



## North Pole Refinery Frequently Asked Questions

May 2023

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**More information is available at DEC's website:**  
[dec.alaska.gov/spar/csp/sites/north-pole-refinery/](https://dec.alaska.gov/spar/csp/sites/north-pole-refinery/)

### Q. What is DEC doing about contaminated groundwater in the North Pole area?

**A.** The Alaska Department of Environmental Conservation (DEC) continues regulatory oversight of the former North Pole Refinery, in particular the groundwater plumes contaminated with sulfolane, petroleum and per- and polyfluoroalkyl substances (PFAS). Groundwater monitoring has been performed under DEC oversight every year to track changes in the sulfolane plume off the former refinery property and to monitor the sulfolane and petroleum plumes on the property. Results are reported annually and posted on DEC's website (see address above) on the Documents page. Under DEC regulations, a Five-Year review of monitoring results both on and off the former refinery property is expected in 2023. The Five-Year Review for onsite monitoring is available on the website. DEC is still reviewing this report. The report for offsite monitoring will be posted to the website when available.

**Off the former refinery property:** The **sulfolane** contamination extending off the property is expected to remain in the groundwater for many years. The sulfolane plume continues to gradually migrate northward, and concentrations in water wells change over time. The public in the affected area has been provided access to alternative drinking water solutions and recently has had the opportunity to connect to the North Pole municipal water system. To further protect North Pole residents and businesses, monitoring is to continue until the plume reaches a cleanup level to be set by the State of Alaska.

In 2018, DEC investigated **PFAS** in the North Pole area groundwater. PFAS were present in fire-fighting foams used historically on the former refinery and have been found in soil and groundwater on that property. In 2018, DEC collected groundwater samples from monitoring wells and water wells both within and outside of the area served by the city's municipal water system. Sample results showed a PFAS groundwater plume migrating off the former refinery property. (See map, page 7.)

**On the former refinery property: Sulfolane and petroleum contamination** are expected to remain in soil and groundwater on this property for many years. Groundwater monitoring through 2022 has shown no evidence of **petroleum** compounds migrating off the property above State cleanup levels, while sulfolane continues to migrate beyond the property line, below levels allowed under the 2017 settlement agreement (400 parts per billion [ppb]). Contingencies are in place to resume active groundwater treatment if petroleum is found to be migrating off the property above DEC cleanup levels or if **sulfolane** above 400 ppb migrates off the property. Groundwater monitoring through 2022 has shown no evidence of contamination migrating off the property above these levels.

**PFAS** contamination is also present in soil and groundwater on the former refinery property. A multi-year investigation to evaluate PFAS levels in soil, groundwater, and surface water on the former refinery property began in 2020 under DEC oversight. The investigation is continuing in 2023.

### **Q. How can I find out if PFAS or sulfolane are in the groundwater under my property, and if so, what the concentrations are?**

**A.** Maps of groundwater sulfolane concentrations are updated annually and posted on the website's Maps page. A recent sulfolane groundwater map may be found on page 6.

The extent of PFAS contamination in groundwater off the former refinery property has not been fully characterized. The current understanding of PFAS in groundwater, represented by the sum of two PFAS (perfluorooctanoic acid [PFOA] and perfluorooctane sulfonic acid [PFOS]), is shown on page 7. For further assistance, see contact information for DEC on page 5.

### **Q. Is the sulfolane plume still being monitored?**

**A.** DEC continues regulatory oversight of the former North Pole Refinery sulfolane, petroleum, and per- and polyfluoroalkyl substance (PFAS) plumes. Groundwater monitoring has been performed under DEC oversight every year to track changes in the sulfolane plume off the former refinery property and in the sulfolane and petroleum plumes on the former refinery property. Results are reported annually and posted on this web page and are available by contacting DEC at 907-451-2117 or james.fish@alaska.gov.

A Five-Year Review of monitoring results through 2022 is expected in 2023 and may result in changes to monitoring frequency and locations. The Five-Year Review for onsite monitoring is available on the website. DEC is still reviewing this report. The report for offsite monitoring will be posted to the website when available.

### **Q. I live in the sulfolane and PFAS plume and recently connected to city water. Why does DEC advise against using my well water for watering my yard or washing my car?**

**A.** Using your well for purposes such as watering your lawn or washing your car brings contaminated water to the surface and can allow the chemicals to run off your property and onto uncontaminated areas or nearby surface water.

To avoid spreading contamination to places where people or wildlife might be exposed, DEC is seeking community assistance in stopping the spread of contamination from untreated, contaminated groundwater use. See DEC's "Groundwater Advisory for North Pole Water Expansion" on the website.

### **Q. What is sulfolane and what do we know about its health effects?**

**A.** **Sulfolane** is an industrial solvent used primarily in natural gas and petroleum refining.

No studies have looked for health effects in people who have been exposed to sulfolane. Most of what we know comes from studies in which laboratory animals were exposed to high levels of sulfolane for short periods of time. High levels of sulfolane (much higher than what has been measured in the groundwater off the former refinery in North Pole) were shown to affect the central nervous system, immune system and the liver, kidneys, and spleen of test animals. Animal studies suggest that sulfolane at very high levels may cause developmental and reproductive problems in mice.

No long-term, or chronic, studies in animals to determine if sulfolane might cause cancer have been published. Research began in May 2015 by the National Toxicology Program (NTP) to evaluate the effects of long-term exposure to sulfolane. The NTP is an expert interagency program, housed within the U.S. Department of Health and Human Services, that evaluates the toxicity of chemicals of public health concern.

## Q. What are PFAS and what do we know about the health effects?

**A.** Per- and polyfluoroalkyl substances (PFAS) are a large and complex class of human-made compounds that have a wide-range of toxicities. They are found in some firefighting foams and many consumer products.

Scientists are still learning about the health effects of long term PFAS exposure. Although more research is needed, studies conducted in highly exposed communities have shown that certain PFAS may have effects on human health.

For more information on the toxicity of PFAS, see the following:

- Alaska Department of Health's PFAS information: [health.alaska.gov/dph/Epi/eph/Pages/PFAS.aspx](http://health.alaska.gov/dph/Epi/eph/Pages/PFAS.aspx)
- U.S. Environmental Protection Agency's Per- and Polyfluoroalkyl Substances (PFAS) website: [www.epa.gov/pfas](http://www.epa.gov/pfas)
- Agency for Toxic Substances & Disease Registry (ATSDR) website on Perfluoroalkyls: [www.cdc.gov/TSP/ToxProfiles/ToxProfiles.aspx?id=1117&tid=237](http://www.cdc.gov/TSP/ToxProfiles/ToxProfiles.aspx?id=1117&tid=237)

## Q. How is the public protected from potential exposure to contaminated groundwater?

**A.** The public in the affected area has been provided access to alternative drinking water solutions and recently has had the opportunity to connect to the North Pole municipal water system. Starting in 2009, alternative, sulfolane-free water supplies were provided to all properties with any detection of sulfolane in their well water. In addition to providing protection from sulfolane, the alternative water solutions were shown in 2018 sampling to also protect residents from per- and polyfluoroalkyl substances (PFAS) in their well water. In February 2017, the State of Alaska, FHRA, and the City of North Pole reached a settlement agreement to expand the City's piped water system to all improved properties located within the sulfolane plume or in its anticipated migration path. By the end of 2020, all eligible property owners were offered connection to the service and able to phase out the use of contaminated groundwater wells. Most property owners were eligible to connect at no cost, depending upon the land's location and improvement status. The expanded system provides permanent protection from contamination in drinking water.

## Q. Should I use my well water for fruit or vegetable gardening?

**A.** Within the sulfolane plume, the Alaska Department of Health (DOH), (formerly the "Alaska Dept. of Health and Social Services," or "DHSS") recommends using a clean, alternative water source for growing fruits and vegetables. In addition, DEC issued a Contaminated Groundwater Advisory to all property owners within the North Pole piped water expansion area where many private water wells contain sulfolane and/or PFAS. In its Groundwater Advisory, DEC advises against using untreated, contaminated well water to reduce spreading pollution and eliminate human exposure.

Plants irrigated with contaminated water or grown in contaminated soil have been shown to take up some PFAS from the surrounding environment. The amount of PFAS taken up by fruits and vegetables will vary based on the severity of the PFAS contamination, the type(s) of PFAS in the water and/or soil, and the type of produce grown. Ultimately, DHSS has indicated exposure to PFAS through produce is not likely to be

substantial compared to other exposure routes, like drinking contaminated water. Furthermore, the health benefits of eating fresh produce generally outweigh the risks associated with PFAS exposure from plants.

Two studies have been conducted to look at the uptake of contaminants in fruits and vegetables grown in the North Pole area:

- **Uptake of sulfolane in Locally Grown Produce** – In 2010, a study conducted by the Technical Project Team investigating sulfolane contamination in North Pole tested sulfolane content in a variety of edible plants from seven local gardens. The study gave preliminary evidence that edible plants can take up sulfolane with water. Of the few samples with sulfolane detections, the results suggested that sulfolane tends to concentrate in the leafy parts of these plants. Sulfolane levels found in the plants were low and not likely to cause adverse health effects. The project was very limited in scope, however, so DHSS recommended that residents use sulfolane-free water for growing fruits and vegetables until more information is available. Very little research has been done on how much sulfolane can be taken up by plants.

### Q. Is it safe to eat fish caught in Kimberly Lake?

**A.** Three rainbow trout from Kimberly Lake, north of the former refinery, were collected and submitted to a commercial laboratory for PFAS analysis in 2018. All three fish were found to contain elevated levels of two PFAS: perfluorononanoic acid (PFNA) and perfluorooctane sulfonic acid (PFOS). Kimberly Lake was closed to fishing in April 2019 by the Alaska Department of Fish & Game (ADF&G) because of PFAS levels found in fish. The ADF&G released an emergency order closing Kimberly Lake to sport fishing at that time. As of May 1, 2023, ADF&G has restricted Kimberly Lake to catch-and-release fishing only for all fish species.

Few other gravel ponds in the North Pole area have been investigated for the presence of PFAS in surface water or fish. Other surface water bodies on Eielson Air Force Base have been sampled and found to contain PFAS, and some fishing restrictions have been implemented.

In 2013, Badger Slough and seven gravel ponds, including Kimberly Lake, were sampled for sulfolane. Sulfolane was not detected in any of the surface water samples. Sulfolane is known to degrade readily in environments with an adequate supply of oxygen, like gravel ponds.

### Q. What is the status of the City of North Pole's expanded public water system?

**A.** The City of North Pole expanded their municipal water system to provide permanent protection from contamination in drinking water. By the end of 2020, all eligible property owners were offered connection to the service and able to phase out the use of contaminated groundwater wells. Most property owners were eligible to connect at no cost, depending upon the land's location and improvement status. DEC considers a public water system to be the best way to provide clean drinking water to those affected by contamination in groundwater, now and into the future, and encourages residents within the city's municipal provision area to connect to the system.

### Q. How can I find out if the home or apartment I am renting is connected to city water?

**A.** The latest information available from the City about the piped water expansion project, including maps of the expansion area, may be found by contacting the City of North Pole Utilities, Danny Wallace, at 907-488-8593. Maps of the project are available on their website: [www.northpolealaska.com/utilities](http://www.northpolealaska.com/utilities)

### Q. I have recently connected to the City of North Pole's expanded piped water system. What am I advised to do with my water well?

**A.** DEC advises against using untreated, contaminated well water after a property has been connected to the water utility service.

To avoid spreading contamination to places where people or wildlife might be exposed, DEC is seeking community assistance in stopping the spread of contamination from untreated, contaminated groundwater use.

For those wishing to use well water, DEC recommends treatment to remove both sulfolane and PFAS. DEC is available to provide guidance on this question — see contact information, this page.

**Q. I live outside the area served by the City of North Pole’s piped water system. What should I do if I am concerned about contamination in my water well?**

**A.** Sulfolane groundwater monitoring is performed under DEC oversight to track changes in the sulfolane plume. Updated maps of groundwater sulfolane concentrations are posted on the project web page. A recent sulfolane groundwater map may be found on page 6.

The extent of PFAS contamination in groundwater off the former refinery property has not been fully characterized. The current understanding (2018) of PFAS in groundwater is shown on the 2018 offsite PFOS + PFOA plume map, page 7.

If you are concerned you may have sulfolane or PFAS in your well water, DEC has prepared fact sheets to provide step-by-step advice for testing your water. DEC recommends you contact Zuzana Culakova, Chemist, DEC Contaminated Sites Program at 907-465-5346, or the Contaminated Sites Program at (907-451-2143) if you have any questions about testing. Fact sheets are available on how to test your water for sulfolane and for PFAS.

**Q. How can the public stay informed?**

**A.** DEC’s website on contamination from the former North Pole Refinery, now Marathon Terminal, remains the best way to learn about the extensive investigation, monitoring, and cleanup efforts at this site. The City of North Pole now provides a permanent source of sulfolane-free water to residents, land owners and businesses in the areas where groundwater has been contaminated by sulfolane. If you have questions, please see contact information listed below.

**[dec.alaska.gov/spar/csp/sites/north-pole-refinery/](http://dec.alaska.gov/spar/csp/sites/north-pole-refinery/)**

**DEC Contaminated Sites Program  
(Provides State regulatory oversight on contaminated sites)**

DEC, Division of Spill Prevention and Response, Contaminated Sites Program  
Jim Fish  
Environmental Program Specialist and Project Manager  
907-451-2117

**Alaska Department of Health  
(Provides State health-related recommendations and information)**

DOH, Division of Public Health  
Andrew Cyr  
Public Health Scientist/Toxicologist  
907-269-6819

**DEC Public Water Systems  
(Provides State regulatory oversight of public water systems)**

DEC, Division of Environmental Health, Drinking Water Program  
Cindy Christian  
Program Manager, Field Operations  
907-451-2138

**City of North Pole  
(Owner of the public water system to serve the impacted area)**

City of North Pole, Utilities  
Danny Wallace  
Director of City Services  
125 Snowman Lane, North Pole, AK 99705  
907-488-8593

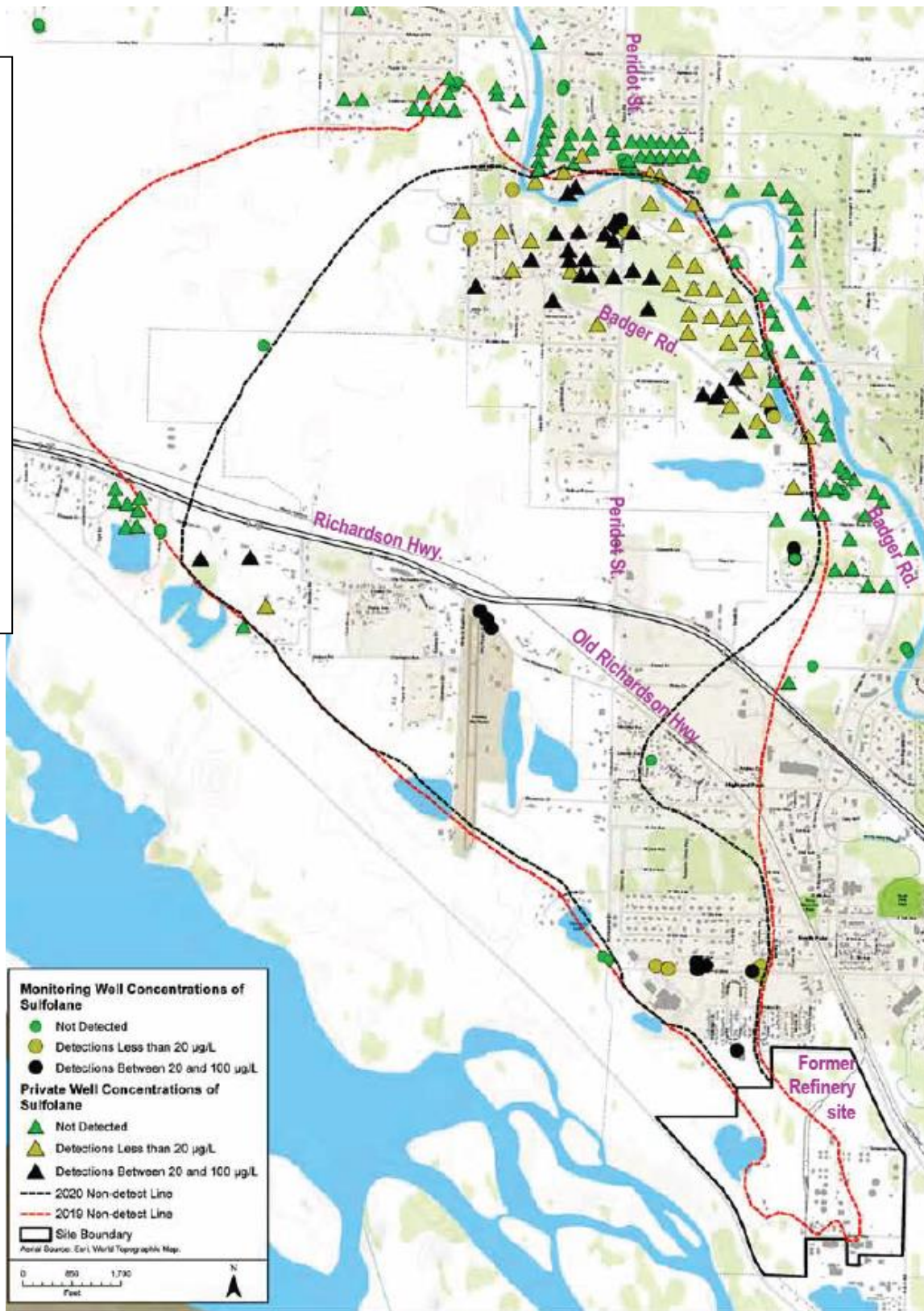


**Map showing the Approximate extent of Sulfolane Impacts in 2019 and 2020**

The red line on this map shows the approximate boundary of the sulfolane plume based on results of groundwater sampling done in 2019 and the black line indicates the approximate boundary in 2020.

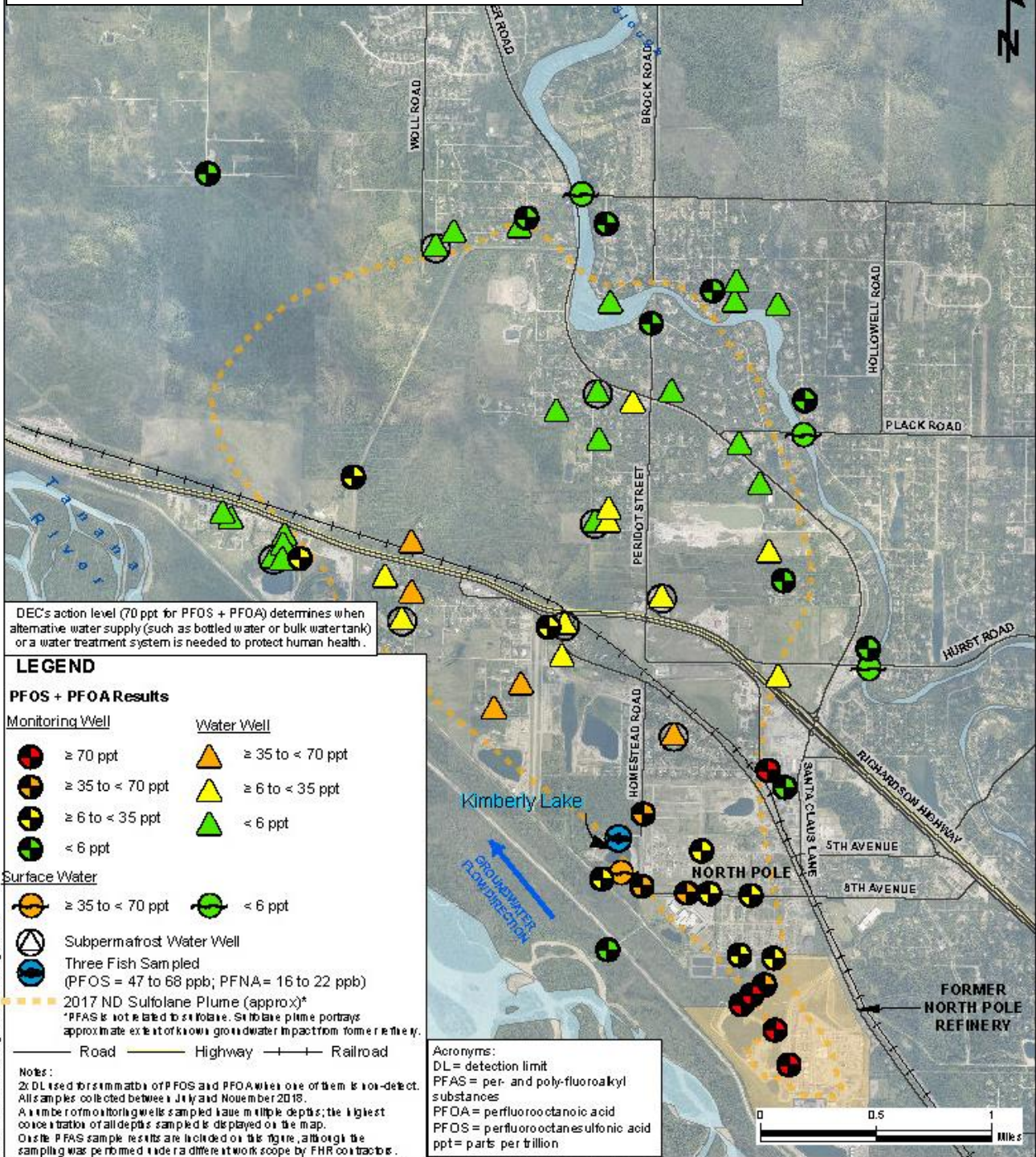
Additional maps showing sampling results and indication of the plume boundary over time are available from the Maps page at the Project website:

[dec.alaska.gov/spar/csp/sites/north-pole-refinery/](http://dec.alaska.gov/spar/csp/sites/north-pole-refinery/)





Map showing the Approximate extent of PFOS and PFOA Impacts, 2018



Complete PFOS+PFOA Water Sample Results (Untreated)  
2018 North Pole PFAS Water Sampling

Figure 9