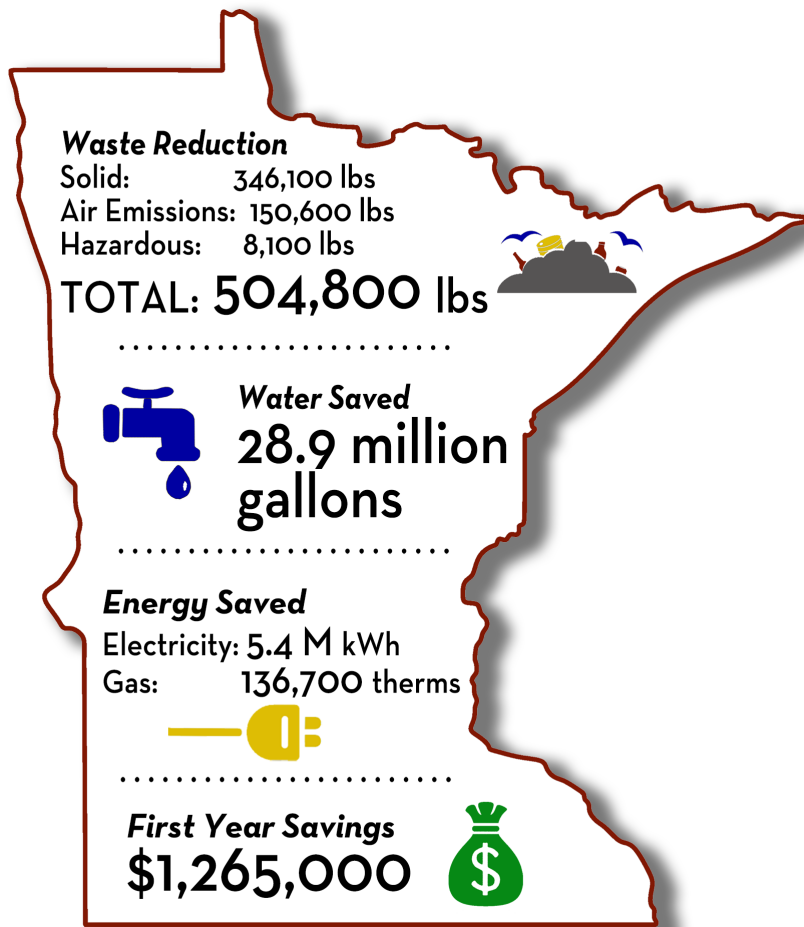


IMPACT

Minnesota Technical Assistance Program

2022 Annual Report



Strengthening Minnesota businesses by improving efficiency while saving money through energy, water, and waste reduction.



Minnesota Technical Assistance Program

UNIVERSITY OF MINNESOTA



Submitted to the Minnesota Pollution Control Agency
Original Publication: May 2023

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 40% of the FY2022 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 5,072 site visits at facilities throughout the state.
- provided solutions to save businesses \$57.7 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: Jane Paulson, Laura Babcock, Gabrielle Martin, Laura Sevcik, Kelsey Klucas, Alaina Ryberg

Back: Daniel Chang, Jon Vanyo, Kevin Philpy, Matt Domski, Kira Peterson

Not shown: Jon Schroeder

Laura Babcock, PhD
Director

Daniel Chang
Associate Engineer

Matt Domski
Intern Program Manager

Kelsey Klucas
Engineer

Gabrielle Martin, CEM, CWEP
Associate Engineer

Jane Paulson, CEM
Senior Engineer

Kira Peterson, PE, CEM
Engineer

Kevin Philpy, PE
Senior Engineer

Alaina Ryberg
Website and Data Manager

Jon Schroeder, LEED AP
Sustainable Materials Management Specialist

Laura Sevcik, EMIT, CWEP
Associate Engineer

Jon Vanyo, CEM
Engineer

Technical Assistance Delivered Across Minnesota

Table of Contents

Director's Note	3
MnTAP's Impact	4
Executive Summary	5
MnTAP Activities	
Onsite Assistance	6
Intern Program	7
Communications.....	8a
MN Materials Exchange	8b
Grant-Funded Projects List	9
Industrial Water Conservation-Metro	10
TCE Alternatives	11
Upstream Nutrient Reduction.....	12
P2 in Metal Fabrication.....	13
Wastewater Energy Training	14
Industrial Water Conservation-NonMetro	15
Wastewater Pond Nutrient Optimization	16
PFAS P2 BMPs	17a
P2 in MN Food Industry	17b

Director's Note

On-site activities resumed at a high level in 2022. A highlight of the year was hiring three additional MnTAP staff members to focus on outreach for hazardous materials reduction, food industry technical assistance and sustainable materials management.

2022 Outputs and Outcomes

- Served **430 organizations**, 41 located in areas with environmental justice concerns
- Conducted **104 site visits** at 77 unique facilities
- Recorded **77 implemented recommendations** at 52 facilities
- Realized reductions of
 - **500,000 pounds** of waste
 - **28.9 million gallons** of water
 - **5.4 million kWh** and **136,700 therms** of energy
 - **\$1.27 million dollars** in first year business cost savings

Highlights of MnTAP's efforts in 2022

- MnTAP provided assistance to eliminate TCE use prior to a Minnesota ban. MnTAP contacted 126 businesses, engaged 11 facilities, completed transitions at nine sites and reduced 83,000 lbs/yr of TCE use with 30,000 lbs/yr replaced with verified lower hazard alternatives.
- Metal fabrication and finishing industry technical assistance continued in 2022. P2 strategies were reintroduced to demonstrate cost savings. Through 2022, five facilities have implemented changes with potential to reduce 16,000 lbs hazardous waste and save \$660,000/yr.
- MnTAP with MPCA and MRWA launched an ENRTF supported project to train operations staff at 200 wastewater pond systems to optimize nutrient reduction. Over 100 facilities were assessed by year end. Work continues through June 2024 on assessments and implementation support.

This report shares stories about the value found in the wide-ranging projects supported in 2022. The organizations engaged in these projects are becoming more resilient by reducing waste, optimizing processes and saving money while helping to sustain Minnesota's environment. We thank our clients, partners and sponsors for the collaborations during 2022, and we look forward to serving YOUR business in 2023.

Laura Babcock, Director, Minnesota Technical Assistance Program

MnTAP Honored with R2E Award

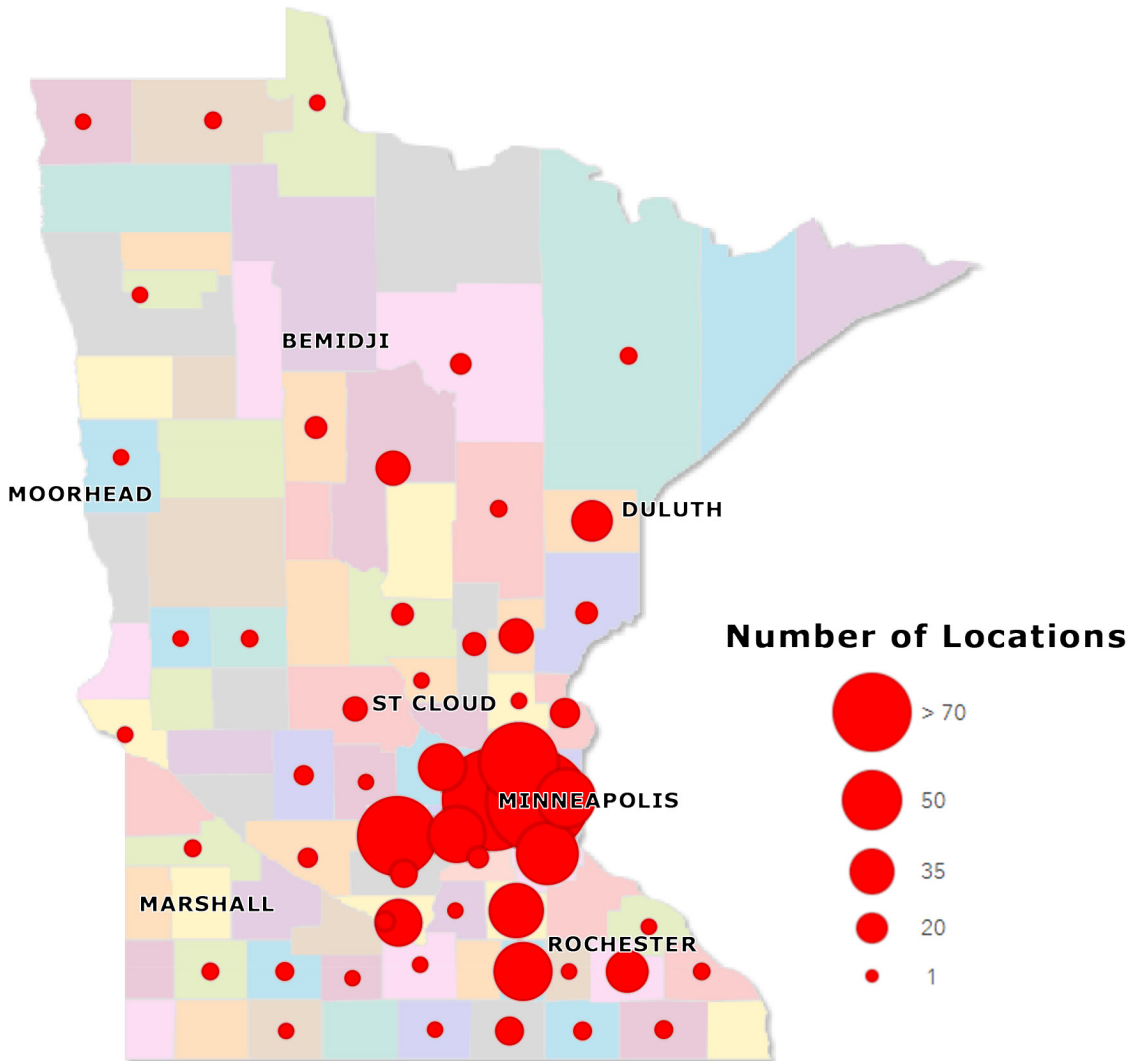
The Central States Water Environment Association Minnesota, Resource Recovery and Energy Committee (CSWEA/R2E) honored MnTAP with the 2021 Minnesota Section Resource Recovery & Energy Excellence Award in April. MnTAP has been working with wastewater facilities since 2014:

- **2014** - Implemented [energy efficiency](#) at mechanical wastewater facilities. Eleven facilities assessed 5.5 million kwh of efficiency identified. (Comm DER, MPCA, DOE SEP Funding)
- **2018** - Developed a wastewater energy efficiency training program through a [project](#) grant (Comm DER, Conservation Applied Research Development (CARD))
- **2018** - Optimized [wastewater nutrient optimization](#) with 10 mechanical facilities and 14 pond systems. (MPCA, Environment and Natural Resources Trust Fund (ENRTF, MRW, City of St. Cloud NEW facility)
- **2019** - [Decreased nutrient discharge](#) upstream of wastewater facilities to ease treatment burdens (ENRTF funding as recommended by LCCMR)
- **2021** - [Trained wastewater staff](#) to achieve low cost energy efficiency strategies (COMM DER, MN Statutes 216C.43 and 216C.42)



MnTAP Contributes to Minnesota's Economic Well-Being

MnTAP Impacts 2018-2022		
Number of Companies Assisted		1,409
Water Reduction (gal)	Recommended	262,000,000
	Implemented	131,000,000
Electric Energy Reduction (kWh)	Recommended	32,000,000
	Implemented	29,000,000
Waste Reduction (lbs)	Recommended	11,000,000
	Implemented	6,800,000
Gas Energy Reduction (therms)	Recommended	1,100,000
	Implemented	337,000
Cost Savings	Recommended	\$8,400,000
	Implemented	\$5,600,000





2022 Outputs			
Technical Assistance Activity	2020 Results	2021 Results	2022 Results
Contacts (calls/emails/meetings)	1,290	1,146	1,162
Requests for Assistance	86	73	68
Total Staff Site Visits (unique facilities)	70 (57)	61 (48)	104 (77)
Student Interns	20	14	16
Events and Presentations	25	43	56
MnTAP Website Unique Visits	43,100	61,298	62,425

2022 Outcomes							
Activity	Waste			Energy		Water	Savings
	Air Emissions (lbs)	Hazardous Waste (lbs)	Non-Hazardous/Solid Waste (lbs)	Electric (kWh)	Fuel (therms)	(Gallons)	(\$)
Site Visits	150,600	2,900	106,500	2,860,000	600	7,000	\$656,000
Interns	0	5,200	216,700	2,520,000	136,100	28,867,000	\$609,000
Materials Exchange	0	0	22,900	-	-	-	-
TOTALS	504,800			5,380,000	136,700	28,874,000	\$1,265,000

Additional GHG reduction of 1,550 tons

On-Site Assistance

2022 Outputs

104 on-site visits
 77 unique facilities
 68 requests for assistance
 432 unique org interactions

2022 Outcomes

504,800 lbs waste
 28.9 million gal water
 5.4 million kWh
 136,700 therms of fuel
 \$1,265,000 annual savings

What they said...

“It has been a privilege to work with MnTAP’s staff during this past year. I am pleased with the results achieved with the past grant-funded P2 projects and look forward to the new grant-funded projects focused on providing assistance to our food industry to reduce waste and conserve water and outreach to our manufacturing industries to find safer alternatives to PFAS chemicals.”

- Mark Snyder,
 Pollution Prevention Lead,
 MPCA

2022 Goals

Conduct 125 site visits at 75 different facilities to identify opportunities for companies to prevent waste and pollution as well as conserve resources including water and energy. Support Minnesota businesses by responding to questions on waste generation and resource utilization.

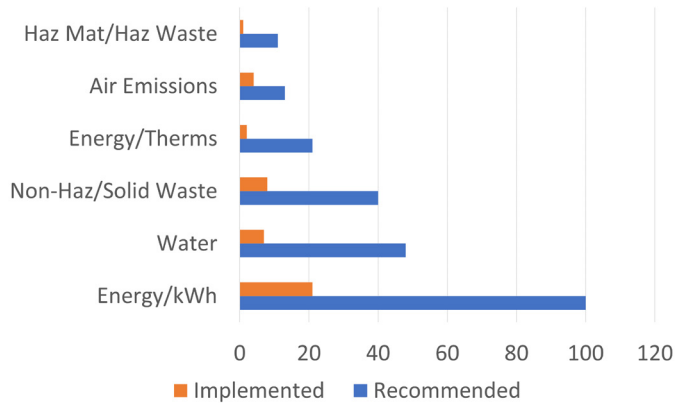
2022 Accomplishments

Site visit activities rebounded during 2022 as MnTAP staffing levels stabilized and companies were more open to technical assistance activities. Business contacts still have little time available due to staffing shortages. MnTAP has focused site assistance on specific operations of interest to facilities, taking less onsite time than general assessments.

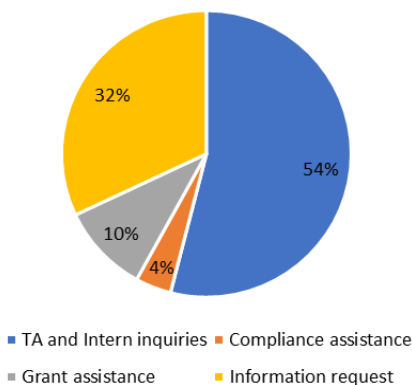
MnTAP staff members were able to interact with 432 unique organizations via phone, email, virtual and in person meetings and site visits. Of these sites, 41 were located in areas with environmental justice concerns, as defined by the Minnesota Pollution Control Agency.

MnTAP staff made **246 recommendations with a value of \$11.1 million** for resource conservation at Minnesota businesses in 2022 from all onsite services. Of the recommendations made during 2022 engagements, 46, or 19%, have been implemented.

2022 First Year Implemented Recommendations



2022 Incoming Call Requests



Project Success: MnTAP a Resource for Minnesota

MnTAP received **68 unsolicited requests for assistance** in 2022. While the distribution of questions varies by year, over half the requests received were for technical assistance. About one-third were for general information about MnTAP programs, activities or resources. Requests for assistance in applying for pollution prevention loans or grant applications and requests for information on compliance issues rounded out the incoming requests for assistance from MnTAP clients.

On-Site Assistance: Intern Program

2022 Outputs

16 intern and student research projects serving 37 facilities
19 company applications processed
60 student applications

What they said...

“Heartland Corn Products was pleased to participate in the MnTAP Intern program for the first time in 2022. It was impressive to see the wide variety of projects related to water use, energy efficiency, and waste reduction. The future looks bright for this group of interns whose efforts have made a positive impact for their host organizations and for our environment.”

- Terry Wendorff,
Plant Manager
Heartland Corn Products

Funding Partners

Minnesota Pollution Control Agency
Metropolitan Council Environmental Services
CenterPoint Energy
Xcel Energy
Environment and Natural Resources Trust Fund



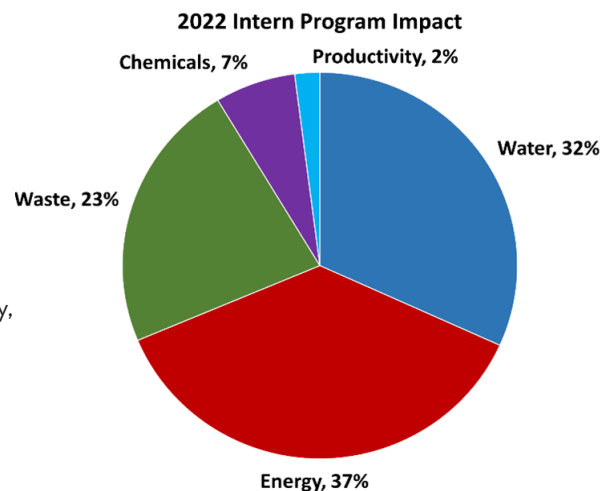
2022 Goals

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

2022 Accomplishments

MnTAP interns come from a variety of disciplines. Our 2022 interns studied chemical, mechanical, bioproducts and biosystems engineering as well as sustainable systems management and chemistry. Most interns attended the University of Minnesota, with ten coming from the Twin Cities campus and four coming from the Duluth campus. One student attended St. Cloud State University, and another attended Macalester College. This summer's projects focused on water conservation, energy efficiency, waste reduction and alternative chemical use.

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



2022 Outcomes - Intern Program Implementation*

Project Year(s)	Waste (lbs)			Energy		Water (gallons)	Savings
	Air Emissions (lb)	Hazardous Waste (lb)	Non-Haz/Solid Waste (lb)	Electricity (kWh)	Gas (therms)		
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	1.1 million	23,400	7.9 million	\$1,100,000
2021	--	2,100	153,000	9.7 million	67,200	38.2 million	\$941,000
2022	0	5,200	216,700	2,520,000	136,100	8,307,000	\$515,000

*Implementation identified in target year from any program year.

Highlight: A Summer Spent as a MnTAP Intern

“The MnTAP internship experience provided me with an opportunity to work in a professional setting where I was able to utilize my studies and initiate actual change. I got to work with some amazing people who were there to guide me through questions and processes but also pushed me to learn and innovate. As a student who had never experienced the reality of the professional world, it was very insightful and taught me a lot. One specific takeaway was collaboration and integrating the ideas and experiences of others are keys to project and professional success.”

In each of my project areas, I needed the help, input and approval of various people working in different roles across the plant. This meant I was constantly reaching out to people and creating strong and meaningful relationships in order to achieve a goal for the company. This internship definitely helped shape my view of what it means to be a professional and how to be a part of a team.”

- Nicole Thompson, 2022 MnTAP Intern



General Outreach & Communications

2022 Outputs

8 Source newsletters
4 P2 Week mini-webinars
2021 Impact
2022 Solutions
55 presentations, booths
and training events

2022 Outcomes

4,400 Source newsletter
subscribers
29,298 new website users
61,298 website page views

2022 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.

2022 Accomplishments

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

- Analyzed MnTAP email and website traffic identifying the following
 - The MnTAP Intern Symposium showed the highest web user engagement
 - P2 week webinars had high click through rates from the sent emails
 - The MnTAP Healthcare pages continue to draw users to waste and sustainability topics
- Completed the second series of P2 Week Mini-Webinars to highlight pollution prevention and other source reduction projects.
<http://www.mntap.umn.edu/resources/publications/p2/>
- Published "Cutting Oil Recovery: Are you in the 1%" Precision Manufacturing: Journal of the Minnesota Precision Manufacturing Association, January/February 2022, Pg 10. <https://www.mpma.com/page/Journal>



Minnesota Materials Exchange

2022 Outputs

7 published newsletters
29 new organizations
2,543 newsletter subscribers
68 listings from 31
organizations
23 successful exchanges

2022 Outcomes

22,870 lbs of material
claimed for reuse

What they said...

"We are a small arts non-profit that received the gift of an iMac computer and Canon printer. We are so grateful for connecting our little team with a generous company looking to make a difference in the world. You have made a difference in our world—most definitely!"

~ Alyssa Breece, Operations
Director, Minnesota Chorale

2022 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.

2022 Accomplishments

The Minnesota Materials Exchange (MME) is a website that links organizations that have reusable goods they no longer need to others who can use them. This no-cost reuse network helps prevent usable materials from becoming waste and saves users money. www.mnexchange.org

MnTAP focused on relaunching MME through the following activities:

- Relaunched the MME newsletter highlighting the benefits of reuse and items listed
- Redesigned the MME website to simplify use and improve compatibility with mobile devices
- Refreshed relationships with others in the reuse community

From early January through the end of December, 23 exchanges were recorded with weights ranging from 7 to 17,000 lbs. These exchanges resulted in 22,870 lbs. of reusable material rescued from becoming waste. Items exchanged ranged from office equipment and supplies such as a printer, a desk, pencils, and other office supplies to industrial items such as filters, air hoses, and unused chemicals.

2022 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 in Greater Minnesota <i>Metropolitan Council Environmental Services Water Supply Planning Unit</i>	This project seeks to improve the efficiency of water use in industries throughout the Twin Cities area. This work is accomplished by MnTAP Interns.	10
TCE Alternatives Project <i>Supplemental Environmental Project (SEP)</i>	The TCE Alternatives Project continued with funding through a SEP. The focus remains on helping Minnesota businesses replace trichloroethylene (TCE) with safer, effective alternatives while avoiding regrettable substitutions.	11
Upstream Nutrient Reduction in Wastewater Treatment <i>Legislative-Citizen Commission on Minnesota Resources (LCCMR)</i>	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 efficiently.	12
Pollution Prevention in the Metal Fabrication Industry <i>MPCA - Resource Management and Assistance Division, U.S. EPA Region 5</i>	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.	13
WWTP Cohort Energy Efficiency Training <i>MN Department of Commerce, Division of Energy Resources</i>	Implement a cohort-based energy efficiency training program targeting no and low-cost opportunities available at municipal, mechanical wastewater treatment facilities.	14
Industrial Water Conservation - Non-Metro <i>Legislative-Citizen Commission on Minnesota Resources (LCCMR)</i>	Support water efficiency training and technical assistance outreach to businesses in communities experiencing water stress.	15
Wastewater Pond Nutrient Optimization, Implementation <i>MPCA with funding from the Environment and Natural Resources Trust Fund (ENRTF)</i>	This project will share operational strategies found to improve nutrient removal with at least 165 pond systems in communities with <5,000 population. Work will also promote a competitive grant funding opportunity targeting repair of broken wastewater pond infrastructure.	16
PFAS P2 BMP Options and Opportunities <i>MPCA - Resource Management and Assistance Division, U.S. EPA Region 5</i>	Define P2 strategies for PFAS within Minnesota industries to prevent PFAS pollution and limit PFAS exposure from packaged food. The focus is to share source reduction strategies and support businesses as they seek to reduce or eliminate PFAS.	17a
P2 BMPs for Minnesota Food Industry <i>MPCA - Resource Management and Assistance Division, U.S. EPA Region 5</i>	Provide technical assistance for food processing industries to reduce hazardous material use, optimize wastewater quality, as well as conserve water and energy use to reduce industry environmental impacts and maintain strong businesses within the state.	17b

Industrial Water Conservation in Greater Minnesota

2022 Outputs

7 metro-area intern projects
22 proposed recommendations
90.9 million gal of proposed water savings
\$2.8 million recommended savings opportunities

2022 Outcomes*

5 implemented recommendations
27.9 million gal of implemented water savings
\$169,750 total implemented savings

**Implemented 2022 from all recommendation years*

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 2022 with support and direction from the Metropolitan Council Environmental Services (MCES) Water Supply Planning Unit. The most recent three-year grant period concluded at the end of December 2022. This partnership has been renewed to support 15 additional intern projects through 2025.

Cumulative Results

This year marks the 10-year anniversary of the partnership between MnTAP and MCES supporting MnTAP interns working with industrial facilities to identify and launch implementation of water efficiency projects.

Since 2013, project outputs include:

- 44 MnTAP facilitated intern projects in the greater metro area
- 253 actions with 417 million gallons of annual water conservation potential
- 108 implemented recommendations to date (43%)
- 166 million gallons saved annual from implemented water conservation recommendations (40%)
- \$1.7 million annually in cost avoidance associated with water use

2022 Activities

Water conservation recommendation potential for the seven metro interns assigned to sites in 2022 totaled 90.8 million gallons of water carrying a cost savings opportunity of \$2.8 million from 22 recommended actions. By the end of the year, two recommendations from the 2022 Intern Program had been implemented saving 15.7 million gallons of water and \$84,750 per year.

Water efficiency projects often carry co-benefits when implemented in addition to gallons of water reduced. Recommendations made by the 2022 interns included 68,000 lb chemical use reduction and over 500,000 therms of natural gas energy reduction when fully implemented. The cost savings from additional chemical or energy reduction associated with water efficiency can help economically justify project investment that may be needed for implementation.

Project Success: Saving Water Means Meeting Corporate Goals

The Kemps facility in Farmington, MN set a goal to reduce water usage by 7% by the end of 2022. With an annual water use of over 130 million gallons, this was shaping up to be a challenge. Fortunately, Sai Ramreddy, a chemical engineering student from the University of Minnesota Duluth, was up to that challenge. He quantified water use across the plant and made several recommendations that could help the facility eliminate over 30 million gallons of water use annually. A few of the recommendations made include:

- Install a pump to reclaim steam condensate water for reuse in the boiler system.
- Optimize rinse time between products using an optical sensor connected to a three-way valve.
- Change from timed-rinse cycles to conductivity-based cycles for the clean-in-place systems.

"Our main goal for the year was to minimize water waste and increase water conservation here at Kemps. With Sai's help we were able to go above and beyond our goal."

~ Peter Stollberg, Kemps Quality Assurance, Sanitation and Compliance Supervisor



TCE Alternatives Project

2022 Outputs

18 companies contacted (126 total)
 1 additional company engaged
 (11 total)
 2 presentations

2022 Outcomes

2 additional sites completed
 transition (9 total)
 7,900 lbs additional TCE reduced
 (83,000 lbs total)

Project Partners

TURI (Toxics Use Reduction
 Institute), U Mass Lowell

Sponsors

U.S. EPA, Region 5
 Minnesota Pollution Control
 Agency
 Water Gremlin Supplemental
 Environmental Project (SEP)

Project Overview

Trichloroethylene (TCE) is a hazardous air pollutant (HAP) that can contaminate soil, air, and water. TCE is a known human carcinogen and can affect the liver, kidneys, immune, reproductive and central nervous systems and may affect fetal development. On June 1, 2022, Minnesota implemented a first-in-the-nation ban on TCE use for all businesses requiring an air permit. MnTAP is committed to helping businesses adjust to this change by finding long term safer solutions through testing and technical assistance.

MnTAP's effort to provide technical assistance for Minnesota businesses looking to eliminate trichloroethylene (TCE) from their facilities launched in 2018 through an EPA Region 5 Pollution Prevention grant with MPCA and was expanded with additional funding from a TCE focused Supplemental Environmental Project. 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, effective options while working to avoid regrettable substitutions such as n-propyl bromide (nPB) and trans-1,2-dichloroethylene (tDCE). Formal outreach on the TCE alternatives project will close at the end of June 2023.

Overall Projects Activities

Through the end of 2022, MnTAP has reached out to businesses across Minnesota that may have been using TCE with training, testing, and technical assistance to help identify safer alternatives for process use.

- 126 facilities received outreach from MnTAP to connect with the program.
- 34 people from 6 facilities participated in training on the hazards of TCE and how to select safer alternatives.
- 8 facilities received safer cleaning alternative assessments for TCE-based processes.
- 11 facilities had site-based assessments of their TCE use.
- 83,000 lb of TCE use were transitioned to alternatives by companies interacting with MnTAP.
- 29,600 lbs of TCE were replaced with verified lower hazard alternatives.

MnTAP will continue to provide technical assistance to any site seeking to find safer alternatives to TCE or regrettable substitutions for TCE such as trans-1,2-dichloroethylene (tDCE) or n-propyl bromide (nPB).

Aqueous Cleaning: A Toolkit for Resilient Business

Over the past 5 years working with facilities to help identify and implement safer alternatives to TCE, we discovered our business community has a need for an independent perspective on mitigating the risks associated with cleaning solvents and degreasers and clear information about alternatives. MnTAP is developing a toolkit as a resource to define the benefits and considerations of switching to safer alternatives for cleaning applications. Major topics in this toolkit include the following.

1. Mitigating the Business Risks of Hazardous Cleaners
2. Conversion Costs and Benefits
3. The Nuts & Bolts of Converting to Aqueous

The toolkit will provide guides, videos, and downloadable content for businesses and technical assistance providers. We anticipate it to be available on the MnTAP website in June 2023.



Upstream Nutrient Reduction

Project Outputs

- 9 communities engaged
- 8 site assessments
- 4 student intern projects

Project Outcomes

- 13,400 lbs nitrogen
- 1,330 lbs phosphorus
- 14,730 lbs combined total nutrient
- 205,000 lbs wastewater solids, BOD
- 30,200,000 gal water
- 18,000 kWh electric energy saved
- \$572,600 project savings

Partners

- Minnesota Rural Water Association (MRWA)
- City of Saint Cloud Treatment Facility

Sponsor

- Legislative-Citizen Commission on Minnesota Resources (LCCMR)



Project Background

The purpose of this project was to partner with MN communities and facilities in these communities to reduce high-nutrient wastewater discharged to treatment facilities. Treatment plants and ponds can face great challenges in managing wastewater effluent, especially nitrogen and phosphorus. In excess, nutrients can result in algal blooms which can kill fish by consuming most of the dissolved oxygen in the water and/or produce toxins or promote bacterial growth that can make people sick.

Project Goals

The primary goal of this project was to improve water quality in Minnesota by reducing nutrient pollution discharged from industrial facilities to municipal wastewater treatment mechanical plants and wastewater ponds. Nutrient pollution was targeted through source reduction technical assistance activities at each industrial site.

2022 Activities

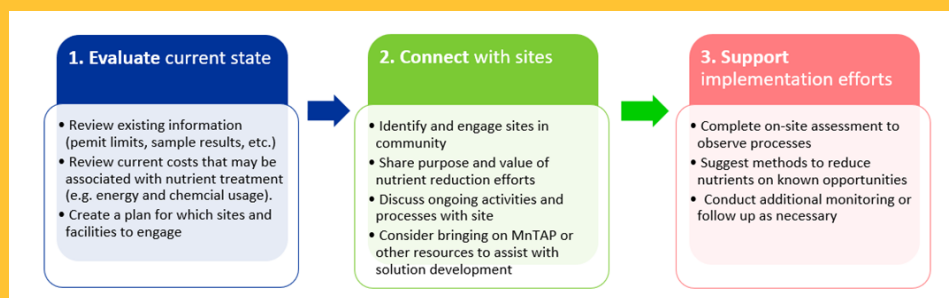
This project concluded on June 30, 2022 with the following activities accomplished.

- Hosted a live webinar on February 15, 2022. The webinar featured two wastewater treatment sites, City of Rochester Water Reclamation Plant and the Hutchinson Wastewater Treatment Facility along with summaries of the projects at two businesses, Rochester Meats in Rochester, MN and Minnesota Specialty Yeast in Hutchinson, MN.
<https://www.facebook.com/watch/?ref=external&v=1125761321568812>
- Compiled the strategies developed and tested through this project into an operators guide “Nutrient Reduction Guide for Minnesota Wastewater Treatment Facility Staff: Community Outreach and Engagement.”
http://www.mntap.umn.edu/wp-content/uploads/simple-file-list/Water/OperatorGuide_final.pdf
- Conducted follow up with engaged facilities to track the status of recommendations and record implementation.

Overall, this project provided nutrient reduction assistance to nine communities through eight site visits and four MnTAP Intern projects. A reduction of nearly seven tons of total nutrient discharged to the wastewater treatment systems was realized. Additional co-benefits included reduction of over 90 tons of wastewater solids that contribute BOD to the system, 30 million gallons of water reduction along with reduced energy use and cost savings.

Nutrient Reduction: Enabling Replication, Creating an Operator’s Guide

Nutrient pollution in wastewater can be a challenge for many wastewater treatment facilities. MnTAP found that reducing incoming nutrient loads at their points of origin can be one strategy to minimize community wastewater operating costs and support cleaner water resources. The goal of this guide is to provide wastewater operators and community leaders with a framework for identifying and addressing opportunities to reduce nutrient pollution at the source and save on treatment costs. A simplified outline of this process is provided below. See more at http://www.mntap.umn.edu/wp-content/uploads/simple-file-list/Water/OperatorGuide_final.pdf



Pollution Prevention in the Metal Fabrication Industry

2022 Outputs

- 1 industry interview
- 6 site assessments
- 1 industry-focused publication

2022 Outcomes

- 753 lbs water pollution avoided
- 28,700 kWh
- 3,000 gallons of water savings
- \$83,800 of cost savings

Project Partners

Minnesota Precision Manufacturing Association



Sponsors

U.S. EPA Region 5
Minnesota Pollution Control Agency

Project Overview

This project seeks to identify pollution prevention priorities for the metal fabrication and metal finishing industries through informational interviews with practitioners, vendors, and other industry stakeholders. Site assessments support implementation of best practices and identify additional improvement opportunities. Follow up activities will seek to motivate implementation of recommendations, confirm actions and develop case studies to share key outcomes for replication.

2022 Activities

MnTAP presented the findings of the project at a meeting of the Minnesota Association of Metal Finishers (MNAMEF). The presentation covered metal fabrication and finishing best practices and highlighted some of the most common P2 opportunities that were identified over the course of the project. Industry members showed interest in material and cost savings opportunities available through P2 practices. The MnTAP pollution prevention recommendations made during this project yielded cost savings opportunities for long established best practices that the industry had not fully appreciated. This presentation was well received and resulted in a 2023 summer internship project and two requests for future technical assistance.

Key Learnings

- Businesses are aware of common P2 best practices but need to be reminded of the value.
- P2 providers must share the full cost savings potential of P2 implementation.
 - Water conservation impacts water and energy cost savings.
 - Dragout reduction impacts chemical and wastewater cost savings.
- Checklists can be helpful to walkthrough standardized processes with businesses.

To further amplify the findings from this project, MnTAP will deliver a webinar to share best practices and outcomes from the project. The goal of this webinar is to highlight the impact of many long-standing P2 practices that have been known within the industries but are often undervalued in their potential to reduce both pollution and costs. The webinar will also share stories from companies that received technical assistance from MnTAP during the project.

Project Success: Traditional Metal Finishing P2 Strategies Yield RESULTS!

Stylmark is an aluminum anodizing company that processes parts through a mechanical and chemical line to create a variety of surface finishes. The company was able to benefit from the application of three traditional pollution prevention (P2) strategies to manage water use and associated chemical consumption and waste generation.

- **Conductivity-Based Rinse Control** – It was recommended that water for rinse tanks be regulated using conductivity sensors to indicate contamination levels rather than manual controls. Addition of conductivity control to 14 rinse tanks has the potential to conserve 12.6 million GPY of water and save \$123,000 annually.
- **Regulate Dragout Time** – It was recommended to pull racks out of anodizing tanks over a minimum of 10 seconds and allow racks to drain for an additional 5 seconds before moving to the next tank. This change has the potential to save 48,100 GPY of water, 10,500 lb chemicals and \$18,000 annually.
- **Install Spray Bars** – Spray bars can significantly reduce dragout of chemicals from anodizing baths. Installing spray bars to select chemical baths on the anodizing line will decrease chemical use by 1,600 lbs, save \$1,700 annually and reduce chemical waste to the city sewer system.



Wastewater Cohort Energy Efficiency Training Program

2022 Outputs

- 1 revised training program
- 2 WWTP training cohorts completed
 - 12 operators trained
- 1 site assessment performed
 - 3 presentations
 - 20 recommendations

2022 Outcomes

536,000 kWh conserved
\$48,000 saved

Sponsors

Minnesota Department of Commerce, Division of Energy Resources



What they said...

"[It's] worth the time to learn how to be more efficient and effective at reducing power requirements. The knowledge that we obtained will be taught to other operators here and [at] other wastewater treatment plants."

Charlie Gammon, Wastewater Supervisor, Brainerd Public Utilities

Project Overview

MnTAP is using a previously developed cohort training curriculum to offer operator training focused on identifying and implementing low and no cost improvements that reduce energy consumption at WWTPs, without sacrificing plant effectiveness at meeting discharge limits. The target audience for this training program are lead wastewater treatment plant operators at municipal mechanical treatment WWTPs processing up to 10 MGD. Operators receive 16 direct wastewater contact hours by completing this MPCA accredited course. Each training is conducted with a cohort of participants from regionally located WWTPs that will attend all four modules and two conference calls. MnTAP plans to provide training to 11 cohorts of five wastewater treatment plants each by the end of 2024.

2022 Activities

- Revised training resources after Cohort 1 to incorporate attendee recommendations
- Contacted 174 local government staff with invitations to join cohorts
- Completed 2 cohort trainings for 12 wastewater operators from eight treatment plants
- Connected 3 sites with funding opportunities and advanced technical assistance to support implementation

Recommendations

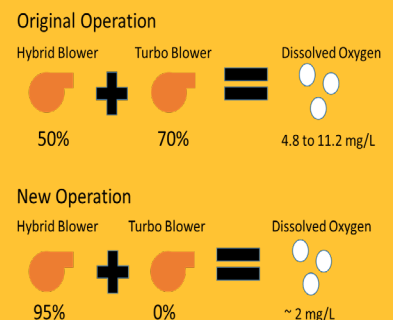
During 2022, there have been 20 recommendations for energy efficiency identified across 8 participating wastewater treatment facilities. These recommendations resulted in the following energy opportunity. Implementation of the recommendations is in progress and follow-up with facilities will provide any needed technical support.

Program Year	Identified (kWh)	Identified Cost Savings (\$)	Implemented (kWh)	Implemented Cost Savings (\$)
2022	3,336,000	\$274,000	563,000	\$48,000
All Years	5,350,000	\$431,000	981,000	\$79,700

Several common recommendations have been identified as opportunities for energy use reduction at facilities participating in the training program. The first is to reduce aeration operations to match system requirements. Over-aeration does not improve treatment; however, it uses a lot of energy. The second is to reduce mixing to match system requirements. For wastewater facilities looking for energy savings, optimizing these two areas is a great place to start.

Project Success: Process Improvements in Elk River

Operators with the City of Elk River participated in the Wastewater Cohort Training Program and found fantastic savings opportunities. Prior to the class, the aeration basins were holding a dissolved oxygen concentration between 4.8 and 11.2 mg/L. This was being done by running their turbo blower and hybrid blower at 70% and 50% speed, respectively. After learning about the benefits of maximizing system efficiency and avoiding over-aeration, the Elk River team explored strategies to bring their dissolved oxygen down to 2 mg/L. Their new operating point had them running with the turbo blower off and the hybrid blower at 95% speed. This maintained their 2 mg/L dissolved oxygen concentration and helped them save 330,000 kWh/yr, equating to cost savings of \$27,000/yr!



Industrial Water Conservation in Greater Minnesota

2022 Outputs

- 1 intern project
- 3 communities/orgs engaged
- 4 site visits
- 1 training activity
- 9 promotional resources

2022 Outcomes

- 8.7 million gal of water savings
- \$10,600 of cost savings

Project Partner

Minnesota Rural Water Association (MRWA)

Sponsor

Legislative-Citizen Commission on Minnesota Resources (LCCMR)



Project Overview

The primary goal of this project is to identify and engage MN communities with water supply and/or water quality challenges. MnTAP, in collaboration with MRWA, is offering water conservation training, outreach and assessments to engage Minnesota communities with water supply and/or water quality challenges. These services will be focused on identifying and implementing actionable industrial water conservation and efficiency measures. Eligible participants include towns, cities and other local units of government, as well as high water-using businesses.

2022 Activities

Identify areas with water stress, engage communities and businesses in water efficiency training:

- Identified high priority areas by mapping water availability and wastewater discharge
- Launched a project website <http://www.mntap.umn.edu/focusareas/water/projects/h2o4mncities/>
- Created a P2 Week Mini-Webinar to promote the project <https://www.facebook.com/watch/?ref=external&v=3171836283033337>
- Invited 13 communities to participate in the project
- Presented one water efficiency training activity with more scheduled for 2023

Conduct water use efficiency assessments at businesses:

- Conducted 4 site visits
- Held 1 intern project
- Proposed 15,450,000 gal water reduction with potential savings of \$60,800
- Implemented 8,700,000 gal/yr water reduction and \$10,600 savings

Share results broadly to promote project activities and support replication at other sites:

- Published one intern project executive summary <http://www.mntap.umn.edu/wp-content/uploads/simple-file-list/Intern/2020-2029/2022/executive-Summary/Heartland-Corn-executive-Summary.pdf>

Project Success: Heartland Corn Takes Water Use to Heart

Heartland Corn Products (HCP), an agricultural cooperative, produces ethanol, corn oil and dried-distillers grain. HCP sought to decrease wastewater discharge to support an increase in ethanol production. Cooling towers were identified as an opportunity to decrease discharge to the city. Towers continuously cycle water, increasing the conductivity over time as water evaporates. Once the water conductivity increases to a set limit, the water is released blowdown. Expanding production would increase cooling tower water consumption blowdown discharge to the city wastewater. Increasing the number of cycles the water does in the cooling towers (cycles of concentration) by increasing the amount of RO water sent to the towers provided an opportunity to optimize cooling tower water efficiency and reduce wastewater discharge.

"In two weeks, I progressed from an undergraduate student overwhelmed by the magnitude of an ethanol plant to an intern eager to solve water conservation problems."

David Isaac, 2022 MnTAP Intern



Wastewater Pond Nutrient Optimization Implementation

Project Outputs

- 117 communities engaged
- 102 site assessments
- 3 presentations

Project Outcomes

- 5,000 lbs/yr nitrogen*
- 2,150 lbs/yr phosphorus*
- 7,150 lbs combined total nutrient*

*Initial estimates based on limited data

Project Partners

- Minnesota Rural Water Association (MRWA)
- Minnesota Pollution Control Agency (MPCA)

Sponsor

Environment and Natural Resources Trust Fund



Project Background

Previous work identified a new operational strategy that wastewater pond operators can use to achieve better treatment for nitrogen and phosphorus. The purpose of this project is to share that strategy and other best practices with 200 wastewater pond site operators through one-on-one site assessments in order to encourage implementation to achieve cleaner water across Minnesota.

Project Goals

- Assess 60-80 wastewater ponds with city population less than 1,000
- Assess 50-60 wastewater ponds with city population 1,000-3,000
- Assess 55-60 wastewater ponds with city population 3,000-5,000
- Quantify success using DMR data
- Assist MPCA by gathering applications for transfer structure repair funding.

2022 Activities

The project team mapped all the wastewater pond sites in Minnesota and assigned them a priority based on their effluent phosphorus concentration. Every two weeks, the project team selects five pond sites with above average phosphorus concentrations and schedules assessments. The assessment process includes walking through a survey on pond operation with the operator and providing guidance on best practices to improve nutrient treatment.

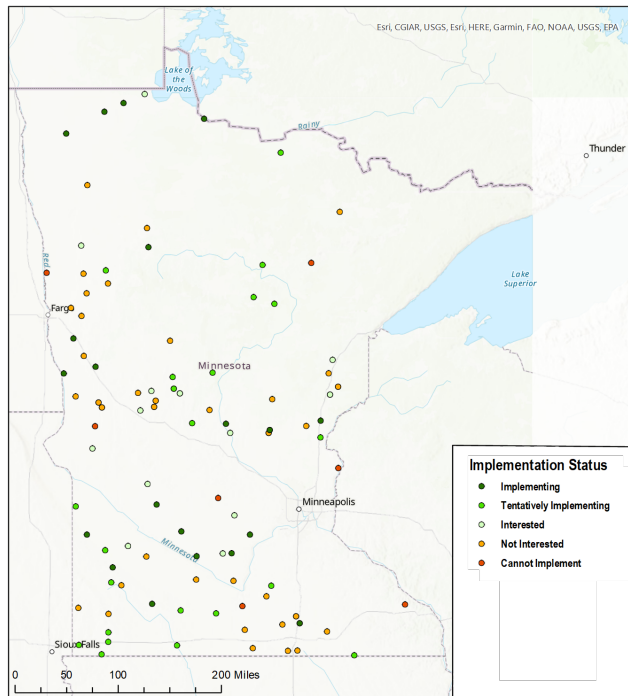
The core recommendation is to utilize the “Steady State Primary Method” strategy that was developed in a prior project. This method has shown promise in helping wastewater pond sites achieve much better nutrient treatment. This process and other best practices are summarized in an information packet which is provided to each operator during the assessment.

On a two-week cycle, the project team meets to discuss the completed assessments and plan the assessments for the next cycle. Assessed sites are assigned an implementation status:

- Implemented
- Planning implementation
- Interested
- Not interested
- Unable to implement.

Once every few months, additional follow up is completed with sites that are interested and/or implementing the method to learn how well nutrient optimization is working and to provide additional guidance on the implementation process.

LCCMR Wastewater Pond Project Sites 3/23



PFAS Pollution Prevention Best Management Practices

2022 Outputs

Literature searches
1 newsletter article
2 presentations

Sponsors

U.S. EPA, Region 5
Minnesota Pollution
Control Agency

Project Overview

As described in the state of Minnesota's PFAS Blueprint, there are currently over 5,000 per- and polyfluoroalkyl substances (PFAS) structures included in the U.S. Environmental Protection Agency's (EPA) master list of structurally defined PFAS and over 9,000 PFAS chemistries. New PFAS are being invented, used in industry, incorporated into commercial products and released to the environment every day. The breadth and diversity of PFAS pollution, coupled with a lack of research on health impacts, complicates development of regulatory and non-regulatory approaches to manage PFAS.

This project, which launched in Q4 2022, seeks to reduce or eliminate the use and release of PFAS and the pollution they create through identification and implementation of safer alternatives. This project will use literature reviews, data analysis and incorporate successful technical assistance activities to identify areas for source reduction. The main project activities include the following:

- Identify materials, processes or products with high levels of PFAS and develop relevant source reduction targets.
- Conduct facility level pollution prevention technical assistance activities to verify PFAS use and assess source reduction strategies.
- Publish assessment guides to assist industry with identifying, reducing and replacing PFAS use in their operations.



Image reprinted from Minnesota's PFAS Blueprint with permission from the MPCA.

Best Management Practices for Minnesota Food Processing Industries

2022 Outputs

18 sites identified for outreach
8 sites contacted for participation
1 resource document created
1 newsletter project promotion
1 presentation

Sponsors

U.S. EPA, Region 5
Minnesota Pollution
Control Agency

Project Overview

The food processing industry is an essential component of Minnesota's economy, accounting for almost 25% of the total shipments by Minnesota manufacturers in 2020. Within the food and beverage industry, dairy manufacturing, animal and meat processing, and beverage manufacturing comprise almost 600 Minnesota businesses.

This project, which launched in Q4 2022, focuses on providing direct technical assistance for food processing industries in Minnesota to prevent pollution and optimize wastewater



quality, water conservation, and energy use to reduce industry environmental impacts and maintain strong businesses within the state. At least 15 facilities will receive technical assistance from MnTAP staff for targeted operations review. At least 4 facilities will be selected for participation in the MnTAP Intern Program to identify more broad scale improvement opportunities. All Minnesota food and beverage producers, no matter how big or small, are eligible for MnTAP's services under this grant.