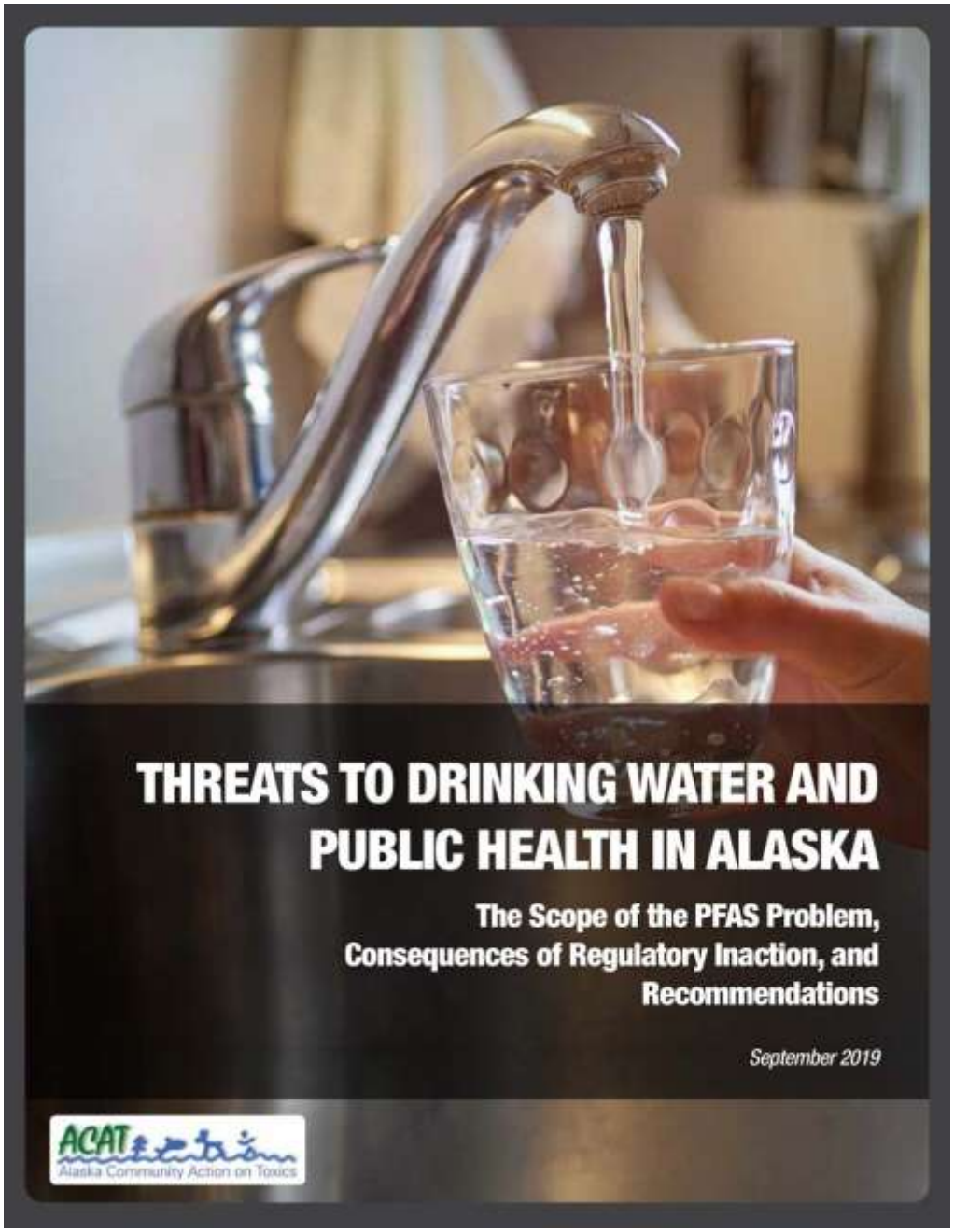


Alaska Collaborative on Health and the Environment (CHE-Alaska)

October 16, 2019

Diana DeFazio
Environmental Health Program Coordinator
Alaska Community Action on Toxics

Link to report (PDF)

Presentation overview

- PFAS background
- Federal and state standards
- PFAS investigation process
- Site specific information

Hagevig Regional Fire Training Center, Juneau.
Photo: Michael Penn, Juneau Empire File

What are PFAS?

- Per- and polyfluoroalkyl substances (PFAS)
- Developed for their heat-, oil-, and water-resistant properties
- PFOS and PFOA most well studied; now phased out in U.S., but persist in environment
- Replacement PFAS may prove to be “regrettable substitutions”

PFAS are:

- Persistent
- Toxic
- Bioaccumulative

How are people exposed to PFAS?

Consumer products

How are people exposed to PFAS?

Food

https://www.webmd.com/diet/news/20190809/pfas-chemicals-in-food-expert-qa

How are people exposed to PFAS?

Dust

- Incidental ingestion of dust

Drinking Water

- PFAS releases into groundwater, surface water, air and soil
- In Alaska, PFAS relseases can be traced to use of firefighting foams

Gustavus households offered safe drinking water after latest PFAS scare

By Elizabeth Jenkins, Alaska's Energy Desk - Juneau - October 31, 2018

Groundwater Contamination Spreads off Eielson Air Force Base

By Dan Bross, KUAC - Fairbanks - June 17, 2015

Popular well at Dillingham Catholic church closed due to PFAS contamination

By AVERY LILL • JAN 18, 2019

Golden Heart Utilities suspends compost sales over PFAS contaminant concerns

Rural Alaska

Erin McGroarty, emcgroarty@newsminer.com May 30, 2019

Yakutat officials wary of state's PFAS double standard

By Jacob Resneck, CoastAlaska - Juneau - July 25, 2019

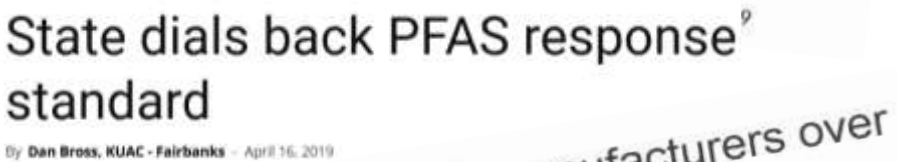
Chemicals in firefighting foam contaminate groundwater at King Salmon Airport

Author: Avery Lill, KDLG Updated:

FEATURED

Wells test positive for contamination near Fairbanks airport

By Robin Wood, rwood@newsminer.com Nov 28, 2017

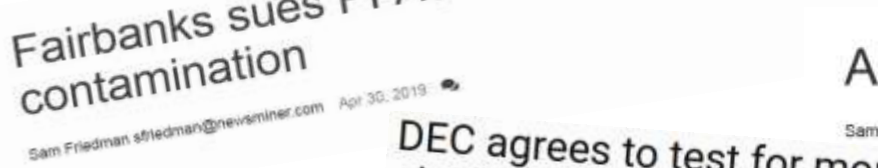

State dials back PFAS response standard

By Dan Bross, KUAC - Fairbanks - April 16, 2019

FEATURED

Two North Pole-area lakes closed because of contamination; stocking of all Eielson lakes halted

Apr 5, 2019


Fairbanks sues PFAS manufacturers over contamination

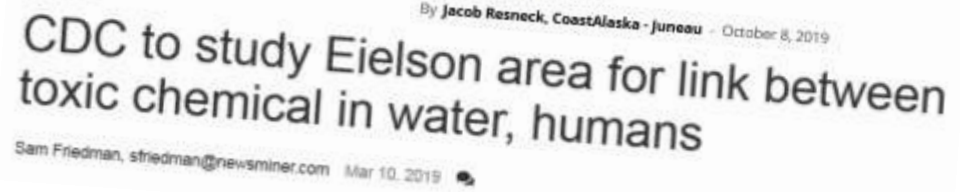
Sam Friedman sfriedman@newsminer.com Apr 30, 2019

Alaska stops testing for four types of PFAS

Sam Friedman sfriedman@newsminer.com Apr 13, 2019

DEC agrees to test for more PFAS chemicals

By Jacob Resneck, CoastAlaska - Juneau - October 8, 2019


CDC to study Eielson area for link between toxic chemical in water, humans

Sam Friedman, sfriedman@newsminer.com Mar 10, 2019

Alaska News

Dissent within Alaska DEC over chemical classification

Author: Associated Press Updated: 2 days ago Published 2 days ago

AFFF

- PFAS contamination in Alaska is linked to use of aqueous film forming foam (AFFF)

Photo: U.S. Air National Guard photo by Airman 1st Class Amber Powell/ Released

PFAS exposure linked to health outcomes, including:

- High cholestrol
- Immune system effects
- Alteration of mammary gland development
- Reduction in breast feeding duration
- Testicular and kidney cancers; possibly other cancers
- Liver damage
- Ulcerative Colitis
- Pregnancy-induced hypertension and preeclampsia

EPA health advisory levels

Non regulatory = not enforceable

- **2009 – Provisional Health Advisory Level:**
  - PFOS: 200 ppt; PFOA: 400 ppt
- **2016 – Lifetime Health Advisory (LHA) Level:**
  - PFOS + PFOA: 70 ppt
  - safety level may be as low as 0.1 – 1.0 ppt, up to 700 times lower than the EPA's health advisory level
- Efforts are underway to establish MCL's for certain PFAS to regulate PFAS in the nation's drinking water under the *Safe Drinking Water Act.*
  - How long will this take, which PFAS will be included, and what will be determined to be a "safe level"?

State of Alaska
Action Levels and Guidance

- August 2018: “sum of five” (PFOS + PFOA + PFNA + PFHxS + PFHpA) = 70 ppt
- April 2019: sum of PFOS + PFOA = 70 ppt (EPA LHA)
- October 2019: no change to action level but state will now be testing for the “full suite” of PFAS compounds
- An increasing number of states are establishing health protective regulations **more stringent than EPA’s LHA**
- **State of Alaska rolled back protections**, choosing to base decisions on only two PFAS compounds (PFOS + PFOA)

These actions have been taken against the recommendations of career environmental and public health professionals in both DEC and the DPHSS.

The best way to protect our citizens of the state of Alaska in not by rolling back standards. Such action goes against our responsibility as environmental and health professionals to ensure the drinking water of Alaskans is safe. As a science-based agency, we must use a science-based approach to set standards, investigation all potential contaminated areas and receptors, require complete reporting of all analytes, and do all that we an to protect Alaskans and the enviornment from additional exposures to PFAS. That's our job. To do otherwise is negligence.

Sally Schlichting, Manager, DEC, Division of Spill Prevention and Response – Contaminated Sites Program, April 28, 2019

Information presented in report obtained through:

- Public Records Act requests to DEC
- FOIA requests to Department of Defense (DoD)
- Analysis of laboratory results, including:
  - August 2018 vs. April 2019 Action Levels
  - PFHxS concentrations
- Conversations with DEC, DOT&PF and DoD staff and residents of impacted communities

Testing for PFAS in Alaska

- Over 100 sites ("AFFF Areas) identified in DEC's contaminated sites database
- Nearly 30 locations

https://www.arcgis.com/home/webmap/viewer.html?webmap=4e81d4f8b21d4a5fa37b5af072c1b4ef

Ten locations with drinking water sources contaminated with PFAS:

- **Utqiagvik (Barrow)**
  - From former Naval Arctic Research Laboratory (NARL) and Airport
- **Eileson AFB**
- **Moose Creek**
- **Fairbanks**
  - From Airport and Regional Fire Training Center
- **North Pole**
  - From former North Pole Refinery
- **Eareckson Air Station (Shemya Is.)**
- **Gustavus**
- **Dillingham**
- **King Salmon**
- **Yakutat**

Photo: Kelly McLaughlin

The investigation process:

- Identify AFFF
- Evaluate potential to impact drinking water sources
- Where PFAS are found to exceed action levels, the “Responsible Party” must provide an alternative drinking water supply
- Expansion of testing based on sampling results
- Further site characterization
- Longer term solutions for drinking water supply
- Remediation

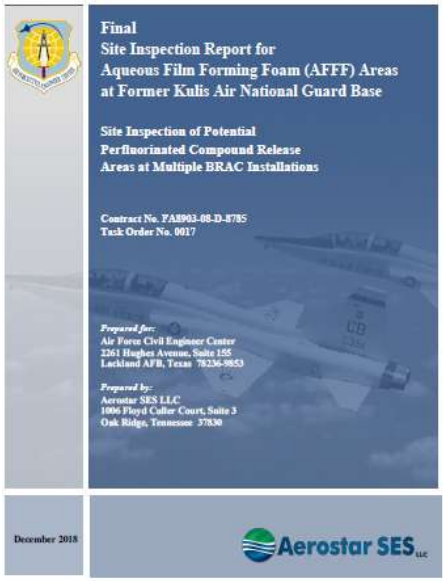
Dept of Defense Investigations: Site Assessment

Preliminary Assessment (PA)

- First step in CERCLA process
- Purpose: Determine if there is a potential threat to human health warranting further investigation
- identify potential AFFF source areas
- makes a formal recommendation for further action/no action
- sets priority for sampling locations

Site Inspection (SI)

- Sampling of water, soil, sediment to characterize releases
- May include recommendations for additional sampling locations



Highest detected PFOS and PFOA levels in Groundwater at Department of Defense Sites under investigation for PFAS Contamination in Alaska

Military installation	Highest detected concentration in groundwater		Year*	Number of PFAS sampled for to date**	Investigation of off-site migration to date?
	PFOS (ppt)	PFOA (ppt)			
Adak[1]	3,630	716	2018	14	N
Clear Air Station[2]	160	2,200	2016	12	N
Eareckson Air Station[3]	250,000	2,800	2016	2	N
Eielson Air Force Base[4]	2,000,000	250,000	2014	14	Y
Fort Greely[5]	90	18	2016	2	N
Fort Wainwright[6]	3,300	440	2013	2	N
Former Galena Forward Operating Location (FOL)[7]	239,000	49,900	2014	12	N
King Salmon Air Station[8]	150,000	81,000	2013	16	N
Former Kulis Air National Guard Base (ANGB)[9]	7,600	8,400	2016	14	Planned; delayed
Joint Base Elmendorf-Richardson (JBER)[10]	24,000	5,100	2016	14	N
Naval Arctic Research Laboratory (NARL)[11]	N/A: No sampling has occurred on site to date	N/A: No sampling has occurred on site to date			Y (Imikpuk Lake)

[1] Naval Facilities Engineering Command Southwest (NAVFAC), 2019a, Figure 7.
[2] Air Force Civil Engineering Center (AFCEC), 2018e, Table 3-4.
[3] AFCEC, 2018a, Table 5-2a.
[4] AFCEC, 2015e, p. 10.
[5] Bering-KAYA Support Services, 2017, p. 9-8.
[6] Fairbanks Environmental Services, 2017. Figure 4-3.
[7] AFCEC, 2016, p. 3-1.
[8] AFCEC, 2014, Appendix A; Table 1.
[9] AFCEC, 2018b, Exhibit 5-10.
[10] AFCEC, 2018f, p. 4-2.
[11] NAVFAC, 2019b, p. 2-4.

*****This is the year that the sample with the highest concentration was taken; PFAS sampling may have taken place in other years.
****** Data for PFAS compounds other than PFOS, PFOA, and PFBS may not be included in site investigation reports (it may not even be mentioned that more PFAS were tested for); however analytical results for additional PFAS may be available in associated laboratory reports.

State of Alaska Investigations

- DEC and DOT&PF have identified 33 Alaska airports to be evaluated for PFAS.

- Some fire training centers and emergency response locations are being evaluated by DEC's CSP

Airports Identified by State of Alaska for PFAS Evaluation

This list compiled based on information provided February – June 2019 by managers within DEC's CSP and DOT&PF.

Those airports with confirmed PFAS impacting drinking water are in bold.

Part 139 Certified state-owned Airports	**PFAS contamination of drinking water sources?**
Adak	Unknown (not yet sampled)
Anchorage International Airport	Unknown (first sampled June 2019)
Bethel	No further investigation
Cold Bay	No further investigation
Cordova	NO (first sampled Dec. 2018)
Deadhorse	Unknown (not yet sampled)
Dillingham	YES (first sampled Dec. 2018)
Fairbanks International Airport (FAI)	YES (first sampled Aug. 2017)
Gustavus	YES (first sampled July 2018)
Homer	Unknown (not yet sampled)
King Salmon	YES (first sampled Dec. 2018)
Kotzebue	Unknown (not yet sampled)
Nome	Unknown (not yet sampled)
Petersburg	Unknown (not yet sampled)
Sand Point	Unknown (not yet sampled)
Sitka	Unknown (not yet sampled)
Unalaska	Unknown (not yet sampled)
Utqiagvik (Barrow)	YES (first sampled Aug. 2017)
Wrangell	Unknown (not yet sampled)
Valdez	NO (sampled Dec. 2018)
Yakutat	YES (first sampled Feb. 2019)
Part 139 Certified Airports (muni-owned and/or operated)	
Kenai	NO (sampled Dec. 2018)
Ketchikan	Unknown (not yet sampled)
Juneau	Unknown (first sampled Aug. 2019)

Past Part 139 Certified Airports and former DoD sites	PFAS contamination of drinking water sources?
Aniak	Unknown (not yet sampled)
Galena (DoD)	Unknown (not yet sampled)
Iliamna	Unknown (not yet sampled)
Kodiak (USCG)	Unknown (not yet sampled)
McGrath	Unknown (not yet sampled)
Northway (DoD)	Unknown (not yet sampled)
Port Heiden	Unknown (not yet sampled)
Red Dog (owned by NANA Regional Corp)	Unknown (not yet sampled)
St Paul	Unknown (not yet sampled)

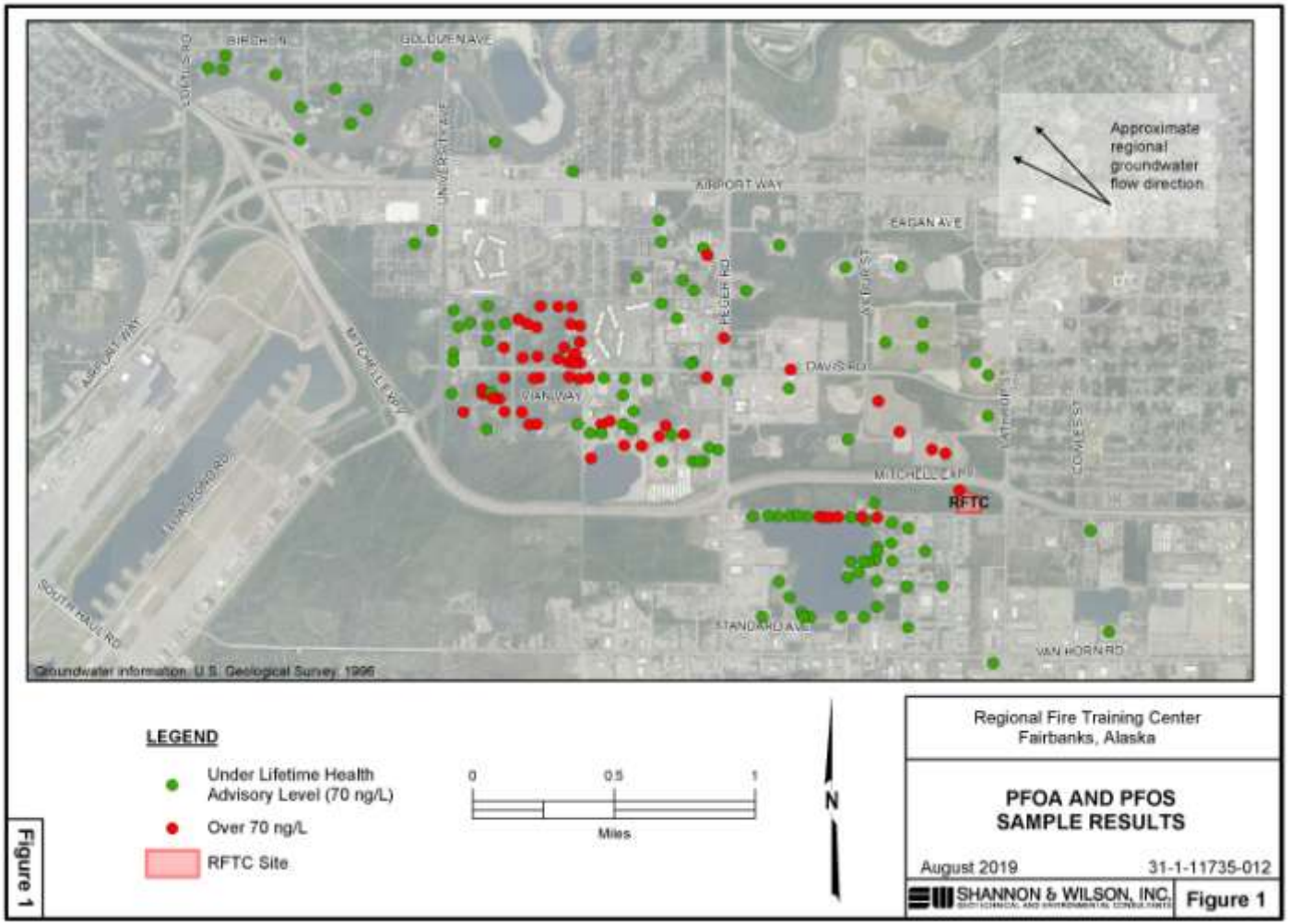
Greater Fairbanks Area

- Eight locations with PFAS groundwater plumes

Greater Fairbanks Area

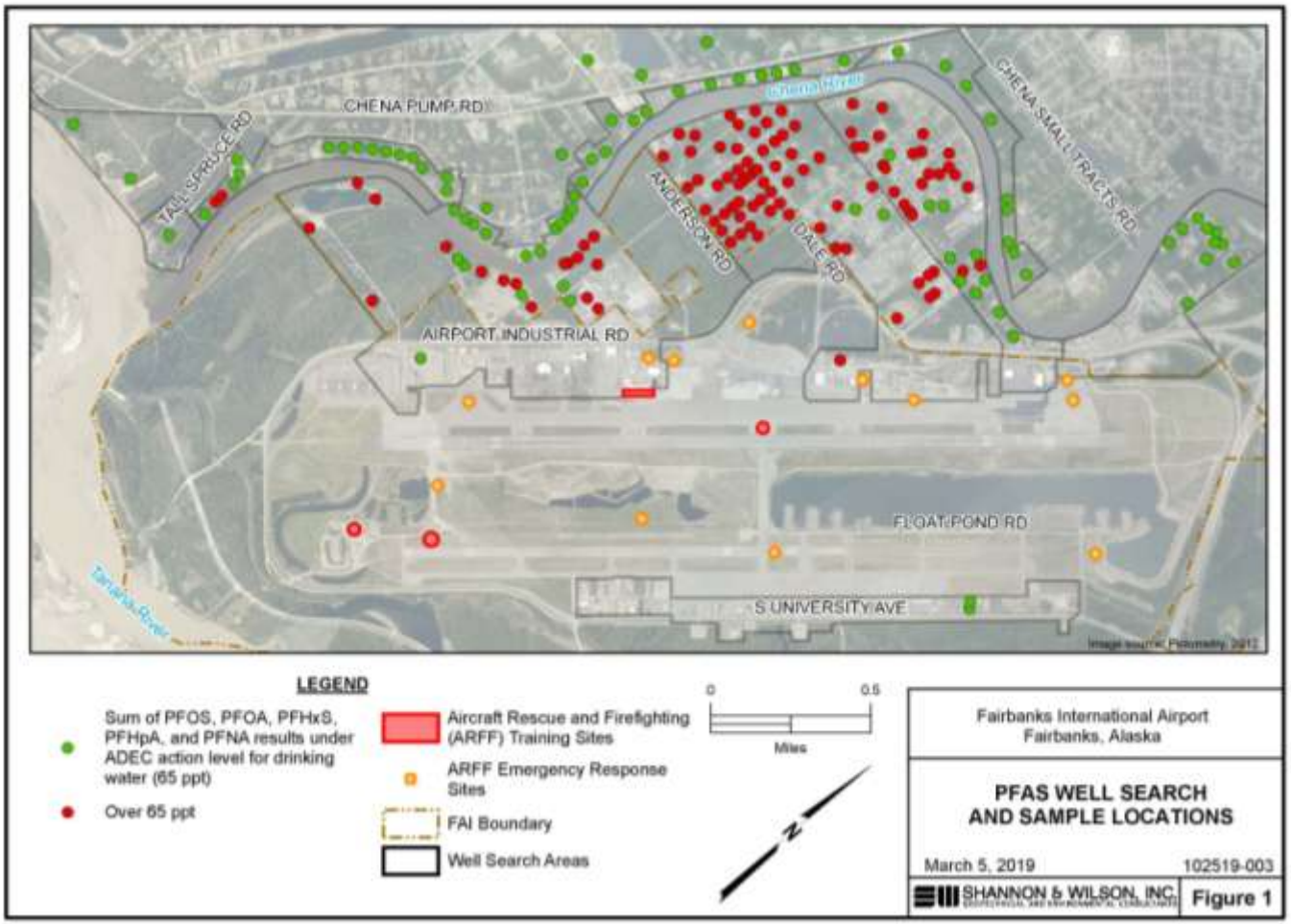
- City of Fairbanks has joined in a suit against 3M and Tyco Fire Products
- Community of Moose Creek is one of eight places in the nation selected by CDC and ATSDR for an exposure study

Fairbanks Regional Fire Training Center



160 wells tested

Fairbanks International Airport



As of Nov. 2018:

193 wells tested and of these 102 were found to have PFAS above action levels

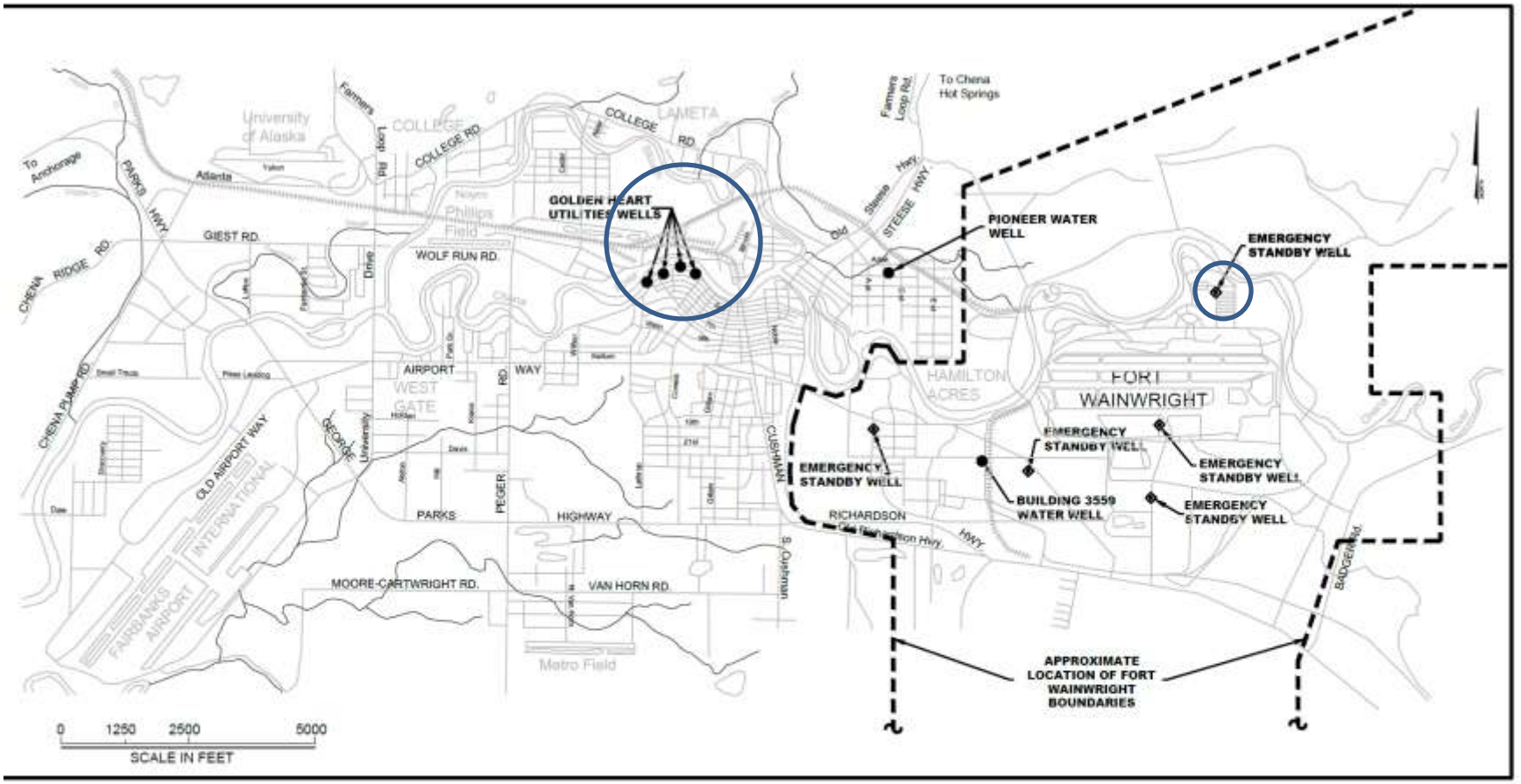
Eielson AFB/ Moose Creek

- DEC requested that the Air Force test the on-base drinking water supply in **Nov. 2012**. No action.
- EPA requested that the Air Force test the on-base drinking water supply in **Jan. 2015**
  - Testing results confirmed contamination
  - GAC filtration systems now being used
- Off-site migration to nearby community of Moose Creek confirmed in **2015**.
  - 169 of 174 private wells tested above action levels with results ranging from 83 ppt – 2,222 ppt.

PFAS in Fairbanks public water supply:

- 2017 water quality report:
  - 13.2 ppt – 15.5 ppt for summed concentration of PFOS, PFOA, PFHxA, and PFHxS
  - PFHxS detected at nearly twice the level as any of the other compounds.
  - According to EPA, conventional water treatment technologies are not effective at removing PFAS

Fort Wainwright



Fairbanks and Fort Wainwright Site Map

LEGEND
- DRINKING WATER WELL LOCATION
- EMERGENCY STANDBY WELL LOCATION USED PRIMARILY FOR FIRE SUPPRESSION

ARMY ENVIRONMENTAL CENTER | CORPS OF ENGINEERS ALASKA DISTRICT

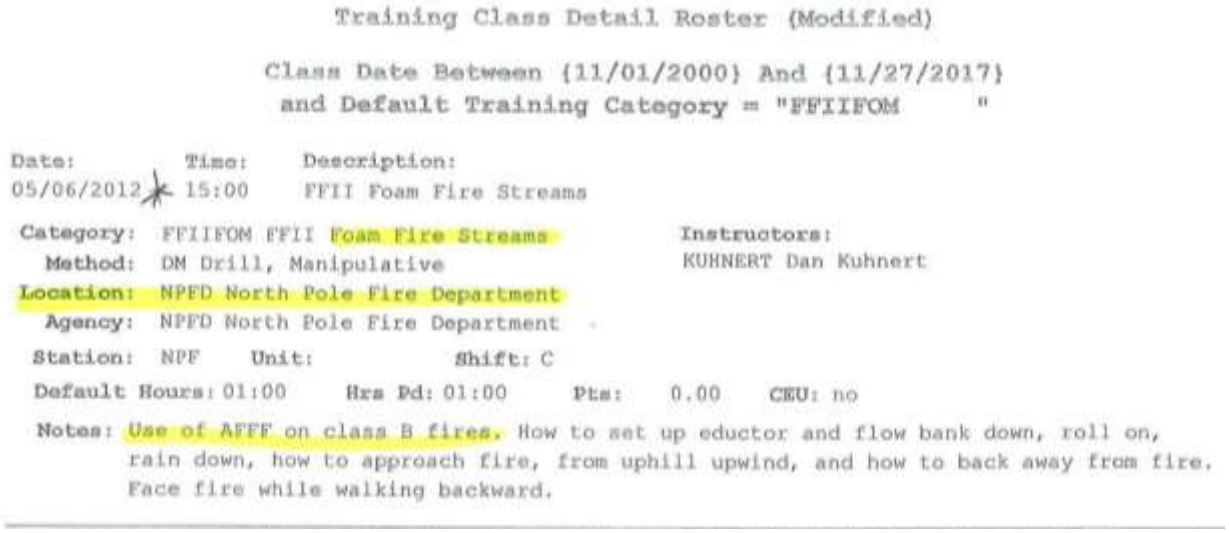
Fort Wainwright and Surrounding Areas

Five Year Review
Fort Wainwright, Alaska

SOURCE: FES, Second 5 Year Review | FIGURE: 3-1 | DATE: 9/11

North Pole Refinery

- Private wells contaminated
- Fish in Kimberly Lake contaminated
- Possible AFFF source area at North Pole Fire Department where trainings included use of AFFF



Training Class Detail Roster (Modified)

Class Date Between {11/01/2000} And {11/27/2017}
and Default Training Category = "FFIIFOM "

Date:	Time:	Description:
05/06/2012	15:00	FFII Foam Fire Streams

Category: FFIIFOM FFII Foam Fire Streams
Method: DM Drill, Manipulative
Location: NPFD North Pole Fire Department
Agency: NPFD North Pole Fire Department
Station: NPF Unit: Shift: C
Instructors:
KUHNERT Dan Kuhnert

Default Hours: 01:00 Hrs Pd: 01:00 Pts: 0.00 CEU: no

Notes: Use of AFFF on class B fires. How to set up eductor and flow bank down, roll on, rain down, how to approach fire, from uphill upwind, and how to back away from fire. Face fire while walking backward.

Kimberly Lake Fish Tissue Sampling

- **October 2018:** Three fish sampled; results:
  - PFNA: 16 – 22 parts per billion (ppb)
  - PFOS: 47 – 68 ppb
- Applying New Jersey's fish consumption advisory levels for PFAS:
  - only be safe to consume fish from Kimberly Lake once every 3 months
  - unsafe for high risk populations to eat them at all

April 3, 2019: Emergency order closed Kimberly Lake to fishing

Utqiagvik (Barrow)

AFFF Source: former Naval Arctic Research Laboratory

Imikpuk Lake

- Lake used traditionally as seasonal water source by elders and others engaged in subsistence.

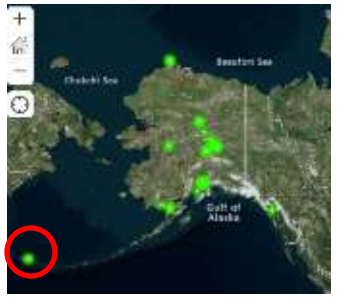
Utqiagvik (Barrow)

AFFF Source: Airport

Isatkoak Reservoir:

Water source for public water system serving approx. 4,000 residents

Eareckson Air Station



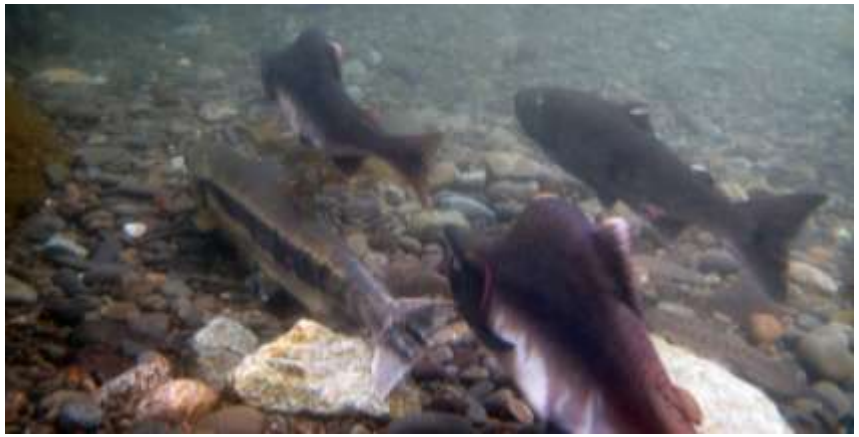
- February 2017 results of drinking water samples:
  - 52.8 ppt PFOS and PFOA only
  - 95.2 ppt sum of 5

	Result Raw Water (ng/L = ppt)	Result Treated Water (ng/L = ppt)
Perfluorobutanesulfonic acid (PFBS)	< 2.0	< 2.0
Perfluoroheptanoic acid (PFHpA)	2.5	2.4
Perfluorohexanesulfonic acid (PFHxS)	40	40
Perfluorononanoic acid (PFNA)	< 2.0	< 2.0
Perfluorooctane sulfonate (PFOS)	47	45
Perfluorooctanoic acid (PFOA)	7.3	7.8

Joint Base Elmendorf-Richardson (JBER)

Concerns

- Off-site migration into surface waters:
  - Ship Creek (salmon and other fish and wildlife)
  - Knik Arm of Cook Inlet (endangered Cook Inlet beluga whale and other marine life)



3 species of salmon and a Dolly Varden char share the Ship Creek migration. Photo: USFWS/ Katrina Mueller

Cook Inlet beluga whale calf. Photo: NOAA Fisheries

Joint Base Elemendorf-Richardson (JBER)

Concerns

- Wastewater generated by JBER is collected by Anchorage Water and Wastewater Utility (AWWU) and discharged into Cook Inlet at Point Woronzof treatment facility.

Former Kulis Air National Guard Base

Concern: Off-site migration with potential impact to:

- private drinking water wells
- wetlands, lakes, fish, and wildlife

Firefighting foam flowing from Tarmac into grass and drainage ditch during training exercise on May 11, 2017. City of Anchorage and Anchorage International Airport conduct fire training exercises at Kulis Business Park. Photo: Aerostar LLC

Additional Concern:
Elementary schools nearby

Former Kulis ANGB, Anchorage

Former Galena Forward Operating Location

Groundwater testing results

- First tested in 2012
- 2013 results
  - 116,000 ppt PFOS
  - 15,500 ppt PFOA
- 2014 results
  - 239,000 ppt PFOS
  - 49,900 ppt PFOA

Drinking water sources:

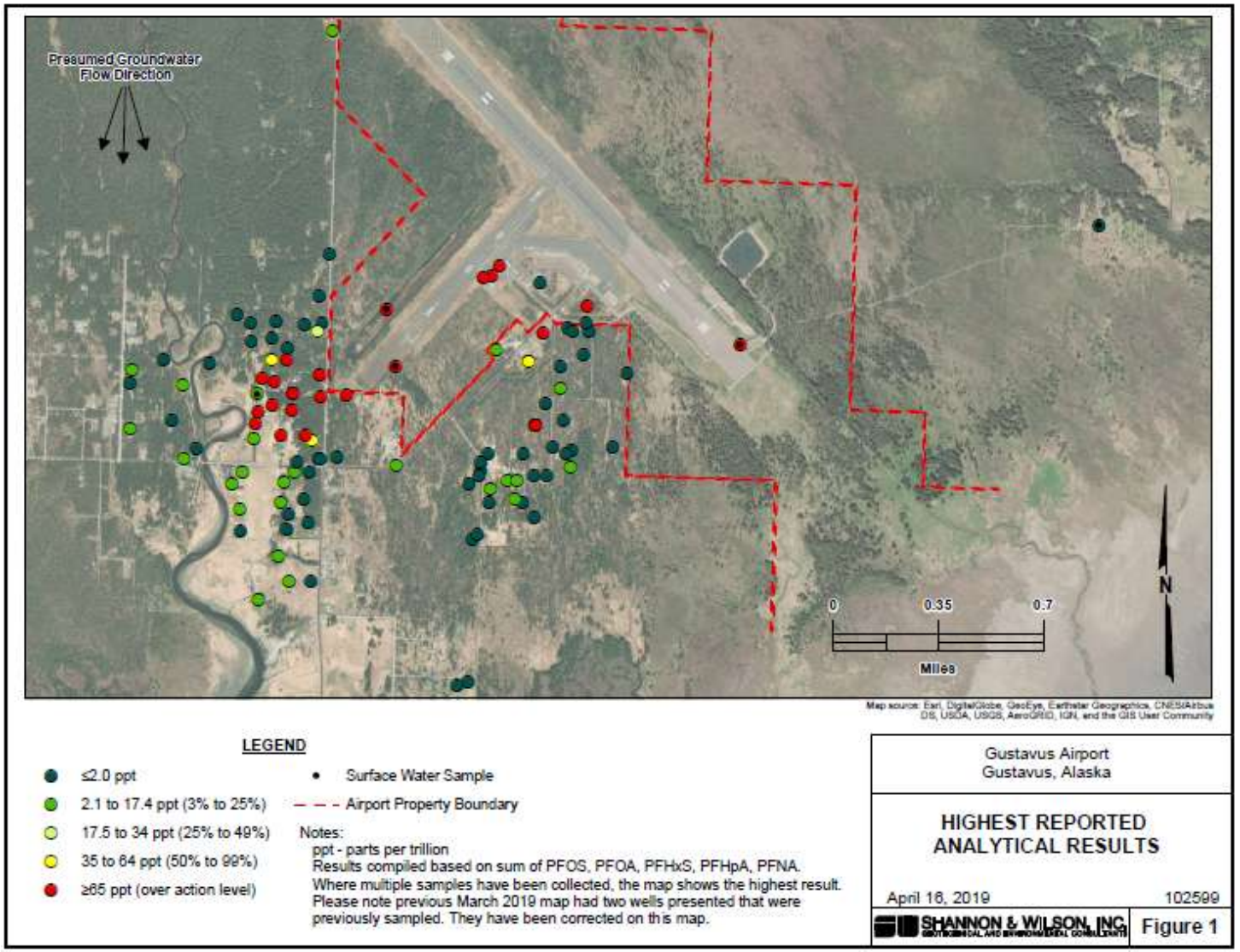
- Non detect for “New Town” public water system wells
- No sampling of “Old Town” private wells has occurred
- No detections above detection limit of 6.4 ppt in late 2016/ early 2017 testing of on-base wells

Concerns: lack of sampling of private wells, potential impacts to Yukon River fish and people who consume them

Gustavus

- August 2018 initial sampling confirmed PFAS contamination of groundwater
- PFAS detected above action levels at airport well
- Four rounds of expanded private well testing through December 2018
- Ongoing quarterly sampling

Gustavus


Presumed Groundwater Flow Direction
0
0.35
0.7
Miles
N
Map source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
LEGEND
≤2.0 ppt
2.1 to 17.4 ppt (3% to 25%)
17.5 to 34 ppt (25% to 49%)
35 to 64 ppt (50% to 99%)
≥65 ppt (over action level)
Surface Water Sample
Airport Property Boundary
Notes:
ppt - parts per trillion
Results compiled based on sum of PFOS, PFOA, PFHxS, PFHpA, PFNA.
Where multiple samples have been collected, the map shows the highest result.
Please note previous March 2019 map had two wells presented that were previously sampled. They have been corrected on this map.
Gustavus Airport
Gustavus, Alaska
HIGHEST REPORTED ANALYTICAL RESULTS
April 16, 2019
102599
SHANNON & WILSON, INC.
Figure 1

Gustavus PFAS Action Coalition (GPAC)

- Formed in response to contamination to:
  - Bring awareness to the PFAS crisis
  - Facilitate, encourage and work with appropriate entities to:
    - Stop further use of PFAS
    - Create public understanding of the full extent of the damage
    - Facilitate the correction of the PFAS damage to the fullest extent possible.

Dillingham

First tested in Dec 2018

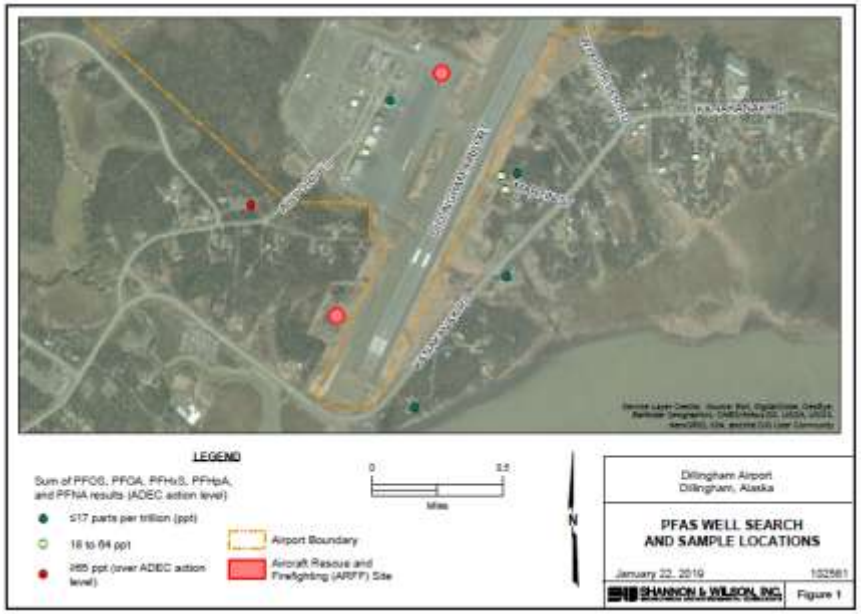
- Holy Rosary Church Well
  - 186 ppt - sum of five PFAS
  - 42 ppt - sum of PFOS/PFOA

PFHxS accounted for 140 ppt of the total PFAS concentration

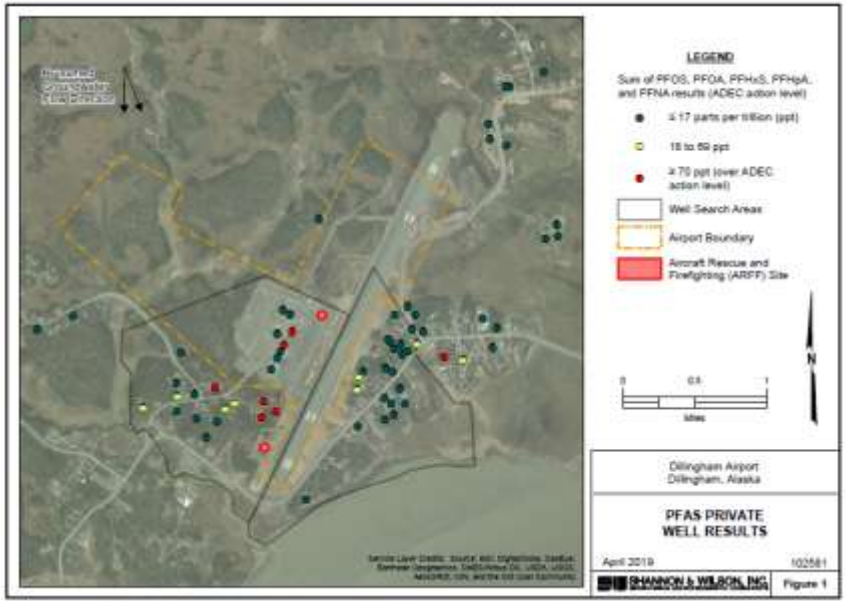
Avery Lill, KDLG

Dillingham

December 2018: Initial well search and sampling



Early March 2019: Expanded well search and sampling



7 wells: 70 ppt or higher for “sum of five”
8 wells: 18 ppt – 64 ppt for “sum of five”
20 wells: detectable levels below 17 ppt
30 wells: non-detect

King Salmon

King Salmon Air Station

- BRAC site
- On base water supply has not been sampled
- No sampling of offsite wells has occurred or is planned

King Salmon Airport

- DEC-led sampling:
  - 10 wells December 2018
    - One well: “sum of five” = 155 ppt; PFOS + PFOA only = 63 ppt
  - 20 wells March 2019
    - Two wells: exceeded “sum of five” action levels
    - Four wells: 18-64 ppt
  - No additional well search/ sampling planned

Yakutat

Sampled in February 2019

- 12 private wells near the Yakutat Airport tested
- One well had PFAS detected at levels exceeding DEC's August 2018 Action Levels.
  - 90 ppt for "sum of five" (36 ppt PFHxS)
  - 48 ppt for PFOS + PFOA only
- Results of initial testing came in when State of Alaska was transitioning to less stringent standards.

Additional concerns

- Need for evaluation of wastewater, treated biosolids derived from sewage, and landfills as sources of PFAS contamination
- Need for more testing of fish, game and other wild foods for PFAS
- Continued non-potable use of PFAS-contaminated wells
- The approval in 2019 of a permit for Organic Incineration Technologies (OIT) in Fairbanks to incinerate soil contaminated with PFAS
- High levels of PFHxS, often detected at the second highest concentrations (after PFOS), but not included in EPA/ DEC health action levels.

PFHxS

- PFHxS, is shorter chain than PFOS or PFOA yet:
  - Is also linked to adverse health outcomes
  - stays in the body longer than either PFOS or PFOA
  - Travels further and faster and is more difficult to remove from water than PFOS or PFOA

- PFHxS has been used in both past and current formulations of AFFF

Thank You!

Co-authors:

- Pam Miller, MS, executive director, ACAT
- Timothy Tynan, graduate student at Emory University who interned with ACAT

Peer reviewers of Health Outcomes section:

- Anna Reade, PhD., staff scientist with the Natural Resources Defense Council
- Samuel Byrne, PhD., Assistant Professor, St. Lawrence University

Other reviewers:

- Nick Riordan, PhD., ACAT
- Samarys Seguinot-Medina DrPH
- Lorraine Eckstein, PhD, ACAT

DEC and DOT&PF staff

*Special thanks to the **Center for Health, Environment, and Justice** and **Kristine Benson** for financial support that made the publication of this report possible.*

Additional Resources

General

- Northeastern University PFAS Project
- PFAS Central – a project of Green Science Policy Institute
- PFAS Chemicals in Food: Expert Q&A
- Danish Environmental Protection Agency Study on PFAS in cosmetics
- The Toxic Teflon – The Intercept
- Environmental Working Group PFAS Timeline
- Safer States PFAS page
- Department of Defense Task Force to Address PFAS

Alaska Specific

- Alaska PFAS Information – DOT&PF
- Alaska Department of Environmental Conservation PFAS Page
- City of Fairbanks Water Contamination Issue page