IMPACT

Minnesota Technical Assistance Program

2020 Annual Report





Submitted to the Minnesota Pollution Control Agency Original Publication: May 2021

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 this funding to win additional competitive grant funding totaling 34% of the FY2020 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 4,908 site visits at facilities throughout the state
- Provided solutions to save businesses \$55.4 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, Amit Itkin, Joshua Kirk



Laura Babcock, PhD Director

Taylor Borgfeldt Pollution Prevention Specialist

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Technical Assistance Delivered Across Minnesota

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| Director's Note

Remote work restrictions, distancing requirements and general business slowdowns caused by the COVID-19 pandemic led MnTAP to reinvent its approach to delivering technical assistance services to Minnesota businesses. Virtual everything—meetings, site visits and intern training activities and support—became the new normal. Despite the challenges, MnTAP supported **20 student internships** over the summer, the largest cohort ever. Outputs for the year include engagement with nearly **400 organizations** across the state with **70 site visits** to **57 unique facilities**. Thirty-one facilities have implemented 40 MnTAPrecommended process changes and realized reductions totaling over **8.1 million gallons of water, 877,700 pounds of waste, 1.2 million kWh and 23,400 therms of fuel energy.** Combined, these reductions are saving companies **\$1.1 million annually.**

Highlights of MnTAP's efforts in 2020 include:

• 20 student projects with 7 funding partners resulted in recommendations for waste, water and energy efficiency that, when fully implemented, could **save \$4.25 million**.

• 87 unsolicited requests for assistance. Of these, 33% were for technical assistance, 20% were for assistance with MPCA loan or grant applications and 20% were for general information about MnTAP program activities. With the statewide emphasis on TCE, 12% of incoming calls to MnTAP were related to TCE and an additional 7% for general regulatory assistance.

 Wastewater treatment nutrient reduction assessments at mechanical plants and pond systems yielded recommendations that could reduce 100,000 lbs of effluent phosphorus (PO4) from facilities and reduce the need for over 600,000 lbs of chemical to treat phosphorus to meet permit limits.

This is good business for Minnesota. 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. The companies whose stories are shared in this report are making their businesses more resilient by reducing waste, optimizing processes and saving money. We thank our clients, partners and sponsors for the collaborations and we look forward to serving YOUR business in 2021.

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 2016-2020				
Number of Companies Assisted		1,552		
Water Daduation (cal)	Recommended	735,400,000		
Water Reduction (gal)	Implemented	149,200,000		
	Recommended	71,800.000		
Electric Energy Reduction (KWH)	Implemented	15,700,000		
Wests Deduction(lbs)	Recommended	22,700,000		
	Implemented	3,600,000		
	Recommended	1,700,000		
Gas Energy Reduction (therms)	Implemented	320,000		
Cook Sourie or	Recommended	\$15,800,000		
Cost Savings	Implemented	\$4,900,000		





2020 Outcomes								
	Waste			Energy		Water	Savings	
Activity	Air Emissions (lbs)	CO2 (MT)	Hazardous Waste (lbs)	Non-Hazardous/ Solid Waste (lbs)	Electric (kWh)	Fuel (therms)	(Gallons)	(\$)
Site Visits	16,320	128	670	10	157,000		209, 000	\$86,000
Interns	0	0	121,250	738,900	1,066,000	23,400	7,910,000	\$1,029,000
Materials Exchange				550				
TOTALS		877,000 lb:	s plus 128 MT	CO2	1,223,000	23,400	8,119,000	\$1,115,000

2020 Outputs				
Technical Assistance Activity	2018 Results	2019 Results	2020 Results	
Contacts (calls/emails/meetings)	991	1,198	1,290	
Requests for Assistance	85	92	86	
Total Staff Site Visits (unique facilities)	110 (74)	124 (78)	70 (57)	
Student Interns	14	16	20	
Materials Exchanges	91	210	13	
Events and Presentations	44	41	25	
Publications	46	30	Not Available	
MnTAP Website Unique Visits	34,955	40,000	43,100	

MnTAP Activities

On-Site Assistance

2020 Outputs

70 on-site visits 57 unique facilities 86 requests for assistance 388 unique org interactions

2020 Outcomes

877,700 lbs waste 8.1 million gal water 1.2 million kWh 23,400 therms of fuel \$1,105,000 annual savings

What they said...

"Amidst a pandemic, MnTAP's skillful team of engineers, scientists and interns forged ahead in finding inventive ways to continue providing the technical assistance Minnesota businesses and industrial facilities need. We are grateful for the outstanding work they do to help MPCA conserve resources, prevent pollution and strengthen Minnesota's economy."

- Mark Snyder, Pollution Prevention Lead, MPCA

2020 Goals

Conduct 125 site visits at 75 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.

2020 Accomplishments

Site visit activities were significantly decreased during 2020 due to University of Minnesota work-from-home order and curtailed access to facilities in response to the COVID-19 pandemic. Even with these challenges, MnTAP staff were able to interact with 388 facilities via phone, email, video conference and in-person meetings and site visits. MnTAP staff made 200 recommendations for resource conservation at Minnesota businesses in 2020 from all onsite services, with a value of \$925,000. Of the recommendations made during 2020 engagements, 39 (or 20%) were implemented in the same year they were recommended.

2020 First Year Implemented Recommendations





Pandemic Pivot to Deliver Pollution Prevention Technical Assistance

During March 2020, Minnesota Technical Assistance Program (MnTAP) staff needed to create a new way to provide technical assistance to Minnesota businesses and organizations—FAST. Virtual meeting platforms became the stand-in for in-person meetings and site visits. Between March 15 and September 1, MnTAP staff needed to:

- confirm if the 2020 Intern Program would be able to continue
- interview, hire and train twenty interns virtually following all University COVID-19 work policies
- manage interns working online from home, on-site or a hybrid, while focusing on safety
- create a meaningful Intern Symposium experience to share results.

Once the Intern Program was settled, MnTAP staff turned attention to conducting technical assistance using remote only and limited visit strategies. We are grateful for the strategies shared by other technical assistance organizations around the country. MnTAP continues to refine how we approach site visits, gather information and share results with facilities.

MnTAP Activities

On-Site Assistance: Intern Program

2020 Outputs

21 intern and student research projects serving 21 facilities

28 company applications processed 137 student applications

What they said...

"It has been great working with such talented, professional interns with the MnTAP Program. The perspective and talent of the interns brings confidence and success to the LCCMR wastewater pond optimization project."

> - Frank Stuemke, Minnesota Rural Water Association

Funding Partners

Minnesota Pollution Control Agency

CenterPoint Energy

Metropolitan Council Environmental Services

Clean Water Land and Legacy Amendment

Minnesota Department of Commerce

Minnesota Department of Administration

Xcel Energy

Environment and Natural Resources Trust Fund

2020 Goals

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

2020 Accomplishments

MnTAP guided 21 intern and student research projects in 2020.

MnTAP interns come from a variety of disciplines. In 2020, chemical, mechanical, bioproducts and biosystems, environmental, biological, industrial engineering as well as environmental science, policy & management and physics were represented. Most interns came from the University of Minnesota Twin Cities campus, while three came from the University of Minnesota Duluth Campus; one came from the University of Illinois Urbana-Champaign and one from University of Northwestern



- St. Paul, MN campus. 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: www.mntap.umn.edu/resources/solutions.html

2020 Outcomes - Intern Program Implementation

	Waste (lbs)			Energy			
Project Year(s)	Air Emissions (lbs)	Hazardous Waste (lbs)	Non-Haz/ Solid Waste (lbs)	Electricity (kWh)	Gas (therms)	Water (gallons)	Savings
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
2020		121,250	738,900	1,066,000	23,400	7,910,000	\$1,029,000



The Minnesota Rural Water Association is a nonprofit organization founded in 1978. MRWA provides technical assistance and training for personnel at small municipal and non-municipal drinking water and wastewater systems, rural water districts and wastewater districts with populations less than 10,000. They offer professional services in several areas, including state and federal regulations, fiscal management, system operation and maintenance, source water protection and more.

MnTAP has been partnering with MRWA and MPCA since 2018 and working with cities to optimize removal of nitrogen and phosphorus from their wastewater effluent. This project has been conducted with funding from the Legislative Citizen Commission on Minnesota Resources (LCCMR), with student researchers and MnTAP interns analyzing current operations in wastewater pond systems, researching best practices, calculating potential improvement opportunity, suggesting operational changes and supporting implementation of low cost optimization improvements. In 2020, MRWA helped support two MnTAP intern projects at four wastewater pond systems at Breckenridge, Karlstad, Roseau and Warroad.





MnTAP Activities

General Outreach & Communications

2020 Outputs

11 Source newsletters 7 Materials Exchange newsletters 2019 Impact 2020 Intern Solutions 25 presentations and training events 106 tweets with 74,000 impressions

2020 Outcomes

4,400 Source newsletter subscribers with a 21% open rate

2,900 Materials Exchange newsletters subscribers with a 24% open rate

50,700 website page views

2020 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.

2020 Accomplishments

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

- MnTAP staff presented at 25 events, ranging from industry-specific topics, such as wastewater optimization, classroom presentations on pollution prevention and intern program opportunities, and even provided training on individual water efficiency in collaboration with TURI in Massechusetts.
- Created and successfully presented a **completely online Intern Symposium** in August, where 228 people attended via Zoom.



Crowds Zoom in for the 2020 Intern Symposium

The 2020 MnTAP Intern Program student cohort, their advisors and host companies showed exceptional resilience as we re-invented the program from our traditional format to a safer, socially distant program during the COVID-19 pandemic. Some of the changes included virtual interviews and training sessions, hybrid work arrangements, and ultimately a fully online symposium. The 2020 MnTAP Intern Program hosted the largest number of interns and student researchers MnTAP has ever supported.

The online symposium was a great success! This year provided MnTAP the opportunity to share the 2020 MnTAP Intern Symposium beyond Minnesota. The virtual event allowed interested viewers from around the world to be a part of the program. The 2020 Symposium attracted an audience from 34 states, as well as Canada, Australia, and Malaysia. Altogether, 228 individuals attended the symposium.



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Minnesota Materials Exchange

2020 Outputs

7 Published newsletters 32 New organizations/ companies 115 New users 71 Listings 13 Successful Exchanges

2020 Outcomes

553 lbs diverted

Goals

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

2020 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 2020, MnTAP continued focusing on promotional efforts through the Materials Exchange newsletter. Seven newsletters were published highlighting new listings, special topics related to reuse, and promoting Minnesota businesses that specialize in secondhand goods or reuse services.

2020 Exchanges

Significantly fewer listings and exchanges were verified as complete in 2020 compared with previous years. Business contractions due to quarantine from the COVID-19 pandemic resulted in fewer sites able to participate in reuse through the Minnesota Materials Exchange. This is a trend that has been reported overall for the reuse, repair and rental industry. Source: https://www.ifixit.com/News/41083/how-quarantine-is-affecting-recyclers-refurbishers-and-repair-shops

Of the 553 lbs. of verified exchanges, furniture, medical/laboratory supplies and equipment, computers and office equipment as well as classroom supplies were on the list.



Bosch Reduces 270 Tons of Wood Waste Through Pallet Reuse



Bosch Automotive Service Solutions in Owatonna hosted a MnTAP intern to meet company waste reduction goals. The intern determined that there was a significant opportunity to reduce wood pallet waste through improved internal pallet management and identifying a new pallet supplier.

The intern developed a new pallet sorting procedure to reuse pallets internally by setting up an effective storage space with clear signage and training staff on the new procedure, which has the opportunity to save 25 tons of wood waste annually and \$9,000 in new pallet costs.

The intern also identified a new pallet supplier company that was capable of repairing broken pallets. Purchasing new and refurbished pallets from this supplier saves the company over \$26,000 in purchase costs and reduces 245 tons of used pallets shredded for mulch.

2020 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
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.	11
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.	12
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 collaborative research, intern projects and technical assistance.	13
Upstream Nutrient Reduction in Wastewater Treatment Legislative-Citizen Commission on Minnesota Resources (LCCMR)	This project partners with communities to identify nutrient source reduction opportunities at facilities with high nutrient effluent discharged to municipal treatment facilities. Decreasing effluent load helps wastewater treatment operate more efficiently.	14
Electrification of Transport Refrigeration Units - Reducing Air Emissions EPA Region 5	This source reduction study focused on characterizing the benefits of running transportation refrigeration units (TRUs) on electricity while they are parked at the dock.	15
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 opportunities in a range of Minnesota facilities.	16
Pollution Prevention in the Metal Fabrication Industry MPCA - Resource Management and Assistance Division	Conduct informational interviews with industry stakeholders to define critical P2 and sustainability targets in the metal fabrication industry. Best practices will be shared and site assessments will support implementation of these best practices.	17
Safer Degreasing with Leech Lake Band of Ojibwe EPA Region 5	MnTAP partnered with the Leech Lake Band of Ojibwe Air Quality program to assist businesses in and around the Leech Lake Reservation with adopting less toxic, lower emission, alternative degreasing solvents.	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 cleaning systems.	19

Industrial Water Conservation Initiatives

Grant-Funded Project

2020 Outputs

4 metro-area intern projects

1 internal data analysis intern project

24 proposed recommendations

4 implemented recommendations

7 planned recommendations

45,000,000 gallons of proposed water savings

2020 Outcomes

6,400,000 gallons of implemented water savings

\$657,000 of total implemented savings

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 2020 with support and direction from the Metropolitan Council Environmental Services (MCES) Water Supply Planning Unit. Water conservation recommendation potential for the four metro interns totaled 45 million gallons of water from 24 recommended actions. Implementation to date has resulted in 6.4 million gallons of annual water savings from four implemented recommendations with an additional seven recommendations planned.

2020 Activities

In addition to intern project successes, MnTAP staff members were busy recruiting new projects for the 2021 intern cohort and presenting opportunities to industry stakeholders that highlight solutions to industrial water conservation. Events featuring MnTAP presentations/trainings in 2020 include:

- Industrial Water Conservation TURA Resource Conservation Training/Workshop, Massachusetts, 2020
- Water Conservation in Minnesota Energy, Water, and Greenhouse Gas Group with the Office of Enterprise Sustainability, 2020.

Industrial Water Conservation Trends

One of the intern projects analyzed 340 industrial water efficiency recommendations from previous MnTAP technical assistance and intern projects between 2015 and 2020. The goal of the project was to identify trends from the recommendations that may be applied broadly for companies seeking to improve water efficiency. Approximately 66% of MnTAP recommendations are related to process water efficiency with the remaining third evenly split between irrigation and domestic water use recommendations. The highest number of recommendations involves managing existing processes to use water more efficiently, which includes adding controls. The highest volume of water efficiency is achieved through modifying processes to rethink how water is used, which includes reusing process water.

Recommendations and Efficiency Opportunities by Category

Recommendation Type	# Recommendations	Implemented Recommendations	Total Proposed Reductions (gallons)	Actual Reduction (gallons)
Process	233	97	580,000,000	150,000,000
Domestic	54	18	25,000,000	7,700,000
Irrigation	55	7	61,000,000	18,000,000
Maintain	33	16	40,000,000	7,400,000
Manage	186	68	170,000,000	68,000,000
Modify	113	35	420,000,000	73,000,000



Project Success: Old Dutch Foods

What's better than eating potato chips all summer long? Helping make those potato chips with less water! That is what the MnTAP intern was able to accomplish this past summer at two Old Dutch Foods sites located in St. Anthony and Roseville, MN. After a deep dive into the various uses of water in these two facilities, the intern developed creative solutions to reduce water use. As part of this process, the water reuse system was examined and recommendations totaling 3 million gallons of water reduction were made. These recommendations included increasing the amount of reused water utilized by different processes throughout the facility and simultaneously increasing the amount of water sent to the water reuse system. Overall, the opportunities identified totaled nearly 20 million gallons of annual water savings, most of which is planned for implementation.

Grant-Funded Project

TCE Alternatives Project

2020 Outputs

1 additional company engaged (9 total) 8 mini-webinar episodes 6 promotional articles 6 presentations

2020 Outcomes

92 companies engaged in project activities 9 companies transitioning from TCE 188 views of TCE webinar series

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

TCE is a hazardous air pollutant (HAP) that can contaminate soil, air, and water. TCE is a known human carcinogen, can affect the liver, kidneys, immune, reproductive, and central nervous systems, and may affect fetal development. Continued use of TCE exposes companies to health, environmental and business liability. In May 2020, the state of Minnesota became the first state to ban the use of TCE by all businesses requiring an air permit effective June 1, 2022. MnTAP is committed to helping these businesses adjust to this change by finding long term safer solutions through solvent testing and technical assistance.

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 options for their applications. This project aims to identify and overcome barriers for businesses seeking to switch away from TCE, while helping them to avoid regrettable substitutions such as n-propyl bromide (nPB) and trans-1,2-dichloroethylene (tDCE). Once suitable alternatives are identified, MnTAP provides technical assistance to support qualification and implementation activities.

Key Project Learning

• Smaller companies may not know if the products they use contain TCE.

· Companies need assistance identifying safer alternatives.

o Online marketing information promotes regrettable substitutions.

o While TCE is one size fits all, safer alternatives must be tailored to process needs.

• When companies feel pressured to make a quick change, they often turn to "drop-in" alternatives that are considered regrettable substitutions.

• Validation can take an extended period of time (>1 year) depending on the number of products and the complexity of the requalification process.

• TCE reductions typically are not realized until the very end of the project, after the new process is fully installed and validated for all products and the old process is decommissioned.

Little Reminders Have Big Impact

When the COVID-19 pandemic restricted in person visits, MnTAP needed a way to continue to inform and engage TCE users, especially at small facilities where staff are often difficult to reach. A series of eight mini-webinars, 2 - 4 minutes each were created, produced and shared via email and social media from June through August 2020.

Topics include: Getting to Know TCE, Hazards of TCE, Policy, Where to Find TCE in Your Facility, Regrettable Substitutions, Case Studies, Financial Assistance, and 10 Tips to Replace TCE.

The mini-webinars are available on the MnTAP web page at: <u>http://www.mntap.umn.edu/</u>industries/facility/machine/tcealternatives/webinar-and-training/.

The webinars were emailed to company contacts at approximately 140 potential TCE users. Over 8 consecutive weeks, a webinar link was sent along with a summary message about TCE in Minnesota to keep the project top of mind with company staff over an extended time. Analytics on the email messages indicate 10 to 20 unique recipients clicked on each video link to watch the webinar content. MnTAP also promoted the series to over 4,000 recipients of the MnTAP Source electronic newsletter. The webinars have been viewed 188 times as of mid-January 2021.



Grant-Funded Project

Nutrient Optimization in Wastewater Treatment

2020 Outputs

4 Intern projects

5 Mechanical plant assessments

5 Wastewater pond assessments

7 Students hired

2 Pilot projects

Project Partners

Minnesota Pollution Control Agency

> Minnesota Rural Water Association

> > City of Saint Cloud Treatment Facility

Sponsors

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 a low cost investment. Recommendations can take an extended trialing period to implement. During 2020 several recommendations have been made at 10 facilities.

2020 Recommendations

- Nitrogen (NH4N + NO3N): 465,000 lb
- Phosphorus (PO4): 100,000 lb
- Chemical Additions for Phosphorus Treatment: 618,000 lb
- Energy Savings: 2,793,000 kWh
- Cost Savings: \$487,000

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 executing a plan to complete comprehensive testing and data analysis at six ponds to learn the key factors contributing to these differences in treatment quality.



Project Success: Baudette Wastewater Operations Changes Produce Big Returns

Achieving cleaner water is the goal of all wastewater treatment professionals. The LCCMR Nutrient Optimization Project Team has been working with pond system operations staff since 2018 to identify strategies to improve treatment. The City of Baudette, MN wastewater system had phosphorus levels in 2018 (4.6 mg/l) and 2019 (3.8 mg/l) that required the addition of ferric chloride to achieve the required level of <1 mg/l phosphorus in the discharge effluent.

Operations staff from the City of Baudette, MN partnered with the team to reduce phosphorus, minimize the use of ferric chloride and improve the overall performance of the facility. Several new operational strategies were implemented bringing their pond nutrient treatment to the next level, achieving a phosphorus effluent level of 0.4 mg/l with no ferric chloride treatment needed. This work resulted in elimination of purchase and application of 6,600 gal ferric chloride saving \$22,000 annually.

See the full case study - <u>http://www.mntap.umn.edu/wp-content/uploads/simple-file-list/</u> POTW/Baudette-Case-Study.pdf

Upstream Nutrient Reduction

2020 Outputs 5 Site assessments 2 Student intern projects

2020 Outcomes

680,000 gallons water saved \$5,300 implemented 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 Minnesota communities and facilities in these communities 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, in excess nutrients can result 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 sick.

Project Overview

Building on work with Minnesota's wastewater plants and ponds to achieve nutrient removal, MnTAP's technical staff have been engaging businesses and organizations in communities that discharge to these plants and ponds. The results for 2020 include 5 business assessments, 2 summer intern projects and continued outreach to communities and businesses on the benefits of better wastewater effluent management.

2020 Activities

Throughout 2020, MnTAP continued to build on strong connections with Minnesota communities and wastewater treatment systems to complete assessments, as well as identify potential businesses for additional assessments and intern projects. The following activities were accomplished in 2020:

- Outreach to additional communities with wastewater treatment plants and ponds to inform them on the benefits of minimizing high-nutrient effluent
- Discussions with 9 communities about the co-benefits for treatment systems and local businesses
- Site assessments completed at 5 facilities, identifying nitrogen and phosphorous reduction along with other efficiency opportunities-current recommended savings of 1,700 lbs. phosphorous, 170,000 lbs. of wastewater loading (biolgical oxygen demand and total suspended solids) and \$47,600
- 2 intern projects resulting in over \$220,000 recommended savings and reductions of 5,700 lbs. of phosphorous effluent, 440,000 lbs. BOD and 240,000 lbs. TSS
- 1 presentation at the 2020 Minnesota Water Resources Virtual Conference
- 2 intern projects planned for 2021

2021 Plans

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



Project Success: Minnesota Specialty Yeast

Minnesota Specialty Yeast in Hutchinson, MN specializes in active yeast formulations for food and agriculture businesses. The company was seeking to decrease their phosphorus output to the local wastewater facility by reevaluating their procedures. The intern found that the company was utilizing phosphoric acid as both a micronutrient and for pH regulation. Through bench scale simulations, the intern identified new process conditions that would allow pH control using sulfuric acid rather than phosphoric acid. When fully implemented, this solution will reduce approx. 1,000 lbs. of phosphorus released to the wastewater facility, saving \$6,400 annually.

Minnesota Specialty Yeast also wanted to decrease their use of water from both private wells and the city. The intern found an opportunity to reduce water consumption and reclaim process heat by reusing softened well water from cooling processes for boiler make up water. When fully implemented this change would save 1.3 million gallons of well water, 3,900 therms of heat energy and \$7,500 annually.

Electrification of Transport Refrigeration Units – Reducing Air Emissions from Local Food Hauling

2020 Outputs

1 Published article 1 Webinar produced

3 Site assessments

2 recommendations made to reduce 12,000 therms and 48 metric tons CO2e

1 TRU converted to electric capable

Project Outcomes

1,700 therms of implemented energy savings

Sponsor

EPA Region 5

Partners

CleanFuture Thermo King Minnesota Trucking Association Second Harvest Heartland Environmental Initiative

Project Overview

This project was a source reduction study focused on characterizing the benefits of running transportation refrigeration units (TRUs) on electricity while they are parked. 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 operated 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. The focus of this project was to verify these results in Minnesota and further identify ways to implement diesel fuel/emission reduction.

2020 Activities

Target Markets: 2020 activities focused on quantifying the emissions and cost savings potential of electric capable TRUs using the data collected throughout the project. Minnesota fleets where electric capable TRU adoption can most easily be justified include fleets that:

- Own electric capable TRUs without shore power
- Replace TRUs on a regular basis
- Experience pressure to reduce emissions
- Contract their hauling

The main barrier for fleet adoption of electrification of transport refrigeration was cost. The payback on the whole system (electric capable TRU, shore power, and installation) was higher than expected with current electricity and diesel prices. However in some cases, equipment or business conditions allow for adoption.

Replication Model: MnTAP produced a replication model for the process. This model was developed to identify potential fleets where electrification makes good business sense and provide instruction on emissions and cost calculations developed to justify transition projects. The replication model was shared with Environmental Initiative staff in Minneapolis, MN. Environmental Initiative manages DERA projects within the state and would be in the best position to use the process to engage fleets as opportunities arise.



Partner Spotlight: Minnesota Trucking Association

An important aspect of this project was amplification of project results by sharing results with fleets and other entities around the state to motivate technology consideration. Throughout this process, the Minnesota Trucking Association (MTA) provided a platform for MnTAP to reach the refrigerated trucking sector. Two outreach pieces came out of the partnership with MTA, an article published in the February 2020 edition of their monthly member magazine and a webinar, both pieces promoting electrification opportunities identified in the project.

The article was an in-depth look at the potential benefits of electric capable TRUs, including reduced diesel use, operating cost, and local decreases in diesel air emissions. It also outlined the process of electrification to motivate fleets to explore the technology. The webinar was a collaborative effort and included Thermo King, CleanFuture, and the local hauling company, Quality Custom Distribution (QCD) that presented a diverse set of perspectives and solidified the benefits of electric capable TRUs. http://www.mntap.umn.edu/focusareas/energy/refrigeration/trus/#webinar

Energy Efficiency in the Drinking Water Treatment Sector

2020 Outputs

3 Electric Utilities interview 5 Sites assessed

2020 Outcomes

6 past opportunities quantified 4 new opportunities recommended

Sponsors

Conservation Applied Research and Development Grant

> MN Department of Commerce, Division of Energy Resources

What They Said

"Water distribution accounts for a large portion of our municipal energy use. MnTAP helped us systematically identify opportunities for energy efficiency within this process. Their work helped us connect actions to measurable savings and provided useful recommendations going forward."

> -Rachel Workin, City of Fridley, Environmental Planner

Project Overview

This has been the second year of a two-year project to identify energy efficiency improvements in the municipal drinking water production sector in Minnesota. During year one, MnTAP surveyed a cross section of the state's water supply and treatment plants as well as industry 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. Year two focused on conducting detailed site assessments at a select number of water utilities to verify the savings potential estimates from the surveying process. Aggregate data from surveying and assessments will be used to create energy conservation recommendations applicable to water utilities across the state. As recommended conservation opportunities are implemented, electric utilities will have information to better develop rebates to facilitate energy reduction in this sector.

2020 Activities

In 2020, MnTAP focused on data acquisition and analysis for five municipal water treatment and supply facilities throughout the state was explored. These site assessments were originally planned as in person visits, but due to COVID-19, were conducted remotely.

After the site assessments were completed, MnTAP calculated the remaining potential conservation opportunity throughout the state. This has been done by taking the findings from the assessments, interviews and original literature search to estimate the statewide opportunity potential for each energy efficiency measure. The table below shows the six opportunities identified, the percentage of drinking water production facilities in the state that could still take advantage of each opportunity and the potential savings each site could attain. Overall, the state-wide potential energy savings is 100,000,000 kWh per year.

Vetted Opportunity	Sites w/Potential Opportunity State- Wide	Potential Estimated Energy Savings
Water Loss Reduction	88%	15%
Custom Conservation	81%	14%
Pump Efficiency Optimization	80%	6%
Pump Rehabilitation	53%	6%
VFD Installation	20%	5-30%
Well Rehabilitation	47%	2%

Future Work

This project will be completed in June 2021 and will include a final report with overall project results and a webinar to share the technical findings of this project with the state. The results from this project will serve as a guide for water and energy utilities across the state to decrease energy use and reduced operating costs.



Project Success: Analysis Shows Big Savings for Local Water Utility

MnTAP completed an assessment of the City of Fridley's drinking water treatment system. This involved both the analysis of previously completed efficiency upgrades and new opportunities for future gains in energy efficiency. One of the previously completed efficiency upgrades was prioritization of their well pumps based on their efficiency. This was an opportunity that showed great promise in the early screening done for this project and has potential for other drinking water treatment systems to adopt. After analyzing data supplied by the City of Fridley, the implemented pump prioritization had netted 43,000 kWh per year in energy savings. A further 21,000 kWh of yearly savings was recommended to the City by automatically prioritizing distribution pumps based on pump efficiency. This would bring the total yearly savings to 64,000 kWh.

P2 in Metal Fabrication

2020 Outputs

2 promotional articles 1 student project created

Project Partners

Minnesota Precision Manufacturing Association

Sponsor

U.S. EPA, Region 5 MPCA

Project Overview

The three-year project plan seeks to develop informational interview strategies to define critical P2 and sustainability targets in the metal fabrication industry. Site assessments will support implementation of best practices and identify improvement opportunities. Follow up activities will seek to motivate implementation of recommendations, confirm actions and develop case studies to share key outcomes broadly for replication.

Fabricated metal processes generate various waste streams that may be hazardous, degrade to hazardous components or require extra expense for management or compliance. Oily wastes from machining operations, heavy metal bearing streams from surface treatment and plating operations, solvents, alkaline and acid solutions from metal cleaning can find their way to wastewater streams. Chlorides in wastewater may come from softened water, cutting fluids containing halogenated paraffins and possibly from wastewater treatment chemistries applied on site. Operations may utilize hazardous solvents for degreasing and other cleaning processes. Aqueous based cleaners may contain phosphate components. While PFAS was banned in chromium plating operations in 2015, there may still be questions about how the alternative are performing.

2020 Activities

- This project was launched in November 2020 with promotions published in MPCA Airmail, and MnTAP Enews.
- Student researcher candidate was identified and hired for Spring semester 2021 to work on informational interviews with businesses and vendors in the sector.

Project Success: Partner - Minnesota Precision Manufacturing Association

MnTAP has worked closely with an industry association, Minnesota Precision Manufacturing Association (MPMA) to develop the concepts for project outreach, promote the project activities and share information within the industry sector. MPMA has a membership of 300+ companies and has been a leader for the precision manufacturing industry for the past 65 years. MPMA will share information on the program through their newsletter, web page, and other forms of notification. Their goal is to include more companies in the project and give the program a hands-on perspective of what it takes to implement safer products.



Safer Degreasing with Leech Lake Band of Ojibwe

2020 Outputs

Safer Products Training 19 Facilities visited 11 Facilities try alternatives 655 lbs VOC 380 lbs HAPs

2020 Outcomes

Implementation is ongoing

Sponsor EPA Region 5

Project Partners Leech Lake Band of Ojibwe

Project Overview

This project partnered with the Leech Lake Band of Ojibwe Air Quality program to assist commercial and industrial businesses in and around the Leech Lake Reservation to reduce air emissions through the 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 of less hazardous alternatives for evaluation. The Leech Lake Band of Ojibwe Air Quality staff encouraged local participation in the program and supported follow up activities.

2020 Activities

Training and assessment aspects of this project were originally scheduled to be a part of the 2020 Intern Program. Due to Covid-19, training was conducted virtually, assessments were conducted by MnTAP staff and follow up activities were conducted by Leech Lake Band of Ojibwe staff.

MnTAP utilized knowledge of safer degreasing alternatives gained in previous projects and utilized suppliers in the local area to purchase these safer alternatives for businesses to try. Leech Lake staff were trained on how to recognize safer products and implement a Safer Products program by MnTAP staff. Due to Covid-19 concerns, this training was held virtually on two separate dates to accommodate necessary staff. Site visit assessments for this project were conducted by MnTAP staff during an intensive one week outreach effort. During this week MnTAP met with 19 businesses and 11 of these businesses agreed to try alternatives. The grant received a no cost extension to continue the work through March 2021 to support implementation.



Project Success: Leech Lake Band of Ojibwe

This project partnered with the trusted community leadership of the Leech Lake Air Quality Program within the Leech Lake Band of Ojibwe Tribal government (Band). The Band and the Air Quality Program are well-known to area businesses and other organizations in the area as they have worked on diesel retrofit projects, including school bus retrofits, as well as other air related projects to raise awareness and improve air quality. Leech Lake Air Quality Program staff were eager to participate in this project and viewed it as an opportunity for MnTAP and the Band to collaborate and affect change across the entire area, as well as to learn about identifying source reduction opportunities, knowledge that they can carry forward in future work with internal and external businesses.

The Band offered to promote the project, support MnTAP with introductions to businesses and internal departments, and provided access to their Green Corp staff member to assist with outreach and implementation. The strong community presence and reputation of the Band gave MnTAP the ability to include schools and fleet service operations in this project. Including their staff in the outreach effort provided an opportunity to include more businesses and internal departments in the project and provided the Air Quality Program a hands-on view of what it takes to implement safer products.

Grant-Funded Project

Safer Dry Cleaning

2020 Outputs

32 Calls 86 Emails 1 Site Assessment 4 Meetings

2020 Outcomes

670 lbs PERC reduction

Sponsor

Minnesota Pollution Control Agency

Project Partners

Environmental Initiative Ramsey County Grant Administration

Project Overview

The focus of this project is to apply technical assistance resources to encourage dry cleaning facilities throughout Minnesota that use perchloroethylene (PERC), to switch to less hazardous alternatives. This work created state wide outreach with dry cleaning business owners to support overall resource utilization efficiency and steady replacement of PERC based equipment with safer alternatives.

Project Background

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. 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 dry cleaning equipment with equipment compatible with less hazardous alternatives is generally beyond the financial reach of most business owners.

2020 Activities

Outreach efforts to dry cleaners were limited to calls, emails and virtual meetings from March 2020 through the end of the year in response to the COVID-19 pandemic. Significant effort was focused on connecting dry cleaning businesses who were seeking to transition to less hazardous alternatives to available financial resources to help reduce the financial hurdle to implementation. This included partnering with Environmental Initiative to engage facilities eligible for the Ramsey/Washington County Recycling & Energy Business Pollution Prevention Program. Other financial assistance opportunities promoted included the Minnesota Pollution Control Agency Small Business Loan Program and the MN OSHA Workers Safety Grant Program.

Safer product transitions supported:

- I Facility completed transition to less hazardous dry cleaning system
- 3 Facilities accepted for financial assistance to facilitate transition to safer alternatives.

Other program activities:

- Connect with dry cleaning businesses to identify those seeking to make a transition away from PERC
- Connect with vendors for technical information on equipment resource utilization to support grant applications
- Assist in writing grant and loan applications for resources to facilitate business investment in new equipment
- Maintain communication with six facilities at various stages of engagement in the project.

MnTAP will continue to engage dry cleaners through project completion in June 2022.

