Environment and Natural Resources Trust Fund

M.L. 2024 Approved Work Plan

General Information

ID Number: 2024-068

Staff Lead: Michael Varien

Date this document submitted to LCCMR: June 7, 2024

Project Title: Determining Ambient Background PFAS Concentrations in Minnesota Soils

Project Budget: $621,000

Project Manager Information

Name: William (Bill) Cole

Organization: Minnesota Pollution Control Agency

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Project Reporting

Date Work Plan Approved by LCCMR: June 20, 2024

Reporting Schedule: June 1 / December 1 of each year.

Project Completion: December 31, 2027

Final Report Due Date: February 14, 2028

Legal Information

Legal Citation: M.L. 2024, Chp. 83, Sec. 2, Subd. 03g

Appropriation Language: $621,000 the second year is from the trust fund to the commissioner of the Pollution Control Agency to determine ambient background per- and polyfluoroalkyl substance (PFAS) levels in urban and nonurban soils to help Minnesota develop management strategies for PFAS-contaminated soils. This appropriation is available until June 30, 2028, by which time the project must be completed and final products delivered.

Appropriation End Date: June 30, 2028

Narrative

Project Summary: This project determines ambient background per- and polyfluoroalkyl substance (PFAS) levels in urban and non-urban soils. This information will help Minnesota develop management strategies for PFAS contaminated soils.

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

As Minnesota's public and private entities incorporate sampling PFAS into their activities, more scenarios will emerge where PFAS-containing materials, such as soils excavated during construction, are found. Currently, there is no information for determining what PFAS concentrations in soil are considered "ambient background" versus impacted by a local source of pollution. This poses challenges to managing PFAS contaminated soil during construction and at waste management facilities such as landfills.

Environmental PFAS contamination is a widespread issue of concern. PFAS do not break down, and their ongoing release results in a growing reservoir of PFAS in the environment, including in the atmosphere. Studies have found that PFAS are ubiquitous at low levels in surface waters, groundwater, fish, sediment, precipitation, and soils – PFAS are also found in areas as remote as Antarctica and uninhabited forests. PFAS found in these remote regions are likely sourced from atmospheric deposition. An understanding of ambient background PFAS soil conditions in Minnesota will help us determine which PFAS and what levels of PFAS found in soils should be expected from global and regional atmospheric deposition. This information on ambient background conditions will allow Minnesota's public and private entities to make better decisions about managing PFAS contaminated soils.

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.

The goal of this study is to measure soil PFAS concentrations from areas distanced from known or likely sources of PFAS releases. This baseline survey of ambient background PFAS concentrations in soil will support Minnesota's goals to development effective PFAS disposal strategies and other crucial PFAS management tools. Shallow soil samples will be collected from approximately 150 locations within the state where atmospheric deposition is likely to represent the vast majority of PFAS loading to soil. The study will be designed to examine if there are different patterns in PFAS soil concentrations between urban and non-urban parts of the state. MPCA is well positioned to oversee this study, as the agency has already undergone a significant effort to identify all known and likely potential PFAS sources.

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?

This study will provide much needed understanding of (1) PFAS soil concentrations in Minnesota representative of ambient background conditions and (2) differences in PFAS soil concentrations between urban and non-urban parts of the state. This study will support the development of disposal strategies and best practices for managing PFAS contaminated soil to protect human health and Minnesota's environment. The study will also inform PFAS source-investigation work by providing an understanding of what constitutes ambient background conditions versus conditions due to a direct PFAS release.

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

Activities and Milestones

Activity 1: Develop sampling and quality assurance project plan

Activity Budget: $30,000

Activity Description:
The monitoring plan and quality assurance project plan (QAPP) will be developed in a collaborative effort between USGS and MPCA and in a comparable manner to similar PFAS soil surveys conducted in other states (e.g., Vermont, New Hampshire, Maine). Non-urban sites will be randomly selected from lands that are currently classified as grassland, forest, barren, shrubland, or herbaceous to represent locations that are currently not under the influence of direct anthropogenic activities. Urban sites will be randomly selected from lands that are currently classified as urban to represent disturbed locations with some influence from anthropogenic activities but located away from known point sources. Non-urban and urban sites will be randomly selected at the closest undeveloped or minimally disturbed property (e.g., parks, natural areas) with no known or suspected PFAS impacts within their respective categories.
A detailed QAPP will be developed to establish data quality objectives and outline sample collection and processing methods. This detailed QAPP is vital to the project to ensure that consistent field methods are used and that proper precautions are taken to avoid potential contamination of samples.

Activity Milestones:

Description	Approximate Completion Date
Finalize USGS-MPCA joint funding agreement	September 30, 2024
Initiate developing selection methods, sampling plan and QAAP	November 30, 2024
Finalize site selection method and sites (for Activity 2)	March 31, 2025
Finalize selection methods, sampling plan and QAPP	April 30, 2025

Activity 2: Collect and analyze soil samples

Activity Budget: $411,000

Activity Description:
A total of 197 samples (150 soil, 15 field replicates, 30 field blanks, 2 source water blanks) will be collected by USGS from the 150 sites identified from Activity 1. Sample collection will occur from July 31, 2025, through November 30, 2025, with samples shipped to the analyzing laboratory weekly. Using the state contract, MPCA will hire an environmental laboratory (such as Eurofins or another approved laboratory) to analyze the soil samples for 40 PFAS analytes using a method equivalent to draft EPA Method 1633. The laboratory will also perform standard soil characterization analyses, such as percent moisture, pH, and total organic carbon (TOC). Cation exchange capacity (CEC) analysis will be performed on a subset of samples as budget allows.

Activity Milestones:

Description	Approximate Completion Date
Initiate soil sample collection	July 31, 2025
Complete collection of soil samples	November 30, 2025
Quantitative analysis of 40 PFAS and standard soil characterization analyses	March 31, 2026

Activity 3: Analyze data, write, and publish report

Activity Budget: $180,000

Activity Description:

Upon receipt of results from the analytical laboratory, an initial quality assurance check will be conducted by the MPCA to ensure data quality. USGS will further evaluate data quality, taking into account results of field quality assurance samples, perform data analysis, and develop a report that summarizes the findings of the study. Summary statistics of individual PFAS, as well as total PFAS, will be calculated for all sites within non-urban and urban locations to provide an indication of ambient background soil PFAS concentrations in the respective land use types. Associations between PFAS concentrations and other soil characteristics will be explored to provide insight to PFAS presence. PFAS data will be compared to other statewide studies conducted in Vermont, New Hampshire, and Maine to put Minnesota data into context with other states. Project data will be stored in the Environmental Quality Information System (EQuIS), a publicly available database. Results will be presented at appropriate scientific conferences and stakeholder meetings and published in a USGS report and in the peer-reviewed literature.

Activity Milestones:

Description	Approximate Completion Date
Complete data quality assurance	April 30, 2026
Conduct statistical analyses	June 30, 2026
Make findings available (EQuIS, USGS report and peer-review publications)	December 31, 2027

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Sarah Elliott	United States Geological Survey	Collaborator	Yes
Melinda Erickson	United States Geological Survey	Collaborator	Yes

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.
Project data will be stored in the Environmental Quality Information System (EQuIS), a publicly available database. Results will be presented at appropriate scientific conferences and stakeholder meetings and published in a USGS report and the peer-reviewed literature. The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgement Guidelines.

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?
The results of this study will be presented in a scientific report and used to support Minnesota's development of PFAS soil disposal strategies and guidance to help waste managers and other entities dealing with PFAS contaminated soil. Any future guidance development leveraging the results of this study will be completed using resources already available to the MPCA. Additionally, leftover soil may be stored and used to determine ambient background conditions for other contaminants in the future. Future work leveraging samples collected in this study will be completed using resources already available to MPCA.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Pilot Program to Optimize Local Mechanical and Pond Wastewater-Treatment Plants	M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 04a	$700,000
Increase Diversity in Environmental Careers to Serve Minnesota's Changing Demographics	M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 05l	$550,000
Reducing Municipal Wastewater Mercury Pollution to Lake Superior	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 04h	$250,000
Optimizing Local Mechanical and Pond Wastewater-Treatment Plants	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 11b	$500,000
Groundwater Contamination Mapping Project - Phase II	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03f	$800,000
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
Wastewater Pond Optimization Implementation	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 20a2	$700,000

Chloride Pollution Reduction	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 20a4	$500,000
Replacing Failing Septic Systems to Protect Groundwater	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 10h	$2,000,000
Pig's Eye Landfill Task Force	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 10j	$800,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
							Sub Total	**-**
Contracts and Services								
USGS	Sub award	Project management, study sampling plan and QAPP, field sampling, data QA/QC and analysis, report development and presentation of results				0		$505,000
TBD	Professional or Technical Service Contract	PFAS analysis under state contract (analysis of 40 PFAS) + shipping				0		$103,000
TBD	Professional or Technical Service Contract	General soil characterization under state contract (TOC, pH, percent moisture, and CEC on subset of sample) + shipping				0		$13,000
							Sub Total	**$621,000**
Equipment, Tools, and Supplies								
							Sub Total	**-**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
							Sub Total	**-**

Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$621,000**

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	Minnesota Pollution Control Agency	MPCA staff time for project assistance	Potential	$122,000
			State Sub Total	**$122,000**
Non-State				
In-Kind	USGS matching funds	USGS cooperative matching funds - pending federal budget	Pending	$284,000
			Non State Sub Total	**$284,000**
			Funds Total	**$406,000**

Attachments

Required Attachments

Visual Component

File: 266bc4a5-cef.docx

Alternate Text for Visual Component

Industrial production and use of PFAS (facility) emits PFAS to air, PFAS are transported via long-range atmospheric transport and deposited via wet and dry deposition to urban (towns/cities) and non-urban environments (forests and other natural lands) leading to a PFAS soil reservoir representative of ambient background conditions....

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Research Addendum revised 2024-068	1d4e9b34-cc4.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

We originally proposed conducting a total organic fluorine (TOF) analysis for all soil samples, however, after reviewing laboratory provided information about TOF analysis on solid matrices, current laboratory reporting limits are not low enough for this analysis to be meaningful for determining low ambient background concentrations. The current reporting limits are in the range of 200-300 ng/g (ppb), and we expect ambient background concentrations to be in the low ppb range. Given the analytical shortcomings and the reduced budget, TOF analysis will not be performed.
Based on the reduced budget we also decreased the number of samples from 220 to 197 and will not perform anion exchange capacity analysis. Additionally, cation exchange capacity analysis will only be performed on a small subset of samples as budget allows.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

N/A

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