agency U.S. Environmental Protection Agency Region 5	Provide assessments for Minnesota food processors focused on hazardous material reduction, as well as support intern projects focused on in-depth waste reduction strategies.	17
Sustainable Spirits Minnesota Pollution Control Agency Environmental Assistance Grant	Develop an outreach and technical assistance model to engage craft breweries and distilleries to reduce environmental impacts and production cost.	18

## **Grant-Funded Project**

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

#### 2018 Outputs

Creation of 4 training modules with a syllabus A draft Model Utility Program

#### Partner

Center for Energy and Environment

#### **Sponsors**

MN Department of Commerce, Division of Energy Resources

#### **Project Overview**

There are 201 mechanical wastewater plants in Minnesota, consuming about 388,000,000 kWh/yr of electricity (about 0.5% of the state total electricity).

Less than 10% of energy use in wastewater plants is used for lighting and building HVAC, while 70% of energy is used for aeration and pumping processes. As a result, typical utility energy assessments that focus on lighting and building energy do not capture the largest energy uses in the facilities.

There are 85 electric utilities serving the 201 wastewater plants; 74 serve a single wastewater plant; and 81 serve three or fewer plants, so there is little incentive for individual utilities to create a conservation program for

one or two facilities in their service territory. The purpose of this effort is to:

- Create an innovative training program that meets the technical needs of small to medium sized wastewater plants.
- Provide an opportunity for wastewater staff to apply new skills to implement low and no-cost changes to reduce energy and operating costs.
- Develop a model conservation program that individual utilities can used to provide energy and conservation resources.

#### **Future Plans**

- Summarize the program and project results in a final report and webinar in June, 2019.
- Explore options to provide the training for operations staff members.

It is anticipated that implementation resulting from training wastewater operations staff on identifying and implementing energy efficiency actions would result in average savings of \$14,000 per facility, based on previous work. If this were implemented at 25 facilities we would anticipate energy efficiency opportunity saving of 3.7 million kWh/yr which is approximately 3% of the small to mid-size mechanical wastewater plant energy use.



#### Examples of Expected Outcomes of Training Program:

Pine River Sanitary District cycled the digester blower to run for two hours on, and one hour off, averaging 397 scfm over the full blower cycle. Changing the cycle to 60 minutes on, 90 minutes off (238 scfm average) brought the air flow closer to the recommended Ten State Standard, resulting in **savings of 33,000 kWh per year (\$2,650 per year)** Pine River uses an oxygen sensor located just before the aeration rotor to maintain a minimum dissolved oxygen level in the oxidation ditches. Reducing the operating point from 2 ppm to 0.5 ppm, lowered **annual energy usage by 18,000 kWh (\$1,450 per year)** while maintaining effective quality.

The Arlington plant operates at < 50% of design capacity, but processed wastewater through all five available aeration basins. Taking two offline and converting another to use as an anoxic zone reduced air demand for minimum mixing and minimum diffuser air flow. To match the reduced air demand, Arlington uses one of two smaller biosolids blowers at 50% speed for secondary aeration. Blower speeds only need to be increased for several weeks during the hottest part of the summer to maintain DO and effluent ammonia levels. **This operation saves about \$20,000 per year.** 





Energy Footprint for a Minnesota Wastewater plant

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

#### 2018 Outputs

26 companies contacted 17 companies engaged to try products 22 suggestions made to reduce 1,400 lbs VOCs 775 lb HAPs 1,000 gallons of water per year

#### 2018 Outcomes

Confirmed reduction of 525 lbs VOC 500 HAPs per year

#### Sponsors

MPCA Environmental Assistance Grant

#### **Project Partners**

UROC (Urban Research and Outreach-Engagement Center) West Broadway Business Coalition

#### **Project Overview**

This project works 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.

#### 2018 Activities

The work in 2108 aimed to engage large and small businesses offering technical assistance and information on how to select safer products that would reduce negative air quality impact.

#### **Challenges Observed**

- Few alternatives offered by major vendor in area
- Cost of safer products may be higher
- · Inability to drop in at a high rate of high frequency to support transistions
- New products may have a different smell and performance





#### **Project Success: Focus on Brake Cleaner**

Based on the data gathered from companies that agreed to try products, **brake cleaner contributes more air emissions that all other categories combined of automotive chemicals.** This is largely due to the volume of brake cleaner used in auto shops.

Brake cleaner is often used for general degreasing in addition to cleaning brake dust. Making the switch to a less hazardous brake cleaner is a hard sell. The biggest factors are cost, supplier relationships, and the different odor of the new products.

The price of bulk alternatives from suppliers in this community tended to be higher than the price per can for aerosols, so bulk product changes were not favored.

## HAP and VOC Air Emission Reduction in the Phillips Communities

#### 2018 Outputs

1 assessment at a large facility 15 assessments at small facilities 26 safer product substitutions 1 intern project 2 local newspaper articles 1 community outreach table event 1 Spanish language training session

#### 2018 Outcomes

155 lbs VOC reduced 105 lbs HAP reduced 7 people attended training session 200 people stopped at the information table

#### **Project Partners**

Hope Community Lake Street Council Franklin Area Business Association

#### Sponsors

U.S. Environmental Protection Agency Region 5

#### **Project Overview**

2018 was the second year for this project which seeks to reduce emission of hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) in the Phillips Communities of Minneapolis. The primary objective of this work is to encourage source reduction of air emissions from both small and large businesses in the Phillips Communities through sitebased technical assistance from MnTAP staff and intern projects. The 2018 focus was on less hazardous janitorial products for small businesses engaged through intern projects.

#### 2018 Activities

- Performed a site assessment at one large emitting facility, providing information on potential improvements, including energy savings through electric hand tools and use of an air curtain, alternative lacquer thinner, and best practices for managing rags.
- Analyzed ingredients for 134 chemical products identifying HAPs, Minnesota Chemicals of Concern, and DfE ratings and recommended replacements for products that did not meet target criteria.
- Conducted a safer cleaning products training session with 7 small businesses in Spanish at the Mercado Central in Minneapolis.
- Published information on the janitorial products project through two local newspaper articles in *The Alley*, July and October 2018.
- Hosted a table with information about safer cleaning products for businesses and consumers at the Lake Street Open Streets event on July 21.

#### 2018 Key Findings

Making changes at multifamily housing facilities was found to require a complex decision making process, involving owners, on-site property managers, property management organizations, and cleaning contractors. High employee turnover was also a barrier in this process. For this reason the intern project scope was expanded to include office buildings, non-profits, and other small businesses where changes only required the approval of the owner.

The products most commonly identified for replacement with safer alternatives were glass cleaners, toilet cleaners, and bleach. Toilet cleaners were often found to contain hydrochloric acid, which is a HAP. Manufacturers of many glass cleaners do not disclose their ingredients, which may hide unsafe materials. Bleach is a common disinfectant that is a TRI reportable chemical and linked to asthma.



## Project Success: A Winning Partnership

For the past two years, MnTAP has partnered with Hope Community and the Lake Street Council (LSC) to sponsor student interns working with small businesses to reduce air emissions including volatile organic compounds (VOCs) and hazardous air pollutants (HAPs). In 2018, this partnership was honored with a School of Public Health Community Partner Award.

Hope Community, a non-profit community development organization dedicated to empowering residents through equitable housing, hosted the MnTAP interns, providing them with a home base, daily guidance and support, and connections to neighborhood businesses. LSC is a local business advisory non-profit with a mission to advocate to increase economic activity and ensure the longevity of small businesses. Our interns found our collaboration with LSC greatly increased the willingness of businesses to participate. Hope Community and the LSC have been vital partners in the success of MnTAP's work in the Phillips Community. MnTAP is preparing to continue this successful partnership with a third intern in the summer of 2019.

A summary of the project is published at: https://z.umn.edu/2018-Phillips-Janitorial

## Industrial Water Conservation Interns

#### 2018 MCES Outputs

5 metro-area intern projects

37 water efficiency recommendations

#### 2018 Outcomes

5.3 million gallons water efficiency implemented \$82,000 implemented values

"MnTAP continues to provide multiple wins for Minnesota: millions of gallons of water saved, thousands of dollars in operational cost reductions for businesses, and, importantly, real-world training for the engineers and scientists who will lead these efforts through the twentyfirst century."

-Brian Davis, Senior Engineer Metropolitan Council Environmental Services

#### Sponsors

Metropolitan Council Environmental Services Water Supply Planning Unit with funding provided by the Minnesota Environmental and Natural Resources Trust Fund

#### **Project Overview**

MnTAP's strategic emphasis on water conservation and efficiency assistance that launched in 2012 continued in 2018 with support from the Metropolitan Council Environmental Services (MCES) Water Supply Planning Unit. MnTAP identified opportunities for water users to improve water efficiency through the work of MnTAP interns. Interns worked closely with vetted facilities providing an opportunity to conduct an analysis of site water use, identifying water efficiency recommendations, and launching implementation projects.

#### 2018 Project Activities

The results from five 2018 MCES summer intern projects have potential savings from water conservation recommendations of over 36 million gallons of water which would potentially save these businesses \$626,000 per year. By the end of the year, 7 recommendations were completed saving 5.3 million gallons of water saving nearly \$82,000 per year.

One outcome of each intern project is to develop a published executive summary detailing the identified water conservation opportunities including technical and cost analysis.

To view a summary of the 2018 intern projects, refer to MnTAP Solutions at: http://z.umn.edu/Solutions-2018

#### **Additional Intern Work**

Several of the most common efficiency options include:

- Reuse or closed looping water
- Maintenance or installation of valves and solenoids
- Adding or replacing hose spray nozzles and sink aerators
- Controlling cafeteria dish-room rinses
- · Installation of irrigation sensors or smart controllers

MnTAP will continue this partnership with five water conservation intern projects in Summer 2019.



#### Project Success: Aveda, Corporation

Aveda is a division of Estee Lauder Companies with a production facility in Blaine, MN. The project goal was to reduce water consumption and waste. The company uses 22 million gallons of water annually at a total cost of \$283,000 with 20% of the volume and 50% of the cost associated with the production of purified water for use in products and in some cleaning steps.

The MnTAP intern worked with production staff and advisors on process and equipment improvements with the purified water system, clean-in-place operations, water softening practices, and sanitation practices. Many recommendations have been implemented and work continues on others. Along with **potential savings of 6 million gallons of water**, the company could save 124,000 lbs of chemicals, 112,000 kWh of electricity, 7,300 therms, 4,900 production hours, and nearly \$290,000 annually.

## Water Efficiency in Washington County

#### 2018 Outputs

6 visits to car-wash facilities in Washington County

> 1 successful 2018 intern project

#### 2018 Outcomes

Intern project irrigation savings: 3.3 million gallons of water saved \$4,000 saved

#### **Sponsors**

Washington County Public Health and Environment

#### **Project Overview**

Washington County Public Health and Environment sponsored a 2018 MnTAP intern project focused on water conservation. The project completed a multi-year assessment of water efficiency potential in lawn irrigation systems. This year focused on conservation opportunities through city programs to encourage installation of pressure regulating sprinkler heads. These sprinkler heads adjust water pressure to maintain the optimal water droplet size, which minimizes evaporation. This project complemented previous work with the City of Woodbury, which focused on water reduction opportunities through smart controller upgrades.

The combination of these projects identified the following residential irrigation program opportunities.

- Install smart irrigation controllers
  - 30,000 gallons saved per household
  - \$150 cost to implement per household
- Implementing pressure regulating sprinkler heads
  - 32,000 gallons saved per household
  - \$830 cost to implement per household

Following partnerships with MnTAP and Washington County, the City of Woodbury continues to expand its development of irrigation efficiency programs in all city operations.

To view a summary of the 2018 intern project, refer to MnTAP Solutions at: http://z.umn.edu/Solutions-2018



**Project Success: Car Wash Best Practices** 

Analysis of water use data in Washington County indicated that 11 car wash facilities use over 1.0 million gallons of water per year. In the County, there are 45 total car wash facilities. The number of sites and high water use potential in the sector suggested that industry Best Management Practices (BMPs) may help reduce overall water use. Washington County and MnTAP staff developed a 1-year research project targeting the car wash sector in Washington County.

A MnTAP student research project identified a number of key BMPs:

- Fix leaks and replace corroded hoses
- Regularly inspect nozzles
  - Ensure they are spraying properly and aligned to make contact with vehicles
  - Replace worn nozzles as needed
- Consider water reclamation practices
  - Capture Reverse Osmosis (RO) reject water to use for another on-site process
  - Implement a wash-water reclaim system to reuse water in process except for final freshwater rinse
- Water reclaim system maintenance
  - Ensure regular pumping of settling tanks is scheduled for water reclaim systems
  - Work with service vendors to regularly inspect system components

A summary of the project is published at: https://z.umn.edu/2018-Car-Wash

## **Nutrient Reduction in Wastewater Treatment**

#### 2018 Outputs

1 presentation 2 site assessments 2 student projects

#### **Project Partners**

Minnesota Pollution Control Agency Minnesota Rural Water Association

City of Saint Cloud

Metropolitan Council Environmental Services

Funding provided by the Minnesota Environmental and Natural Resources Trust Fund



#### Project Background

The goal of this project is to improve the removal of nitrogen and phosphorus (nutrients) from wastewater at treatment plants and ponds throughout Minnesota. Nitrogen and phosphorus 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.

#### **Project Overview**

The approach taken in this project is to use software models to simulate existing wastewater plant operations, and to test how changing operational parameters impacts nutrient removal. Critical parameters like sludge age, dissolved oxygen, and recirculation rates can usually be adjusted by operators without spending capital on new equipment. This project will work directly with five mechanical plants and five pond systems to identify and test operational changes. The final outcome will be a series of case studies and guidance documents providing a basis for Minnesota wastewater plants to improve process nutrient removal.

#### **Site Selection Process**

Sites are being selected for this project based on the following selection criteria:

- Plants in top 20% of total N discharge (mass)
- Plants in top 20% of total P discharge (mass)
- Plants within 20% of N permit limit
- Plants within 20% of P permit limit
- Plants in watershed designated medium or high priority for N or P

Minnesota wastewater plants meeting one or more of these criteria are added to a shortlist of potential assessment sites for this project. Plants that meet more criteria are given higher priority. Plants with the highest priority are offered a no-cost nutrient optimization assessment.

#### Future Plans

- Thursday, March 28, 2019, the project will be presented at the MPCA Annual Wastewater Conference in Brooklyn Park to share initial project findings.
- Summer of 2019 2 summer intern projects.



## Initial Findings:

At a mechanical plant, simulations show effluent nitrogen reduction opportunity of roughly 50%, and effluent phosphorus reduction opportunity of roughly 30%. Modeling suggests implementing a water recirculation loop from the aerobic basins to the anoxic basins, and increasing existing water recirculation rates will reduce efficient nutrient load. The proposed modifications recirculates nitrate to a low-oxygen zone where it can be used as an oxygen source for microorganisms, releasing the nitrogen as N2. If these changes are implemented, it will result in a total reduction of 25,000 lb of nitrate, and 700 lb of phosphorus in the wastewater effluent.

These chemicals will no longer be released into the waters of Minnesota. There is also opportunity to reduce the dissolved oxygen set-point within the aeration basins. Making this change will save the plant 580,000 kWh per year in energy, for cost savings of \$46,000.

## Food Processing: Pollution Prevention Assistance

2018 Outputs

2 intern projects 4 facility assessments

#### 2018 Outcomes

Implemented savings: 42,000 lbs of product waste prevented 96,000 lbs of chemical waste reduced

6.8 million gallons of water reduced

140,000 kWh 30,000 therm of energy conserved

\$59,000 combined cost savings

#### Sponsors

Minnesota Pollution Control Agency U. S. Environmental Protection Agency Region 5

#### **Project Overview**

Food processing is a vital part of the Minnesota economy, providing jobs to 46,000 people throughout the state. Excellent food products are supplied by the industry, but processing these products comes with challenges. The industry emits over 4.5 million lbs of Toxics Release Inventory (TRI) chemicals each year. Facilities also deal with large energy and water demands and must work to reduce process waste and manage wastewater effluent. Through this project, MnTAP has assisted food processors by conducting staff site assessments and summer intern projects.

The primary goals of assistance included:

- Review cleaning procedures and reduce hazardous chemical use.
- · Identify opportunities to conserve water.
- Reduce process related food waste and related wastewater strength charges.
- Find ways to save energy.

#### Over all Project Activities and Outcomes from the 2-year project

- Hosted a Food Processor Waste Prevention and Energy Conservation webinar: https://z.umn.edu/Food-Processing-Webinar.
- · Four summer intern projects completed with final recommendations and presentations
  - Kerry Ingredient, Rochester, MN: https://z.umn.edu/2017-kerry-pdf
  - Seneca Foods, Rochester MN: https://z.umn.edu/2017-seneca-pdf
  - Lamb Weston, Park Rapids, MN: https://z.umn.edu/2018-Lamb-Weston
  - Sensory Effects Sleepy Eye, MN: https://z.umn.edu/2018-SensoryEffects

#### Food Processing Technial Assistence Outcomes

	Recommended	Implemented	
Cost Savings	\$500,000	\$233,000	
Water	248 million gal	36.3 million gal	
Hazardous Materials	32,000 lbs	31,000 lbs	
Non-Hazadous Materials	110,000 lbs	78,000 lbs	
Electric Energy	1,252,000 kWh	143,000 kWh	
Gas Energy	260,000 therms	98,000 therms	



#### **Project Success: Savings Under Your Feet**

A MnTAP intern with Lamb Weston in Park Rapids made a simple and cost-effective procedural change to increase the plant's chemical usage efficiency. The intern focused on optimizing the rate and duration of the application spray time for sanitizing chemical used in foot baths located at 10 entryways to the production floor. This reduced the amount of chemicals being purchased and used, as well as the time spent mixing and delivering the materials to the stations. **The modifications resulted in a reduction of 5,000 lbs of chemical, 3,200 gallons of water, and \$11,000 in savings every year.** 

At a separate food manufacturer, it was discovered that by changing the type of floor mats used throughout the facility, the amount of sanitizing chemical used to fill the mats could be reduced by up to 40%. The surface of the mats consisted of densely packed cylindrical nubs designed to dislodge and scrape away soils from footwear. However, because the facility was filling these mats with a powder chemical rather than liquid, a significant amount was lost in the void spaces between the nubs and could not make effective contact with employees' footwear. It is estimated that switching to mats with flat treads would allow the company to use 600 lbs less sanitizing powder yearly – a savings value of \$3,800.

## Sustainable Spirits (Reducing the Impact of Breweries and Distilleries in Minnesota)

#### 2018 Outputs

3 assessments at craft breweries2 assessments at distilleries

#### 2018 Outcomes

Implemented savings: 13,800 kWh energy savings Recommended savings: 55,000 kWh of energy 1100 therms 80,750 gallons of water \$7,300 annual savings

#### **Project Partners**

Ecolibrium 3 Iowa Waste Reduction Center

#### Sponsor

Minnesota Pollution Control Agency

#### **Project Overview**

Continuing to build on past work MnTAP has done with small craft breweries, the "Sustainable Spirits" project started in 2017 to develop an outreach and technical assistance model to engage craft breweries and distilleries to reduce environmental impacts and production costs.

- Benchmarking activities identify opportunity areas at each facility.
- Technical assistance uncovers opportunities for reducing waste generated, optimizing water use, wastewater effluent compliance, and improving energy efficiency.
- Technical and financial support brings needed resources to facilitate implementation of process improvements.
- Information from this project will be shared broadly through the industry.

#### **Project Activities**

Created checklist method of assessing breweries based on input from Brewers Association Sustainability Manuals, Iowa Waste Reduction Center Green Brewery Certification Program, and work that was completed during the Fulton Brewing intern project.

A total of six companies received site visits, and four additional companies, referred to MnTAP as a result of this project received technical assistance. MnTAP provided resources and had conversations with these companies.

Five facility assessments in 2018:

- Site assessments were completed by MnTAP staff at three facilities in metro area, two facilities in Duluth.
- Three facilities were craft breweries, two distilleries
- Recommendation summaries provided to facilities included benchmarking against the Iowa Green Brewery Certification, and suggestions for grant funded pass-through items.
- Distribution of grant pass through fund's to aid implementation continues in 2019.
- Rapid Turnaround model trialed at one facility to shorten the timeline between assessment and implementation.

Learn more about reducing waste and wastewater at craft breweries, at: http://www.mntap.umn.edu/industries/facility/brewstill/



#### Project Success: Sustainable Spirits and the Brewers Association

Brewers take pride in their beer as well as being good environmental stewards. With the help of the Brewers Association, as well as the local Minnesota Brewers Guild, these businesses are always looking for ways to make improvements. It is no secret that eliminating single pass cooling and setting up hot and cold liquor tanks to capture and reuse this water is the best way to reduce water use. Unfortunately for a growing business trying to juggle manufacturing, bottling, distribution and a taproom with a limited staff and budget, these capital investments are often too much to implement. MnTAP's Sustainable Spirits project has been successful in showing this growing industry low or no cost solutions to add to their sustainability toolbox.

Recommendations include:

- LED lighting
- Compressed air system improvements
- Insulation

- Eliminating single pass cooling
- Low-flow aerators on sinks
- Improving cleaning procedures
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