DEQ
Montana Department of Environmental Quality

2021 PFAS Monitoring Results: Billings

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a group of thousands of human-made chemicals. They have been used in many consumer and household products since the 1940s, including cookware, food packaging, and stain repellants, as well as some firefighting foams used at airports, fire training areas, emergency response locations and military installations. PFAS are sometimes called "forever chemicals" because they do not easily break down and can stay in the environment for long periods of time.

What health risks are associated with PFAS?

Only a few of the thousands of PFAS have been studied for their potential to affect people's health. Research is ongoing and we will learn more over time. Studies that have occurred suggest that exposure to certain PFAS may lead to health problems including changes in the liver, immunological effects, increased cholesterol levels, cardiovascular effects, reproductive effects in women, developmental effects in infants and children, and an increased risk of kidney and testicular cancer.

What were the objectives of this project?

DEQ is proactively working to assess the prevalence of PFAS in Montana's water bodies. This is one part of implementing the Montana PFAS Action Plan that was adopted in June of 2020. In late summer and early fall of 2021 DEQ's Monitoring and Assessment Section conducted a water quality monitoring project to screen for PFAS around the state.

What screening levels were used for this project?

In 2019, Montana DEQ adopted a Human Health standard for PFOA and PFOS individually or combined in groundwater at 70 parts per trillion (ppt). Since there is no standard for PFAS in surface water to protect human health, this monitoring project used the groundwater standard of PFOA and PFOS individually or combined of 70 ppt as a screening level for surface water samples.

Montana has no sediment standards for PFAS, and the EPA has no guidance for PFAS in sediment. DEQ used a sediment screening level from Maine's Department of Environmental Protection Remedial Action Guidelines (RAGs) for Contaminated Sites. DEQ used the recreation sediment RAG of 4,900 ng/g for PFOS and 4,900 ng/g for PFOA.

What monitoring methods were used?

This project used a targeted sampling approach to determine the prevalence and magnitude of PFAS contamination in surface water. At-risk areas and sampling sites were selected by performing a risk analysis using Montana's PFAS Work Group's Geographic Information Systems (GIS) layers and existing data. The determination of at-risk locations rapidly began to focus on urban and industrialized landscapes within Montana and four areas were selected in 2021: Bozeman, Helena, Billings, and Great Falls. At least one low-risk site was selected in each at-risk area. A low-risk site was defined as an area with a low potential for PFAS contamination and has no potential or confirmed sources of PFAS upstream. All other sites were located downstream of potential or known PFAS sources. A total of 26 sites were sampled throughout the four at-risk areas of Montana.

Surface water and sediment sampling was conducted in accordance with DEQ's PFAS Standard Operating Procedures (SOP). Samples were analyzed in accordance with Energy Laboratories EPA Method 537 Modified (E537 M). A total of 28 PFAS were analyzed using E537 M.

What are the key findings?

- This project was designed to determine the prevalence and magnitude of PFAS in at-risk areas. Results determined that PFAS are moderately prevalent in at-risk areas and PFAS concentrations range in magnitude depending on site location. Multiple PFAS were detected in each at-risk area of the state near or downstream of confirmed and potential sources.
- PFAS detected relate to the use of fire-fighting foams, food packaging, surfactants used in industrial processes, stain resistant fabrics, metal manufacturing and other uses.
- Results indicate PFAS may be entering surface water from sources such as wastewater treatment plants, industrial facilities, military instillations, airports, and urban runoff.
- More monitoring is needed throughout Montana to understand the presence of PFAS in our waterways and to determine the impact to human health and the environment.
- The EPA continues to study human health impacts related to PFAS exposure and the EPA will provide federal regulatory thresholds for certain PFAS chemicals to protect human health. This study used the best available science and results could be interpreted differently if updated regulations refine human health thresholds.

Where can I find more information on PFAS?

deq.mt.gov/cleanupandrec/programs/pfas

What were the findings in my community?

Five sites were sampled in the Billings area. Sediment sample results at four sites reported non-detect values for all 28 PFAS and sediment results at Yegan Ditch near the mouth had a detection of PFOS. Surface water sample results at two sites reported non-detects values for all 28 PFAS and three sites had detections of one or more PFAS. There were no detections of PFOA and PFOS individually or combined above the surface water and sediment screening levels in the area.

Parameter Acronym	Parameter Name	Concentration (ppt)
Yellowstone River 3 miles downstream Hwy 87 bridge		
PFOS	Perfluorooctane sulfonic acid	1.1
PFHxS	Perfluorohexanesulfonic acid	1.2
Total PFAS Concentration		**2.3**
Yegan Ditch near mouth - Water Sample		
PFOS	Perfluorooctane sulfonic acid	17.0
PFPeA	Perfluorovaleric acid	4.0
PFPeS	1-Pentanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-	1.3
PFHxA	Perfluorohexanoic acid	4.8
PFOA	Perfluorooctanoic acid	2.3
PFHxS	Perfluorohexanesulfonic acid	8.9
PFBA	Heptafluorobutyric acid	2.6
PFBS	Perfluorobutanesulfonic acid	2.7
PFHpA	Perfluoroheptanoic acid	1.2
Total PFAS Concentration		**44.8**
PFOS + PFOA Concentration		**19.3**
Alkali Creek		
PFOS	Perfluorooctane sulfonic acid	3.4
PFPeA	Perfluorovaleric acid	92.0
PFPeS	1-Pentanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-	14.0
6:2 FTS	1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-	1.1
PFHxA	Perfluorohexanoic acid	67.0
PFOA	Perfluorooctanoic acid	16.0
PFHxS	Perfluorohexanesulfonic acid	29.0
PFBA	Heptafluorobutyric acid	24.0
PFBS	Perfluorobutanesulfonic acid	19.0
PFHpA	Perfluoroheptanoic acid	13.0
Total PFAS Concentration		**278.5**
PFOS + PFOA Concentration		**19.4**

Sites with no detections
Yellowstone River at Duck Creek Road crossing
Yellowstone River at Mystic Park