Gustavus PFAS Action Coalition

History, Accomplishments, and Next Steps

PREPARED FOR:

Gustavus PFAS Action Coalition

April 2021

McDowell GROUP

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Glossary

Aqueous film forming foam (AFFF): a fire suppressant that contains PFAS and is used to extinguish flammable-liquid fires. AFFF is commonly used at airports and fire training facilities, and currently required by the FAA at larger airports.

Per- and polyfluoroalkyl substances (PFAS): a group of more than 5,000 human-made chemicals that do not easily break down and have been widely used in industry and consumer products since the 1950s. PFAS compounds resist heat, oil, stains, grease, and water and have been used in firefighting materials, nonstick cookware, stain-resistant products for furniture and carpets, fabric waterproofing, outdoor gear, food packaging, and personal-care products.

Perfluorooctane sulfonate (PFOS): a long-chain PFAS found in older stocks of AFFF and as a breakdown product of precursor compounds.

Perfluorooctanoic acid (PFOA): a long-chain PFAS that is a side product created during the AFFF manufacturing process.

PFAS encompass an evolving list of derivatives and combinations that include the following chemicals:

- Perfluorobutanoic acid (PFBA)
- Perfluorotetradecanoic acid (PFTA or PFTeDA)
- Perfluoropentanoate, perfluoropentanoic acid (PFPeA)
- Perfluorotridecanoic acid (PFTrDA or PFTriA)
- Perfluorobutane sulfonic acid, perfluorobutane sulfonate (PFBS)
- Perfluorononanoic acid, perfluorononanoate (PFNA)
- Perfluorohexanesulfonic acid, perfluorohexane sulfonate (PFHxS)
- Perfluoroheptanoic acid, perfluoroheptanoate (PFHpA)

Gen-X: a trade name for a short-chain PFAS chemical that is used to make high performance fluoropolymers (for example, some non-stick coatings) without the use of perfluorooctanoic acid (PFOA).

Executive Summary

In the two years since its inception, the Gustavus PFAS Action Coalition (GPAC) has made major strides in addressing contamination by per- and polyfluoroalkyl substances (PFAS) in Gustavus.

Among its accomplishments, GPAC has:

- **Advocated for additional testing** to identify the extent of PFAS contamination in the community, including dozens of extra water tests at Gustavus homes. The coalition worked with the Gustavus Clinic, the Alaska Community Action on Toxics (ACAT), and Indiana University (IU) to offer free blood tests to residents to gauge their PFAS body burden. In addition, PFAS testing has been completed on local subsistence food samples.
- **Held two statewide PFAS summits** to raise awareness and connect with other affected residents across the state.
- **Launched the statewide network Alaska PFAS Action Coalition (APAC)**, with participants from Gustavus, Dillingham, Anchorage, and Fairbanks, following GPAC's first summit.
- **Advocated for replacing firefighting foam that contains PFAS** with a sodium bicarbonate (or similarly safe) substitute as a fire suppressant at the Gustavus Airport.
- **Advocated for replacing firefighting foam that contains PFAS** with fluorine-free foams at other larger airports around the state.
- **Advocated for PFAS legislation**, which would require:
  - Stricter limits on PFAS in drinking water.
  - Periodic testing of Alaska drinking water supplies from areas where PFAS has been released.
  - Alternative sources of drinking water and testing for those whose water sources are contaminated with PFAS.
  - Testing first responders (such as a firefighter, police officer, or cleanup personnel) exposed to PFAS and anyone who routinely consumed PFAS-contaminated drinking water. Testing would occur at least once a year for three years after exposure to monitor their PFAS body burden.
  - Phasing out the use of PFAS-containing firefighting foams at Alaska airports.
- **Partnered with other groups** to increase PFAS awareness. These groups include Alaska Community Action on Toxics (ACAT), the Southeast Alaska Conservation Council (SEACC), the Nature Conservancy, and the Alaska Native Sisterhood. GPAC also worked with local, state, and federal government representatives to increase PFAS awareness and funding for testing.

> "I've been reminded that even small fish in a big pond can have their voice heard. It's a reminder you can speak up in this country and be heard."
>
> – GPAC member

> "If all communities could network together and have a united message about what we're asking for, we could be a lot more effective."
>
> – GPAC member

- **Raised public awareness of PFAS** through newspaper articles, interviews, letter writing, social media posts, legislative testimony, and development of a GPAC website.

> "Definitely pushing the state to do the right thing has had a dramatic effect. The more we speak together and ask for the same things, the better chance we have."
>
> – GPAC member

GPAC members have worked with state officials to address the contamination in their community. Currently, the State of Alaska requires a responsible party to take the following steps upon discovery of a contaminated drinking water source:[1]

- Initial sampling of water supplies to identify contamination levels.
- Providing an alternate source of clean water to residents and businesses whose water does not meet the EPA's Lifetime Health Advisory (LHA) levels of combined concentrations of PFOA and PFOS at 70 parts per trillion.
- Monitoring contaminated sites.
- Launching remediation efforts (possibly involving excavation, containment, or technology to reduce contamination).

These steps, however, are minimal, can be cursory, and may face considerable delays due to disputes between the state and responsible party, staff shortages, evolving regulations, and the slow pace of federal decision-making on environmental guidelines.

At the Gustavus airport, the party responsible for PFAS contamination is the Alaska Department of Transportation & Public Facilities (DOT&PF). At Alaska contamination sites at or near military installations the U.S. Department of Defense is responsible. One such site is Joint Base Elmendorf-Richardson (JBER) near Anchorage.[2]

Upon discovering contamination, GPAC advises communities take the following actions:

- **Request a public meeting** with state officials and the responsible party. For PFAS contamination, involved state officials would likely include the Alaska Department of Environmental Conservation (DEC), the Department of Transportation & Public Facilities (DOT&PF), and the Department of Health & Social Services (DHSS).
- **Ask for a schedule of concrete steps and deliverables,** including water sampling, long-term alternative water supplies, an interim water source until the long-term supply is in place, and remediation.

[1] Title 18, Alaska Administrative Code 75.345, as amended Nov. 7, 2020; Sally Schlichting, environmental policy analyst for Southeast Alaska Conservation Council and a former manager of the Alaska Department of Environmental Conservation Contaminated Sites Program, interview Jan. 5, 2020.

2 DeFazio, Diana, Alaska Community Action on Toxics, "Threats to Drinking water and Public Health In Alaska: The Scope of the PFAS Problem, Consequences of Regulatory Inaction, and Recommendations," September 2019, p. 40.

- **Obtain contact information** for state officials and those responsible for the contamination.
- **Notify media** to increase coverage of the issue.
- **Partner with city government to take a leadership role** in negotiating with the State and the polluter. Develop a compliance order that spells out obligations by the State and the polluter to address the contamination and restore safe drinking water.
- **Maintain follow-through**: Interviews clarified that public pressure often drives government action, which is why follow-up calls to state officials are important, as well having media involved to amplify a community's message.

GPAC's ongoing priorities are:

- Stopping the use of PFAS-containing firefighting foams in Alaska.
- Cultivating support for state and federal legislation that creates more stringent drinking water standards for PFAS and provides testing, alternative water supplies, and medical monitoring to those exposed to these compounds, among other measures.
- Reaching out to other communities and strengthening a statewide network to prevent and protect Alaskans from PFAS contamination.
- Working with state officials to ensure all Gustavus and Alaska homes and businesses have safe drinking water.
- Advocating for ongoing testing so the PFAS plume's extent and location in Gustavus are well-defined.
- Urging the State of Alaska to safely dispose of stored firefighting foams.
- Remediation of contaminated sites to prevent years of continued leaching into drinking water wells and water sources.

Gustavus PFAS Action Coalition (GPAC) contracted with McDowell Group to prepare a history of GPAC's efforts to raise awareness about per- and polyfluoralkyl substances (PFAS), stop further PFAS use, and correct PFAS damage as much as possible. This summary documents GPAC's mission, actions, and progress for a broad audience, including legislators, scientists, and other Alaska communities affected by PFAS contamination.

This report provides:

- A brief history of PFAS contamination in Gustavus.
- A review of GPAC's inception, actions, and future plans.
- An overview of data collected by GPAC, including egg, produce, and water test results.
- A discussion of unmet needs and key priorities.
- Community rights and advocacy.
- Lessons learned in Gustavus and how they might translate to other communities.

Information in this report was based on:

- Test results for PFAS levels in water, people, local wildlife, and plants in Gustavus.
- Studies on PFAS and its effects.
- Government-agency reports and news articles.
- Interviews with GPAC members, Gustavus residents, and other Alaskans.
- GPAC correspondence and testimony.

PFAS Contamination

In 2018, state officials alerted Gustavus residents that their groundwater was contaminated by chemicals in firefighting foam used at the Gustavus Airport since at least the mid-1980s.[3] Gustavus citizens immediately began educating themselves about aqueous film forming foam (AFFF) and the family of compounds known as PFAS.

The Forever Chemical

Across the country, citizens and government regulators were becoming increasingly aware that PFAS are linked to higher rates of cancer and a wide variety of other health issues. What made PFAS compounds seem at first like a family of super-chemicals – so resistant to heat, water, and oil that they are difficult to break down – is also among the reasons why they are detrimental to human health.[4] They cannot readily be removed from the human

> "It's a beast of an issue because PFAS are everywhere. These compounds are used in so many places."
>
> – Gustavus resident

[3] Howell, Wayne, "Report to the Gustavus City Council Gustavus Water Action Committee: Historic Use of Aqueous Firefighting Foam In and Around Gustavus, 1969-2015," September 2019.

[4] DeFazio, Diana, Alaska Community Action on Toxics, "Threats to Drinking water and Public Health In Alaska: The Scope of the PFAS Problem, Consequences of Regulatory Inaction, and Recommendations," September 2019, p. 4.

body and they bioaccumulate over time. Accumulation of PFAS has been connected to thyroid disease, infertility, high blood pressure, liver and kidney damage, preeclampsia, and lower birth rates. Higher rates of several kinds of cancer have been found among military personnel, firefighters, and others with higher exposures to PFAS, and multiple research projects are under way to better understand links between PFAS and cancer.

Concern about the health impacts of PFAS has triggered calls for action by the Union of Concerned Scientists,[5] the United Nations,[6] and the U.S. Environmental Protection Agency (EPA), among others.[7] The U.S. Department of Defense (DOD) has spent millions of dollars evaluating alternatives to the firefighting foam, which is the primary way PFAS has entered groundwater near airports and military installations across the country.[8] Fluorine-free firefighting foams are used in other countries such as England, France, Denmark, Norway, Australia, and the United Arab Emirates.[9] The Federal Aviation Administration (FAA), however, has not adopted use of these foams and instead built a facility to conduct its own tests on fluorine-free foams. AFFF continues to be used and stored at airports across the United States.

> "A lot of us believe the (action level) number should be lower. It's maddening that the number is so high."
>
> – Gustavus resident

In Alaska

As of September 2019, the State of Alaska identified 33 airports where AFFF is known or suspected to have been released, and evidence of PFAS contamination in groundwater has been confirmed at almost every location that has been investigated.[10] Besides Gustavus, PFAS contamination from airports was confirmed as of September 2019 in Fairbanks, Utqiagvik, Dillingham, King Salmon, and Yakutat. Since then several more contaminated sites have been identified. At least 10 Alaska communities have instances of PFAS in drinking water above health advisory levels. These are Utqiagvik, Eielson Air Force Base, Moose Creek, City of Fairbanks, North Pole, Eareckson Air Station, Gustavus, King Salmon, Dillingham, and Yakutat. Many other communities have not yet tested for possible contamination.

> "Regulating just PFOA or PFOS does virtually nothing, since PFAS can be reconfigured in many, many new ways."
>
> – GPAC board member

Research has triggered concerns as to whether the PFAS levels thought to be safe are appropriate. The EPA has a health advisory level for PFAS of 70 parts per trillion (ppt) for PFOS and PFOA (combined) but has not set standards for the many other types of PFAS, which also pose health risks. The safe-exposure level for PFOS and

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[5] Union of Concerned Scientists, "Time for Action to End PFAS Threat," Union of Concerned Scientists, updated June 13, 2019, https://www.ucsusa.org/resources/pfas-threat.
[6] International Pollutants Elimination Network (IPEN), "At UN meeting, governments agree to a global ban on PFOA – a toxic water pollutant", IPEN, May 3, 2019, https://ipen.org/news/un-meeting-governments-agree-global-ban-pfoa-%E2%80%93-toxic-water-pollutant.
[7] "EPA's PFAS Action Plan," U.S. Environmental Protection Agency, viewed Dec. 28, 2020, https://www.epa.gov/pfas/epas-pfas-action-plan.
[8] Paley, Miranda, "5 Things to Know About DOD's Research on 'Fluorine-Free' Firefighting Foam," U.S. Department of Defense, Sept. 6, 2019.
[9] Benesh, Melanie, Environmental Working Group, "It's Time To Switch to PFAS-Free Firefighting Foams," ewg.org, April 22, 2020, https://www.ewg.org/news-and-analysis/2020/04/it-s-time-switch-pfas-free-firefighting-foams.
[10] DeFazio, Diana, Alaska Community Action on Toxics, "Threats to Drinking water and Public Health In Alaska: The Scope of the PFAS Problem, Consequences of Regulatory Inaction, and Recommendations," September 2019, p. 10.

PFOA may be much lower than 70 ppt, perhaps as low as 0.1 to 1 ppt, according to some experts.[11] Numerous states have set lower limits than 70 ppt, but Alaska continues to use the EPA guidelines.

For more information on PFAS contamination in Alaska, see the 2019 ACAT report "Threats to Drinking water and Public Health In Alaska."

> "Our public places were contaminated – our school, our library, the coffee shop at the airport. I don't know of anyone who doesn't go to one of those three places."
>
> – Gustavus resident

PFAS in Gustavus

Gustavus, near Glacier Bay National Park, was one of the first Alaska communities where PFAS contamination was investigated and local residents worked with state officials to address it. The town is 50 miles west of Juneau and has a year-round population of 550.

> "It's a strange world you have to live in where you have to think about the chemicals that may be affecting the beautiful strawberries you want to pick."
>
> – Gustavus resident

Nearly all Gustavus residents depend on private wells 15 to 25 feet deep. A well serving National Park Service housing in the community also serves a few nearby properties including the school and library. The Alaska Department of Transportation & Public Facilities (DOT&PF) began testing water for PFAS in Gustavus in August 2018, through a contract with the environmental consulting firm Shannon & Wilson.[12]

> "My 12 year-old has twice the level of PFAS in his blood than I have. Little kids tend to uptake it so much faster."
>
> – Gustavus resident

Initially, tests showed that 19 Gustavus wells had PFAS concentrations above state action levels.[13] These included 12 drinking water wells for private homes or businesses and one serving Alaska Airlines and Alaska Seaplanes terminals. Since then, additional sites have been identified for a total of 21 contaminated sites.[14] Shortly thereafter, DOT&PF began providing bottled water to those whose wells tested above the action level. DOTP&F also provides quarterly and annual testing of wells, with frequency depending on the level of contamination.

> "It's hard to think about decades of drinking that water."
>
> – Gustavus resident

Wells sometimes are not retested because they have not met all the state requirements for retesting. Residents, however, have found fluctuations in PFAS levels in wells that were repeatedly tested. Because of this fluctuation, GPAC would like to have wells that did not initially show contamination tested again.

[11] DeFazio, p. 18.
[12] Alaska Department of Transportation and Public Facilities, "Gustavus Airport Firefighting Testing Area Contamination," last updated Sept. 14, 2020, http://dot.alaska.gov/airportwater/gustavus/
[13] Ibid.
[14] Shannon & Wilson Inc., "Highest Reported Water Supply Well Analytical Results," September 2020.

Safe Water for Gustavus

One of GPAC's major accomplishments has been successfully advocating for safe water supplies for Gustavus residents affected by PFAS contamination. In 2020, the State began installing rainwater cisterns for those with contaminated wells. In addition, DOTP&F began work to identify a site for a potential community water source. The National Park Service, which owns the Gustavus School well, worked quickly to provide a granular activated carbon (GAC) filtration system for the school's water.

Effects on People

The discovery of PFAS contamination has added a layer of uncertainty to the lives of Gustavus residents, many of whom chose this remote community to live off wild-harvested and garden-grown foods. Despite GPAC efforts to have subsistence foods and locally grown produce tested, residents are still unsure if harvesting moose, gathering wild plants, or eating from their gardens is safe and would like to see additional testing and research.

> "A big concern is that the plume is moving."
>
> – GPAC member

Without continued biomonitoring and additional research, it remains unclear what PFAS body burden levels pose significant health risks. Many current and former Gustavus residents exposed to PFAS through their drinking water have experienced various types of cancer, liver issues, and other physical and mental health problems. Some have died as a result and others deal with ongoing chronic health and quality of life issues. At this point, they have no way of knowing for sure if PFAS exposure is a cause or contributing factor in these ailments.

In addition to the PFAS plume emanating from the Gustavus Airport, a second source of contamination also exists. In 2015, a brush fire broke out at a Gustavus home and threatened nearby houses. The Gustavus Volunteer Fire Department used PFAS-containing firefighting foam to extinguish the blaze. When water samples were completed in 2018, PFAS levels in the area were unusually high. "It was so high it was thought to be a lab error. It was ridiculously high," a GPAC member said. "But it was real." Test results have left residents in the neighborhood wondering whether growing gardens or gathering wild plants on their property is safe.

> "It was world-changing and life shattering when we thought we lived in a completely pristine world."
>
> – Gustavus resident

Until 1925, Gustavus was known as Strawberry Point for the abundance of wild strawberries that grew all over town. Some residents have become wary of picking berries in areas that are believed to be contaminated with PFAS. Testing has indicated that the plume of contaminated groundwater has expanded in the two years that water sampling has taken place, raising a concern that land that did not have unsafe levels of PFAS in initial tests may become contaminated in the future. Point sources will continue to contribute to contamination of surrounding areas beyond the lifespan of current residents.

Formation of GPAC

Gustavus residents founded GPAC in December 2018 to bring awareness to PFAS contamination and take steps to prevent further harm. During the previous summer and fall, state officials had notified the community that wells at various residential, community, and commercial properties had tested positive for PFAS. After discussion and networking with the statewide group Alaska Community Action on Toxics (ACAT), Gustavus resident Kelly McLaughlin launched the coalition. The organization has about 25 members.

> "We're interested in everyone stepping up and taking action, but it's not anyone's fault. We see the state as a helpful resource. It's not a flame-throwing type of group."
>
> – GPAC member

GPAC has reached out to other organizations to address PFAS, joining forces with ACAT, the Southeast Alaska Conservation Council (SEACC), the Nature Conservancy, and the Alaska Native Sisterhood, among others.

Mission

GPAC has three primary goals:

1) Stop further use of PFAS.
2) Create public understanding of the full extent of the damage.
3) Correct PFAS damage to the fullest extent possible.

The coalition works with local, state, and federal agencies, as well as nonprofits and universities, to address the issue in a cooperative way.

Containing the Source

Firefighting foam, also known as aqueous film forming foam or AFFF, has been the primary source of PFAS contamination in Gustavus and other affected Alaska communities. Much of the contamination across the state came not from AFFF use during fires, but from training or testing exercises involving the foam.

Actions and Accomplishments

GPAC has taken the following actions to halt the use of firefighting foam:

> "If (AFFF)'s been deployed, it's still there. It's a forever chemical."
>
> – GPAC member

- **Advocated for replacing firefighting foam that contains PFAS** with a sodium bicarbonate (or similarly safe) substitute as a fire suppressant at the Gustavus Airport.
- **Advocated for replacing firefighting foam that contains PFAS** with fluorine-free foams at other larger airports around the state.
- **Supporting state legislation** that would cease the use of AFFF at Alaska airports.

AFFF Substitutes

GPAC has succeeded in its efforts to influence the State's practices regarding airport fire suppressants. The Alaska Department of Transportation and Public Facilities (DOT&PF) has stopped training with AFFF and all unnecessary use of fluorinated foams at airports. The Gustavus group has urged the DOT&PF to use sodium bicarbonate substitutes instead of AFFF for suppressing fires at Index A airports, where AFFF was never required. Index A is a federal designation, based on aircraft length and average number of daily departures, that determines the airport's safety requirements. While the State has not adopted sodium bicarbonate substitutes, it did supply the Gustavus Airport with Purple-K, a potassium bicarbonate fire suppressant (though AFFF is still required to be on hand in tandem with Purple-K).

The FAA Reauthorization Act of 2018 directed the agency to stop requiring the use of fluorinated firefighting foams at airports by October 2021.[15] Legislation proposed in the 31st Alaska Legislature would have prohibited the use of AFFF at Alaska airports once the federal requirement for its use is no longer in place. That legislation was not passed, but is likely to be reintroduced in 2021.

[15] Federal Aviation Administration, "FAA Opens One-of-a-Kind Fire Research Facility in Atlantic City," Jan. 14, 2020, https://www.faa.gov/news/updates/?newsId=94946&omniRss=news_updatesAoc&cid=101_N_U.

In part, states are waiting for federal action. Since fiscal year 2017, the U.S. Department of Defense has invested $11 million in research to find environmentally safe replacements for AFFF.[16] Fluorine-free foams, however, are already used at a number of major international airports, such as London Heathrow, Paris-Charles De Gaulle, and Dubai, as well as by Danish and Norwegian armed forces, and oil and chemical manufacturers such as BP, ExxonMobil, Pfizer, and Lilly.[17]

State Legislation

During the 31st Alaska Legislature, GPAC worked to build bipartisan support for Senate Bill 176, sponsored by Sen. Jesse Kiehl (D-Juneau), and House Bill 240, sponsored by Reps. Sara Hannan (D-Juneau) and Geran Tarr (D-Anchorage). These bills, introduced in February 2020, would have required the following:[18]

- Firefighting foams containing PFAS would no longer be allowed once federal law does not require them.
    - An exception would be made for the oil and gas industry, if no safe and effective alternative to firefighting foam containing PFAS is available. However, if the state fire marshal determines that a viable alternative exists, then it must be used instead.
- DEC would accept for disposal up to 25 gallons of AFFF each year from any person living in Alaska.
- Stricter limits on PFAS in drinking water.
- Periodic testing of Alaska drinking water supplies from areas where PFAS has been released.
- Alternative sources of drinking water and testing for those whose water sources are contaminated with PFAS.
- Testing first responders (such as a firefighter, police officer, or cleanup personnel) exposed to PFAS and anyone who routinely consumed PFAS-contaminated drinking water. Testing would occur at least once a year for three years after exposure to monitor their PFAS body burden.

While this legislation did not pass in 2020, legislators plan to introduce similar bills during the 32nd Alaska Legislature, which began in January 2021.

Next Steps

GPAC plans to take the following measures to prevent continued use of AFFF:

- Advocate for the passage of legislation addressing PFAS contamination.
- Advocate for the use of fluorine-free fire suppressants until federal standards halt the use of AFFF.
- Urge the state to properly dispose of stored firefighting foam.

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[16] Paley, Miranda, "5 Things to Know About DOD's Research on 'Fluorine-Free' Firefighting Foam," U.S. Department of Defense, Sept. 6, 2019, https://www.defense.gov/Explore/News/Article/Article/1953510/5-things-to-know-about-dods-research-on-fluorine-free-firefighting-foam/

[17] Benesh, Melanie, Environmental Working Group, "It's Time To Switch to PFAS-Free Firefighting Foams," ewg.org, April 22, 2020, https://www.ewg.org/news-and-analysis/2020/04/it-s-time-switch-pfas-free-firefighting-foams.

[18] Alaska Senate Bill 176 and House Bill 240: "An Act relating to pollutants; relating to perfluoroalkyl and polyfluoroalkyl substances; relating to the duties of the Department of Environmental Conservation; and relating to firefighting substances."

Raising Awareness

GPAC's efforts to increase awareness of the effects of PFAS have been two-pronged:

1. **To test PFAS levels** in water supplies, residents, local game, wild plants, and garden produce so as to fully understand the extent of PFAS contamination in Gustavus.

2. **To inform Gustavus residents and other Alaskans** about the risks from widespread AFFF use, safer alternatives, and other actions to prevent further harm.

Actions and Accomplishments

In the first two years after its inception, GPAC worked with state agencies, nonprofit groups, and researchers to ensure that water supplies, Gustavus residents, local wildlife, and plants were tested for PFAS levels. The coalition also launched a campaign to increase awareness of PFAS in Gustavus and around the state. Education efforts included public appearances, legislative testimony and meetings with lawmakers, two statewide PFAS summits, and the creation of a statewide PFAS network.

> "It's not all about taste. There's more awareness about getting water tested for things that can be tasteless in your water but be long-term problems."
>
> – GPAC member

PFAS Testing

Blood Tests

GPAC – in collaboration with the Gustavus Clinic, the Alaska Community Action on Toxics (ACAT), and Indiana University (IU) – offered free blood tests in November 2019 to Gustavus residents.[19] Those who may have been exposed to PFAS through Gustavus School or homes and businesses near contaminated water supplies were eligible for the test. Blood samples were analyzed for 39 PFAS compounds.[20] The goal was to determine PFAS levels in those most likely to have been exposed to these substances.

The collaborative study found a strong correlation between exposure to PFAS-contaminated drinking water and PFAS levels in blood serum. Nineteen PFAS were detected in human blood samples, with concentrations ranging from 2,420 to 28,200 ppt.

[19] Gustavus PFAS Action Coalition website, viewed Dec. 28, 2020, https://www.gpacalaska.org/blood-tests/.

[20] Salamova, Amina and Maksat Babayev, Guomao Zheng, Pamela Miller, Kelly McLaughlin, *PFAS Exposure Near a Point Source in Gustavus, Alaska*, Indiana University, draft study completed in April 2020.

Water samples from the Gustavus Department of Transportation (DOT) and a Gustavus Airport well contained extremely high PFAS levels, suggesting these locations were major sources of contamination. PFAS levels were 27,100 ppt at the Gustavus DOT site and 590 ppt at the airport well. That compares to the EPA's lifetime health advisory with an action level of 70 ppt for PFOS and PFOA, and to proposed limits, based on guidelines in other states, of 16 ppt for PFOS and 8 ppt for PFOA.

Overall, 22 distinct PFAS were detected in Gustavus water samples. Perfluorooctane sulfonate (PFOS) constituted up to 60% of the PFAS concentrations, making it the most abundant PFAS in water and blood samples.

Moose and Bear

In 2019, the Alaska Department of Fish and Game (ADF&G) tested meat and liver samples from 12 moose and one black bear in the Gustavus area.[21] The Department found detectable levels of PFAS in four of the 13 animals tested (three moose and the bear) and determined that in all samples, PFAS was below levels considered safe for consumption as defined by the EPA health advisory. These levels, however, are strongly questioned and under further evaluation. The PFAS concentrations in the meat were similar to those found in game in remote areas of the Northwest Territories in Canada.

> "We were trying not to be alarmist but make them aware this is an issue for the whole community."
>
> – Gustavus resident

ADF&G relied on Minnesota guidelines for safe PFAS levels for fish consumption because neither the EPA nor Alaska DEC had developed such standards of their own. According to Minnesota recommendations, concentrations of less than 10,000 ppt PFAS per gram of fish may be consumed without restriction. The four samples of Gustavus meat with detectable PFAS contained it at the following levels:

- 7,000 ppt in the liver of a cow moose.
- Less than 1,000 ppt in one sample each of bear meat, moose meat, and moose liver.

Department officials noted that chemicals tend to concentrate in liver more than muscle, but that all samples appeared safe for consumption.

Chicken Eggs

GPAC has facilitated and funded three rounds of egg testing, primarily of eggs from two flocks living on properties affected by substantial PFAS contamination. The first two rounds of testing were completed by the testing company Eurofins and the third round was by Vista. Test results on these have shown detectable concentrations of the PFAS compounds PFOS, PFBA, and PFTA.

Some eggs from chickens raised outside of known PFAS-contaminated properties in Gustavus were also tested for comparison. Results showed high concentrations of just one PFAS compound, PFOS, with all of the other compounds not detected. GPAC members consulted with multiple academic experts and the research has led them to suspect that these may be false positives for PFOS caused by the presence of a common bile acid (TcdA). In fall 2020, GPAC worked with the testing firm Vista Analytical Laboratories to conduct more sensitive

[21] Alaska Department of Fish and Game press release, "ADF&G Finds Gustavus Game Samples Safe for Consumption," July 18, 2019.

egg tests, the results of which are shown in Table 1 below. In summary, the results in bold in Table 1 are thought to be correct, while the italicized results are considered suspect due to the bile acid issue present in Eurofins test results.

Table 1. PFAS Test Results for Chicken Eggs from Affected and Unaffected Properties (ppt)

	PFOS	PFBA	PFTA	All Other
Vista Test Results - Fall 2020				
Egg Sample 1 (affected property)	-	-	-	-
Egg Sample 2 (unaffected property)	-	-	-	-
Egg Sample 3 (affected property)	**900**	-	-	-
Eurofins Test Results - December 2019				
Egg Sample 1 (unaffected property)	*38,000*	-	-	-
Egg Sample 2 (unaffected property)	*17,000*	-	-	-
Egg Sample 3 (affected property)	*30,000*	-	-	-
Egg Sample 4 (affected property)	*400*	-	-	-
Eurofins Test Results - September 2019				
Egg Sample 1 (affected property)	*25,000*	**2,200**	**200**	-
Egg Sample 2 (affected property)	*13,000*	**700**	-	-
Egg Sample 3 (affected property)	*23,000*	**1,800**	-	-

Source: Test result reports provided by GPAC.
Note: Results in bold are thought by GPAC to be correct, while the italicized results are considered suspect due to potential false positives present in Eurofins test results. Results blank (-) when tests did not detect compound at concentrations above the method detection limit. All results in wet weight concentrations.

Other Subsistence Foods and Growing Media

A GPAC member had garden soil, compost, and produce tested in May 2019 by the testing laboratory Eurofins. Results indicated that detectable amounts of PFOS and PFTrDA were present in one garden soil sample, with PFTrDA was also present in compost. Potato and swiss chard samples returned no hits, while one rhubarb sample had detectable amounts of 6:2 FTS present.[22]

In late 2019, GPAC had a variety of produce samples from gardens on affected properties tested by Eurofins. The results showed no detectable levels of PFAS compounds for three potato samples, one kale sample, one rhubarb sample, and one wild mushroom sample. Two kale samples and two mint samples showed detectable amounts of PFBA. One mint sample also showed detectable amounts of PFPeA.

In Fall 2020, GPAC funded another batch of testing for various subsistence and farmed foods, including chicken meat, wild mushrooms, spruce tips, strawberries, currants, and dandelions. Detectable amount of 6:2 FTS were found in one spruce tip sample and detectable amounts of PFBA were found in three chicken meat samples. All other tests on these samples found concentrations below the method detection limit, as shown in Table 2 below.

[22] In newer AFFF foams, 6:2 FTS was used as a replacement to PFOS.

Table 2. PFAS Test Results for Produce and Soil from Affected Properties (ppt)

	PFOS	PFBA	PFPeA	PFTrDA	6:2 FTS	All Other
Eurofins Test Results - September 2019						
Kale Sample 1	-	700	-	-	-	-
Kale Sample 2	-	-	-	-	-	-
Kale Sample 3	-	1,500	-	-	-	-
Mint Sample 1	-	900	-	-	-	-
Mint Sample 2	-	1,000	1,100	-	-	-
Potato Sample 1	-	-	-	-	-	-
Potato Sample 2	-	-	-	-	-	-
Potato Sample 3	-	-	-	-	-	-
Wild Mushroom	-	-	-	-	-	-
Rhubarb	-	-	-	-	-	-
Eurofins Test Results - May 2019						
Potato	-	-	-	-	-	-
Rhubarb	-	-	-	-	21,000	-
Swiss Chard	-	-	-	-	-	-
Garden Soil Sample 1	1,100	-	-	4,800	-	-
Garden Soil Sample 2	-	-	-	-	-	-
Compost	-	-	-	3,200	-	-
Vista Test Results – October 2020						
Wild Mushroom	-	-	-	-	-	-
Strawberries Sample 1	-	-	-	-	-	-
Strawberries Sample 2	-	-	-	-	-	-
Strawberries Sample 3	-	-	-	-	-	-
Strawberries Sample 4	-	-	-	-	-	-
Currants	-	-	-	-	-	-
Spruce Tip Sample 1	-	-	-	-	-	-
Spruce Tip Sample 2	-	-	-	-	858	-
Spruce Tip Sample 3	-	-	-	-	-	-
Dandelion Sample 1	-	-	-	-	-	-
Dandelion Sample 2	-	-	-	-	-	-
Chicken Meat Sample 1	-	-	-	-	-	-
Chicken Meat Sample 2	-	-	-	-	-	-
Chicken Meat Sample 3	-	1,300	-	-	-	-
Chicken Meat Sample 4	-	1,600	-	-	-	-
Chicken Meat Sample 5	-	794	-	-	-	-
Chicken Meat Sample 6	-	-	-	-	-	-

Source: Test result reports provided by GPAC members.
Note: Results blank (-) when tests did not detect compound at concentrations above the method detection limit. May 2016 test results reflect dry weight concentrations, while September 2019 and October 2020 results are in wet weight concentrations.

Salmon

GPAC provided six samples of pink and coho salmon from the Salmon River in Gustavus to California-based Vista Analytical Laboratory, which tested the salmon tissue for more than 20 types of PFAS compounds.[23] Based on test results received in November 2020, none of the compounds tested were present in any of the samples at concentrations above the detection limit of Vista's protocols (approximately 200-1,000 ppt per compound).

Education Efforts

Besides reaching out to state legislators and businesses such as Alaska Airlines, GPAC members have written dozens of letters to government agencies and elected officials regarding PFAS contamination. The coalition has joined forces with groups such as SEACC, the Nature Conservancy, the Alaska Native Sisterhood, and ACAT in writing some of these letters. GPAC shared information on PFAS with the Gustavus community at the public library, on Facebook, and in regular pieces in the Fairweather Reporter, a now defunct Gustavus newspaper. With funding from a city grant, GPAC created a website (www.GPACAlaska.org) and also maintains a Google Drive with extensive information about PFAS, including studies, legislation, regulations, permits, correspondence, and other documents.

In addition, GPAC has been involved in an array of public events to increase understanding of AFFF risks and decrease exposure to PFAS.

Public Appearances and Testimony

GPAC's efforts to spread PFAS awareness include participation in:

- **An Anchorage press conference** on Sept. 25, 2019, to announce release of the report, "Threats to Drinking Water and Public Health in Alaska: The Scope of the PFAS Contamination Problem, Consequences of Regulatory Inaction, and Recommendations." Other participants were the Alaska PFAS Action Coalition (APAC) and ACAT, which produced the report. Diana DeFazio, ACAT's environmental health program coordinator, was the report's primary author.
- **An *Anchorage Daily News* interview** on Sept. 25, 2019 for a newspaper article.
- **Alaska Public Radio's "Talk of Alaska" program,** on Oct. 15, 2019, titled, "How dangerous are PFAS chemicals and what's being done to clean them up?"
- **Testimony before the Alaska House Resources Committee** on May 10, 2019, on costs of PFAS contamination.

Alaska PFAS Summits

Summit 2019: GPAC held the first statewide PFAS summit May 17-19, 2019, in Gustavus. More than 70 people attended the summit kickoff, potluck, and dessert auction at the Gustavus Inn, and more than 20 people participated in the following two days of presentations. Discussions covered PFAS health effects, state and

[23] Vista Analytical Laboratory Work Order No. 200228, Nov. 10, 2020.

federal policy, and strategies to address PFAS contamination. Summit participants came from Gustavus, Juneau, Anchorage, Fairbanks, Dillingham, New Hampshire, and New York.

Summit 2020: The COVID-19 pandemic altered plans for the second summit, originally slated for May 1-3, 2020. Instead of an in-person gathering, GPAC held a series of four Zoom meetings, the first three in 2020 and the final one in February 2021 in preparation for the start of the Alaska legislative session. Fifteen to 75 people from around the state and country attended each session.

Creation of Statewide PFAS Network

GPAC's 2019 summit resulted in the creation of a statewide network, the Alaska PFAS Action Coalition (APAC), with members from Gustavus, Dillingham, and Fairbanks. The group's goal is to share information and strategies in addressing PFAS contamination at a local, state, national, and international level.

One of its first actions was to write Alaska Gov. Mike Dunleavy on May 31, 2019, objecting to the state's decision to relax the stringency of state drinking water standards. In fall 2018, the Alaska Department of Environmental Conservation took public comment on a draft regulations package that would have set the State's action level for contaminated drinking water at 65 ppt for a combined total of five PFAS compounds.[24] In April 2019, the Dunleavy administration dropped this plan and aligned state standards with the less-stringent EPA lifetime health advisory, which includes only two PFAS chemicals, PFOS and PFOA, at an action level of 70 ppt. The initial well sampling efforts for Gustavus were under the 65 ppt level for five PFAS chemicals,[25] whereas sites tested in other communities after spring 2019 fell under the lower standards.

Next Steps

GPAC's continued efforts to increase public understanding include:

- Continuing to network with and support other Alaska communities with PFAS contamination.
- Strengthening the statewide network to advocate for stricter environmental standards and remediation.
- Provide consultation to communities or people struggling with PFAS contamination.
- Continue to hold public events around PFAS education.
- Continue advocating for further testing of the Gustavus PFAS plume.

[24] Alaska State Legislature, March 9, 2020 testimony before the House Resources Committee, http://www.akleg.gov/basis/Meeting/Detail/?Meeting=HRES%202020-03-09%2013:00:00&Bill=HB%20240.
[25] Shannon & Wilson, Inc., "Summary: Gustavus PFAS 2019 Site Characterization," April 2020.

Strengthening State Standards

GPAC's top priority for preventing further damage from PFAS contamination is to pass PFAS legislation in the 32nd Alaska State Legislature. Such legislation would establish more stringent limits on PFAS levels in Alaska drinking water and provide biomonitoring and clean water to more of those who have been affected by PFAS contamination. In addition, the legislation would eventually require airports to switch to fluorine-free foam.

Actions and Accomplishments

GPAC members met with legislators during the 2020 session and were encouraged by the bipartisan response they received. The coalition has been building support for the legislation by:

- Working with legislators.
- Educating Alaskans about PFAS.
- Leading a letter writing campaign in support of these bills.
- Providing testimony on behalf of the legislation.

> "They test your well once. If you're at 65 (ppt), you don't qualify for further testing or supplemental water. The problems we've observed when these wells get retested are that the results are all over the place. They're basing everything on these numbers and they fluctuate wildly."
>
> – Gustavus resident

State Legislation

PFAS-related bills have not yet been introduced in the 32nd Alaska Legislature, but they are likely to be similar to the previous bills. Those bills would have addressed PFAS contamination in the following ways:[26]

- **Stricter limits on PFAS in drinking water**. The proposed legislation would have included seven, instead of two, PFAS chemicals when determining whether drinking water was safe. The proposed limits for these compounds are shown below.

Table 3. Proposed Limits for PFAS in Alaska Drinking Water

	Full Name	Limit (ppt*)
PFBS	perfluorobutanesulfonic acid	420
PFOA	perfluorooctanoic acid	8
PFOS	perfluorooctanesulfonic acid	16
PFNA	perfluorononanoic acid	6
PFHxS	perfluorohexanesulfonic acid	51
PFHpA	perfluoroheptanoic acid	400,000
Gen-X	hexafluoropropylene oxide dimer acid	370

Source: Alaska SB 176 and HB 240 *Parts per trillion

[26] Alaska Senate Bill 176 and House Bill 240: "An Act relating to pollutants; relating to perfluoroalkyl and polyfluoroalkyl substances; relating to the duties of the Department of Environmental Conservation; and relating to firefighting substances."

- **Periodic testing of Alaska drinking water supplies** from areas where PFAS has been released. Testing at Gustavus homes have shown movement of the PFAS plume and fluctuations in PFAS levels so that repeated testing of contaminated areas is needed.

- **Drinking water for those whose water supplies are contaminated with PFAS.** If PFAS levels exceed state limits, those who use that drinking water would be provided uncontaminated water at no cost.

- **Monitoring PFAS levels** in the blood of those exposed to PFAS in their drinking water. Testing would take place at least once a year for three years after PFAS is detected.

- **Testing first responders exposed to PFAS.** Any responder (such as a firefighter, police officer, or cleanup personnel) who ingests, inhales, or absorbs PFAS through the skin or eyes would be offered free blood tests to monitor PFAS levels at least once a year for three years after the exposure.
- **Halting use of fluorinated firefighting foam at airports** as soon as federal law no longer requires it. An exception would be made for an oil or gas business, unless the state fire marshal determines a safe and effective alternative to AFFF is available and therefore must be used.

Next Steps

GPAC's long-term goal is to work with the City of Gustavus and the State of Alaska to contain the contaminated water and remove PFAS from it. Numerous systems have been developed to deal with this, but many of them are extremely expensive.

> "People are going to continue to care and demand action."
>
> – Gustavus resident

One option, called PlumeStop®, involves pumping a suspension of fine particles of carbon into the ground. PlumeStop removes PFAS from the groundwater, binding it to other substances, and expediting permanent biodegradation. Regenesis, the California-based company that produces PlumeStop, says that such a system at Camp Grayling Army Airfield in Michigan, brought PFAS below detectable levels within 60 days of treatment.[27] An Alaska-based company, Aquagga, offers another option, using heat and pressurized water to convert PFAS to benign salts without toxic byproducts. This system can also be used on stockpiled AFFF.[28]

Other GPAC plans to prevent further PFAS damage include:

- Supporting remediation of all contaminated areas to the fullest extent possible.
- Continuing efforts to win support for PFAS legislation.
- Seeking grants for safer gardening, such as raised beds for contaminated properties.
- Advocating for ongoing testing and expanded understanding of groundwater movement so the PFAS plume's location is well-defined.
- Working with state officials while rainwater cisterns are installed for all homes with contaminated water.

[27] "Pilot Test Conducted to Remove PFAS Risk, Case Study: Michigan Dept. of Military and Veteran Affairs Employs PlumeStop Barrier to Grayling Army Airfield," Regenesis, 2019, https://regenesis.com/wp-content/uploads/2019/02/002_EU_REGENESIS_Case_Study_Camp_Grayling.pdf.
[28] Aquagga, "Destroying PFAS via Modern Manufacturing," last viewed Feb. 19, 2021, Tech (aquagga.com).

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