Environment and Natural Resources Trust Fund

2025 Request for Proposal

General Information

Proposal ID: 2025-080

Proposal Title: Pine Needles Reveal Past and Present Airborne PFAS

Project Manager Information

Name: Summer Streets

Organization: Minnesota Pollution Control Agency

Office Telephone: (651) 757-2761

Email: summer.streets@state.mn.us

Project Basic Information

Project Summary: Pine needles are great passive air samplers because their waxy outer layer attracts airborne pollutants. Pine needles will be used to assess airborne PFAS in current and historic pine needles.

ENRTF Funds Requested: $574,000

Proposed Project Completion: June 30, 2027

LCCMR Funding Category: Air Quality, Climate Change, and Renewable Energy (E)

Project Location

What is the best scale for describing where your work will take place?

Statewide

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

PFAS has become one of the most pressing environmental issues in Minnesota. MPCA and sister agencies are expending considerable resources to monitor, assess, and control PFAS in the state. Widespread, ongoing monitoring of surface water, groundwater, and fish are now part of our regular work at the agency. Ambient air remains our least-studied environmental media leaving us with a huge PFAS data gap. Understanding PFAS in ambient air is critical to our understanding of PFAS fate, transport, and exposure.

Ambient air monitoring for organic contaminants like PFAS is difficult, expensive, and subject to several limitations. For example, a high-volume air monitor is standard equipment for collecting ambient air samples. High-volume air monitors require a fenced area with electricity, trained staff to manage sample media and run the monitor, and expensive media preparation and analyses that are available at very few laboratories. These limitations mean that a large portion of our state (especially places where we don't have existing air monitoring stations) cannot be monitored for PFAS in air using traditional sampling techniques.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

Pine needles provide an opportunity to test atmospheric PFAS that is cost-effective and limited only by the presence or absence of pine trees. Pine needles are ideal passive samplers because:

- They have waxy, lipid-rich cuticles that facilitate sorption of airborne organic pollutants like PFAS,
- It is easy to identify the current year's growth of needles, making it possible to assess current atmospheric conditions,
- Collecting and analyzing is inexpensive, especially when compared with the cost and limitations of using the high-volume air samplers required for PFAS sampling,
- Pine needles capture both long-range and local PFAS, giving a total picture of PFAS in ambient air,
- And pines grow in the most remote areas of the state, making air testing possible in areas where it is not possible to place a monitor.

In addition, using pine needles to assess a wide variety of organic contaminants in air, including PFAS has proven effective and efficient in several studies.

Minnesota's unique resources are advantageous for this type of study. Minnesota has pine throughout the state. We also have a volunteer network at the ready, a contracted laboratory with excellent analytical capabilities, and an herbarium with a vast collection of pine needles dating back to 1875.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

Pine needle analysis for PFAS will provide the state with a large amount of ambient airborne PFAS data. Data will be used to:

- Assess current PFAS ambient air conditions, statewide.
- Estimate ambient anthropogenic "background" PFAS conditions in air.
- Identify "hot spots" potentially associated with local sources, which may spur further investigations and source identification.
- Increase our understanding of PFAS presence, fate, transport, and exposure, especially in the most remote parts of the state where data are currently lacking.
- Estimate PFAS deposition to surface waters as a means of understanding fish contamination when no other source can be identified.

Activities and Milestones

Activity 1: Selection and Analysis of Historic Pine Needle Samples

Activity Budget: $91,500

Activity Description:
Up to 35 archived pine needle samples will be selected from UMN Bell Museum Herbarium. Sample selection will focus on samples collected in Washington, Ramsey, and Dakota counties. Samples dating back to the late 1800s/early 1900s prior to the advent of PFAS production will be selected to serve as reference samples. Beginning with samples collected in the 1940s onwards (PFAS production era), 1 – 2 samples will be selected for analysis per decade, up to the year 2020. A subset of samples from greater Minnesota will also be analyzed and will serve as additional reference samples.

Upon selection, all samples will be shipped to Eurofins for non-targeted PFAS analysis. Non-targeted analysis (NTA) provides semi-quantitative data for over 1,000 PFAS, which can be used to assess changes in PFAS production and regional differences in PFAS congener patterns.

Activity Milestones:

Description	Approximate Completion Date
Historic Sample Selection	July 31, 2025
Non-targeted PFAS analysis of historic samples by Eurofins	July 31, 2026

Activity 2: Statewide Collection and Analysis of Current Pine Needle Samples

Activity Budget: $479,500

Activity Description:
Current-year pine needles will be collected by these volunteers at no cost to the state of Minnesota. Our goal is to collect 3 samples in each of Minnesota's 87 counties, including the most remote parts of the state. A total of 261 samples will be collected, along with 26 duplicate samples and 26 aqueous field blanks for a total of 313 targeted analyses. A subset of 5 samples will also be analyzed using non-targeted analytical methods.

The project manager will work with the Volunteer Monitoring Coordinators to develop training for PFAS sample collection with our volunteer network. Training will include video and written materials, including a frequently asked question (FAQ) guide. The collection procedure is relatively simple, and our volunteers are already skilled sample collectors.

Upon completion of training, volunteers will receive a sample collection kit including everything needed to collect pine needle samples, including nitrile gloves, Ziploc bags, and other supplies. Volunteers will collect the sample according to protocol and promptly submit the samples to Eurofins for analysis.

All pine needles will be shipped to Eurofins for PFAS analysis. Current pine needles will be analyzed by Eurofins using targeted methods (EPA 537 modified) to measure 75

Activity Milestones:

Description	Approximate Completion Date
Volunteer recruitment	August 31, 2025
Develop and share sample collection training	September 30, 2025

Send collection kits to volunteers who have completed training	September 30, 2025
Volunteers collect current-year samples	December 31, 2025
Targeted PFAS analysis by Eurofins	May 31, 2026

Activity 3: Interpretation, Publication, and Dissemination of Results

Activity Budget: $3,000

Activity Description:
The project manager will receive and interpret the data generated by the analysis described in Activities 1 and 2. Historic data will be used to identify the first appearance of PFAS in the state, as well as a decade-by-decade look at changes the types and relative amounts of different PFAS present in air over time. Current data will be used to understand the current condition of Minnesota's ambient air as it relates to PFAS presence and levels, identify potential "hot spots", and develop better understanding of PFAS movement from air into terrestrial and aquatic environments.

Results will be published in an open access journal and made available on MPCA's website as well as in presentations at scientific conferences.

Activity Milestones:

Description	Approximate Completion Date
Receive and Review Data	November 30, 2026
Prepare data for publication and submit to open access journal	May 31, 2027
Present data at scientific conferences	June 30, 2027

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Eurofins	Eurofins Environment Testing LLC	PFAS analysis in pine needles	Yes
Timothy Whitfled	University of Minnesota Bell Museum Herbarium	Provide access to archived pine needle samples for PFAS analysis	No

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

Results will support Minnesota's PFAS Monitoring Plan. The goals of the monitoring plan are to:
1. Gather Minnesota-specific information in order to craft effective policies around PFAS and their incorporation into MPCA programs;
2. Identify areas of particular concern (due to PFAS concentrations or routes of exposure) that need quick action; and
3. Gather data that galvanizes support for PFAS source reduction and pollution prevention.
The data collected in this study will be supportive of all 3 goals.

This is a one-time study. No ongoing efforts are expected at this time.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Developing Strategies To Manage PFAS In Land-Applied Biosolids	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 04d	$1,404,000

Project Manager and Organization Qualifications

Project Manager Name: Summer Streets

Job Title: Research Scientist

Provide description of the project manager's qualifications to manage the proposed project.

Summer Streets is a research scientist in the Environmental Analysis and Outcomes Division of the Minnesota Pollution Control Agency. She will be lead technical administrator for the project with responsibility for the study and overseeing management, project reporting, and contracting. Since 2008, Summer has successfully developed and conducted several complex studies on environmental contamination of PFAS in Minnesota. Summer has extensive experience studying environmental contamination, and managing large project budgets, including an LCCMR-funded project.

Qualifications
Education:
M.S. 2012 University of Minnesota (Water Resources Science)
B.S. 2005 University of Wisconsin-River Falls (Environmental Science and Biology)
Work Experience:

2007-Present Research Scientist 3, Minnesota Pollution Control Agency
2016 – 2019 Adjunct Faculty, University of St. Thomas, Department of Biology

Organization: Minnesota Pollution Control Agency

Organization Description:
The Minnesota Pollution Control Agency's mission is to protect and improve the environment and enhance human health. The MPCA monitors environmental quality, offers technical and financial assistance, and enforces environmental regulations.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
							Sub Total	**-**
Contracts and Services								
Eurofins Environment Testing	Professional or Technical Service Contract	Analysis of PFAS in pine needles using targeted and non-targeted methods				0		$566,000
							Sub Total	**$566,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Nitrile gloves, Ziploc bags, coolers, other sampling supplies including shipping	Sample collection materials					$3,500
							Sub Total	**$3,500**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	One trip to UMN Herbarium from outstate Minnesota	Acquisition of historic pine needle samples					$300
	Conference Registration Miles/ Meals/ Lodging	Conference registration (virtual)	Presentation of results					$1,700
							Sub Total	**$2,000**

Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Publication	Open Access Journal Fee	Required fee for publication in open access journal					$2,500
							Sub Total	**$2,500**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$574,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
In-Kind	MPCA staff time equivalent to 0.5 FTE per study year	MPCA staff time	Secured	$135,000
			State Sub Total	**$135,000**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**$135,000**

Total Project Cost: $709,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: cb8be545-011.pdf

Alternate Text for Visual Component

PFAS emitted to the atmosphere adheres to pine needles, where it can be measured to assess past and present PFAS contamination....

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

No

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Alexis Donath, MPCA