Alaska Department of Environmental Conservation Action Plan for Per- and Polyfluoroalkyl Substances (PFAS)

December 2018

Executive Summary

The Alaska Department of Environmental Conservation (DEC) has prepared this per- and polyfluoroalkyl substances (PFAS) action plan to provide for a coordinated approach among the various programs addressing the challenges with regulating this class of emerging contaminants. The ubiquitous nature of PFAS and their use over the past 70 years in a wide variety of products has led to their presence in environmental media and waste streams that are subject to regulatory oversight by DEC programs. This class of compounds has been found in Alaska in soil, groundwater, surface water, and drinking water, and also presents issues for solid waste management and air quality as PFAS are found in many commercial and consumer products typically disposed of at regulated solid waste facilities or potentially emitted into the environment through incineration.

Currently, the greatest known risk to human health from PFAS is from drinking water that has become contaminated through the use of aqueous film forming foams (AFFF) used in firefighting and fire training activities. Other sources of PFAS contamination are present in the environment and will require additional evaluation before it is known what risk they may pose, if any. The Contaminated Sites and Drinking Water programs have been involved in addressing the risk to drinking water sources since approximately 2015 and are available to provide technical assistance to other DEC programs as needed.

Internal and external coordination and providing timely information to the public are key components of this action plan and will form the basis of the State of Alaska's efforts to address PFAS within the State.

Introduction: What are PFAS?

PFAS are an extensive family of more than 3,000 human-made substances that have commercially useful properties: they resist heat, oil, stains, grease, and water. PFAS have been used since the 1950s in a wide range of products, including firefighting materials, non-stick cookware, stain resistant treatments for furniture and carpets, waterproofing for clothes and mattresses, food packaging, and personal care products. When PFAS are released to the environment (by spills or through intended uses, such as fighting fires with PFAS-containing foams), they can enter groundwater and surface water that may be used as drinking water sources. These compounds are resistant to typical environmental degradation processes and are therefore extremely persistent in the environment. Several perfluoroalkyl acids (PFAAs), notably perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and perfluorohexane sulfonic acid (PFHxS), are listed or are being considered for listing as persistent organic pollutants under the Stockholm Convention.

Across the United States a number of PFAS compounds including the most prevalent, PFOS and PFOA, are being detected in public and private water systems, most commonly as the result of releases of aqueous film-forming foam (AFFF) at military bases, airports, fire-training facilities, refineries and at other sites where AFFF has been used in training or fire-fighting activities. Although scientific information about the toxicity of these compounds is limited, a growing body of evidence indicates that some PFAS pose a risk to humans and the environment. However, extensive scientific research into the health effects takes time, creating a gap between adequate science and the basis for establishing informed and expedited decisions by regulators and policy makers. Though not yet confirmed in Alaska, other states and countries have found PFAS in wastewater, landfill leachate and air emissions, industrial stack emissions, biosolids, and other sources.

The specific formulations of AFFF vary by manufacturer and have changed over the years since it was first produced in the early 1970s. While PFOS began to be phased out in the early 2000's and has not been manufactured in the U.S. since 2015, it was replaced with other PFAS compounds of unknown or suspected toxicity. PFOS-containing foam is still produced in other countries and can be imported into the U.S. In addition, some AFFF formulations contain PFAS that are precursors[1] to fully fluorinated compounds, such as PFOS and PFOA. Recent AFFF products incorporate a higher percentage of shorter chain[2] PFAS compounds that are expected to have lower toxicity and are often manufactured in a way that produces fewer precursors (but may contain trace amounts of PFOA and precursors to it), however many recent formulations contain PFHxS, which was included in the August 2018 cleanup level update from SPAR. Efforts are currently underway to produce and test fluorine-free AFFF in coordination with the Department of Defense, Federal Aviation Administration and manufacturers in the private sector.

Risks to Human Health and the Environment

Studies have found small quantities of PFOS and PFOA in blood samples from the general human population and in wildlife nationwide, indicating that exposure to PFAS is widespread. Scientists are not sure about the health effects of human exposure to PFAS, although the Centers for Disease Control is treating it as a public health concern. EPA has not established national drinking water standards for any PFAS, although it set health advisory levels for PFOS and PFOA in drinking water in 2016. Studies in humans and animals are inconsistent and inconclusive but suggest that certain PFAS may have a variety of adverse effects. Some studies in humans have shown that PFAS at high levels may increase cholesterol levels; decrease how well the body responds to vaccines; increase the risk of thyroid disease; decrease fertility in women; increase the risk of serious conditions like high blood pressure and pre-eclampsia in pregnant women; and lower infant birth weights.

Studies do not clearly show whether PFAS cause cancer in people. Studies in animals have shown PFOA and PFOS can cause cancer in the liver, testes, pancreas, and thyroid. However, some scientists believe that humans may not develop the same cancers as animals. Further studies are needed to better understand the human health effects. For fish and wildlife in Alaska, there is concern that wastewater discharges in streams and rivers, contaminated groundwater discharge to surface water, or uses of AFFF in the marine environment may impact Alaska's aquatic resources and the species who depend upon them for food, including people.

Regulatory Overview

The regulatory landscape regarding PFAS has been evolving for a number of years and is expected to continue evolving as new studies are conducted. Currently, the only regulatory standards in place in Alaska for PFAS are soil and groundwater cleanup levels[3]. Drinking water maximum contaminant levels (MCLs), water quality standards, wastewater discharge limits, and air emission standards have yet to be developed.

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[1] A precursor is a substance that, in animals or in the environment, may degrade to PFOS, PFOA, or other fully fluorinated perfluoroalkyl acids (PFAAs).

[2] Shorter chain PFAS compounds i.e., those with fewer carbon atoms, are thought to be less toxic as they remain in the body for a shorter period of time and are less likely to bio-accumulate.

[3] These standards are found in 18 AAC 75.341-345.

In 2009, EPA published Provisional Health Advisory Levels of 0.4 µg/L (400 parts per trillion or ppt) for PFOA and 200 ppt for PFOS and recommended people not drink water containing higher levels of these compounds.

In 2012, EPA published the third Unregulated Contaminant Monitoring Rule (UCMR3) under the Safe Drinking Water Act (SDWA). The rule required a subset of public drinking water systems to monitor for thirty unregulated contaminants, including six PFAS [PFOS, PFOA, perfluorohexane sulfonate (PFHxS), perfluorononanoic acid (PFNA), perfluorohepatanoic acid (PFHpA) and perfluorobutane sulfonate (PFBS)] between 2013 and 2015. The UCMR3 monitoring effort only included reference concentrations for PFOS and PFOA and found that almost one percent of public water systems contained PFOS above the reference concentration of 70 parts per trillion[4].

In 2016, EPA published lifetime health advisories (LHAs) under the SDWA for PFOS and PFOA. These LHAs were created to assist state and local officials, and drinking water system operators, in evaluating risks from these contaminants in drinking water so they can take appropriate action to protect residents. EPA recommended people not drink water containing a total concentration of PFOS+PFOA above 70 ppt. The LHA level incorporates a default relative source contribution (RSC) factor that assumes 20% of the exposure to PFOS and PFOA is from drinking contaminated water and the remaining 80% is from exposure from other sources. The RSC is used to capture other exposure beyond the consumption of drinking water, such as consuming contaminated food, contact with consumer products, and occupational exposure.

In 2016, DEC's Contaminated Sites Program utilized EPA's published LHA reference dose (RfD) to calculate and adopt risk-based soil and groundwater cleanup levels for PFOS and PFOA at contaminated sites regulated under 18 AAC 75. Soil cleanup levels were established for three climate zones and for the migration to groundwater pathway, however, for sites where groundwater or surface water is used for human consumption the department had referenced the EPA LHA level of 70 ppt for these two compounds per 18 AAC 75.345(c) and used it as a threshold for requiring a responsible party to supply an alternative drinking water source under 18 AAC 75.345(d).

In August 2018, due to the detection of additional PFAS in groundwater used for drinking, DEC's Contaminated Sites and Drinking Water programs developed a Technical Memorandum establishing PFAS action levels for drinking water. The action levels are 70 ppt for the sum of five of the UCMR3 compounds - PFOS, PFOA, PFHxS, PFNA, PFHpA and a separate action level of 2,000 ppt for PFBS. These levels were proposed for adoption into regulation as cleanup levels in October 2018.

PFAS are not currently considered hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, however EPA has begun the necessary steps to propose designating PFOA and PFOS as "hazardous substances" through one of the available statutory mechanisms, including potentially CERCLA. Regardless of their status under CERCLA, numerous federal agencies including the U.S. Air Force, Army, and Navy acknowledge that PFAS are contaminants of potential concern at many of their facilities and have begun sampling for PFAS at sites where they are suspected of being present.

[4] EPA, 2017, *The Third Unregulated Contaminant Monitoring Rule (UCMR 3): Data Summary, January 2017*

In Alaska, PFAS are considered hazardous substances as defined in Alaska Statute (see AS 46.03.826(5) and AS 46.09.900(4)).

Current and Proposed DEC Actions

The divisions of Spill Prevention and Response (SPAR) and Environmental Health (EH) are taking the lead on this action plan due to the priority to protect drinking water and the fact that PFAS are regulated under 18 AAC 75, Oil and Other Hazardous Substances Pollution Control. The Contaminated Sites Program (CSP) within SPAR has promulgated soil and groundwater cleanup levels and has been coordinating with the Drinking Water Program (DWP) within EH to identify private and public drinking water wells that may be impacted by PFAS and ensure any necessary treatment or alternative water supplies are provided.

CSP maintains a PFAS webpage at: http://dec.alaska.gov/spar/csp/pfas-contaminants/

The following sections outline specific actions currently being taken or planned by DEC programs to address PFAS within their programs' authority.

Identify Sites Where PFAS Discharge, Release, or Disposal has Occurred

CSP is conducting a comprehensive evaluation of contaminated sites across the state where PFAS contamination is or may be present. This includes reviewing existing active and closed sites where the use of AFFF is suspected or known to have occurred including military bases, fire training areas, airports, refineries, fuel storage and pipeline infrastructure, and sites where AFFF was used to respond to a fire. Sites located in areas where groundwater is used as a drinking water source are being prioritized for sampling and additional follow-up as needed.

CSP is also collaborating with the Alaska Department of Transportation and Public Facilities (DOT&PF) and others to compile a list of airports where Aircraft Rescue and Fire Fighting (ARFF) response capabilities have been required by the Federal Aviation Administration (FAA). Such FAA certified airports must meet minimum petroleum firefighting training requirements and equipment testing to demonstrate proper application of AFFF. DEC and DOT&PF are developing plans to conduct water sampling at airports where past AFFF use may have resulted in PFAS contamination that could impact drinking water. CSP intends to continue its effort to identify source areas and respond as appropriate.

Evaluate and Respond to Drinking Water Impacts

The CSP and DWP continue to collaborate on efforts to identify and respond to PFAS impacted drinking water. The DWP provides regulatory oversight for public water systems[5], while CSP in coordination with responsible parties identifies public and private wells in the vicinity of PFAS contaminated sites / source areas and works with responsible parties to have at-risk wells sampled and provide alternative water, when necessary.

When public water systems (PWS) are potentially at risk from PFAS releases, the DWP is:

[5] Regulated public water systems include Community Water Systems that serve 1) 15 or more residences on a year-round basis or 2) 25 or more individuals on a year-round basis; Non-Transient Non Community Water Systems that regularly serve the same 25 or more individuals for at least 6 months per year and Transient Non Community Water Systems that serve 25 or more individuals each day for at least 60 days per year.

- Providing technical assistance to PWS operators on the detection and treatment of PFAS.
- Providing technical assistance and conducting engineering plan review for public water systems that decide to install treatment.
- Requiring alternative drinking water be provided where specific PFAS compounds are detected above the DEC cleanup level or action level.

Future planned actions of the DWP include:

- Working with PWS throughout the state to perform targeted sampling and analysis of source water and treated drinking water to determine the presence of PFAS compounds in areas where there are known or suspected sources of PFAS in the source water protection area. These sources include but are not limited AFFF used for firefighting and fire training activities, leachate from solid waste landfills where PFAS containing materials were disposed, and wastewater discharges from treatment plants or lagoons where PFAS containing wastewater was processed. Testing will be conducted by the DEC Environmental Health Laboratory.
- Seeking funding to conduct surveillance sampling of all community PWS for PFAS compounds.

When PWS or private wells are potentially at risk from PFAS releases, the Contaminated Sites Program is:

- Requiring responsible parties to identify and sample drinking water wells in areas where PFAS are suspected of being present in groundwater that is used as drinking water.
- Requiring responsible parties to delineate the extent of PFAS contamination in groundwater.
- Requiring responsible parties to provide alternative drinking water to properties where PFAS exceeds the action level[6].
- Conducting collaborative outreach efforts with responsible parties, the Department of Health and Social Services, local governments, and other stakeholders as needed.
- Conducting sampling and response activities to ensure protectiveness when no responsible party is willing or able to respond.

Evaluate Wastewater Discharges and Treated Biosolids as Sources of PFAS Contamination

The use of PFAS-contaminated water sources can lead to PFAS-contaminated waste streams. Conventional wastewater treatment systems have limited ability to treat PFAS-contaminated waste streams that can then become new sources of contamination when partially-treated wastewater is discharged to the environment. DEC-Water will prioritize actions based on proximity to known or suspected PFAS sources and whether discharge locations are near drinking water sources or prioritized environmental receptors, such as anadromous fish, endangered or threatened waterfowl, and species of ecological, economical, and subsistence value. DEC-Water will coordinate with public utilities to sample prioritized waste streams, including waste water effluent, landfill leachate, and treated biosolids. This information may be used to identify and characterize sources of PFAS and important exposure pathways. If PFAS are detected in these waste streams, a site-specific determination will be made to conduct additional sampling of appropriate environmental media at waste discharge locations.

[6] The current action level for PFAS is based on the sum of five PFAS compounds including PFOS, PFOA, PFHxS, PFNA, and PFHpA which may not exceed 70 parts per trillion or PFBS which may not exceed 2,000 ppt.

Treatment of waste streams and sources of PFAS will also be considered on a case-by-case basis. Specific actions include:

- Coordinate with wastewater treatment facility operators on technical assistance for detection and treatment of PFAS in effluent and biosolids.
- Work with select wastewater treatment facilities to do targeting sampling and analysis of potential sources of PFAS entering wastewater infrastructure. Quality Assurance/Quality Control practices and testing will occur in conjunction with other DEC-Water program requirements, the Environmental Health Laboratory, and SPAR.
- Modify permits or authorizations, as necessary, to incorporate PFAS monitoring and/or receiving water limitations.

Evaluate Lakes, Streams and Rivers for PFAS

Surface waters including rivers, sloughs, streams, lakes and ponds, and marine waters have the potential to be impacted by the release of PFAS from known or yet to be identified contaminated sites as well as from contemporary releases, discharges or disposal activities including stormwater and wastewater discharges. Surface water bodies will be prioritized for potential sample collection based on proximity to known or suspected PFAS sources, the use of surface water for drinking water, and presence of prioritized environmental receptors including anadromous fish, endangered or threatened waterfowl, and species of ecological, economical, and subsistence value. Surface water that is in proximity to existing contaminated sites will be sampled by responsible parties in coordination with the CSP. DEC Water will work with CSP and DHSS to establish communication protocols and individualized response strategies to address the extent of contamination and potential risk to public health and the environment. Specific actions to be conducted by DEC-Water include:

- Continue to monitor efforts by other states to develop and implement surface water criteria that pertain to aquatic life and human health.
    - Review and share information with EH on PFAS toxicological studies on aquatic life to determine if species of concern in Alaska are affected and have the potential to create an unacceptable risk to individuals who consume aquatic life.
    - Monitor efforts by EPA to establish reference dose, bioaccumulation rates, and other factors used for assessment and criteria derivation.
- Collaboratively work with other agency staff to develop standards on health impacts for the affected population(s)
    - Determine which factors (e.g., risk assessment, implementation) DEC needs to be cognizant of when considering adoption of surface water quality criteria.
    - In conjunction with EH, SPAR, other DEC-Water program requirements, establish formal sampling protocols and Quality Assurance/Quality Control practices.
    - Evaluate applying the existing impaired waters listing policies to PFAS or develop a pollutant-specific approach.
        - Fish Tissue may be a reliable screening indicator as very low or even non-detectable levels of PFAS in water may bioaccumulate to a level of concern in fish. (New Jersey 2017).
        - Adoption of a state water quality criterion based on fish tissue has been promoted by EPA (i.e., methylmercury) but has implementation issues.

    - Monitor EPA and other states to determine the practicality of TMDLs or other applicable regulatory actions in cases where surface water is impacted.
    - Work with SPAR programs to determine how PFAS action levels will be applied when conducting water quality assessments for sediment in surface waters.
- Work with DHSS and the State Veterinarian to establish acceptable Fish Consumption Advisory levels

Evaluate Solid Waste Landfills as Sources of PFAS Contamination

Due to the presence of PFAS in many industrial, commercial and consumer products, solid waste landfills may be a significant source of PFAS contamination to the environment if landfill leachate is not collected and treated or disposed of properly. The Solid Waste Program in the Division of Environmental Health will:

- Continue to provide guidance to permitted landfills regarding obligations relating to accepting PFAS contaminated soil for disposal. Currently, any landfill that accepts contaminated soil or AFFF for disposal is being advised that PFAS compounds will be added to the landfill's monitoring program.
- Amend regulations at 18 AAC 60 to more clearly define the existing authority to add PFAS compounds to a landfill's detection monitoring program.

Protect Air Quality

There are currently no industrial or other processes in Alaska that are known to result in the emission of PFAS into the air. A soil remediation unit operated by Organic Incineration Technology near North Pole is in the process of evaluating the effectives of thermal remediation of PFAS contaminated soil, however the evaluation of whether or not this process mobilizes PFAS into the atmosphere from the facility emissions is not yet complete.

The Division of Air Quality (AQ) will:

- Continue to research soil remediation techniques using portable soil remediation units (SRUs) to ensure that PFAS thermal destruction temperatures can be accommodated in SRUs for efficient, localized remediation. Further research will require the Division to identify a funding source for non-permit related time and material.

Provide Data for Informed Decision Making

Currently samples of drinking water and environmental media must be sent to out-of-state laboratories for analysis with results typically received 2-4 weeks after the samples are received. In an effort to expedite sample analysis and provide Alaskans with an in-state option, the Environmental Health Laboratory (EHL) will:

- Seek capital funding to purchase equipment and hire staff to analyze PFAS compounds in water, soil, fish, and other media. Major equipment needs include a Liquid Chromatography Tandem Mass Spectrometry (LS-MS-MS) system to replace aging equipment at the EHL, as age of equipment has been shown to directly impact the sensitivity required to reach the 10 ppt detection limit.
- Adopt or modify methods appropriate for different media such as EPA Method 537 and EPA SW-846 Method 8327 (currently draft).

Interagency Coordination

Due to the various sources of PFAS in the environment interagency coordination is critical to share information and resources and respond to public concerns in a timely and efficient manner. In situations where people are known or suspected of being exposed to PFAS in drinking water, DEC works with DHSS public health specialists on public outreach and responding to community concerns regarding potential health implications.

SPAR has been coordinating with DOT&PF as noted above to evaluate the presence of PFAS in groundwater and drinking water sources near airports where AFFF has been used. DOT&PF have convened a multi-agency working group to coordinate on PFAS response actions statewide and begun the process of contracting with a qualified firm for sampling and public outreach support.

The State will continue to coordinate with national organizations and agencies researching issues surrounding PFAS contamination, including source identification, release prevention and response, laboratory analytical methods, toxicity, development of standards, contaminant fate and transport, sampling guidance and protocols, and PFAS remediation or treatment technologies.

SPAR and EH will continue to engage with the EPA and other federal agencies to support PFAS research and the development of federal guidelines.

In coordination with DOT&PF, SPAR and EH will continue to track national issues including requirements from the FAA and DoD, for example, that mandate the use of PFAS-containing AFFF and the discharge of AFFF through training and equipment testing activities.

As agencies submit information, DEC will continue to add their statements to the additional material section found at the end of this document.

Coordination with Emergency Responders

DEC has been engaged with emergency response agencies, specifically fire departments, on PFAS since approximately 2016. DEC's current efforts have been focused on encouraging replacement of PFOS containing AFFF in fire-suppression inventories with newer, less toxic formulations, identifying AFFF release locations, and informing fire-fighters of the exposure risks to contaminants in AFFF. The use of AFFF to protect life and property is expected to continue as it is the most effective means of extinguishing certain types of petroleum fires. The Prevention, Preparedness, and Response program will publish guidelines on the use of AFFF and other Class B firefighting foams that contain PFAS. Guidelines will include recommendations to dispose of older stocks of foam and replace with newer formulations, containment of foams that are discharged during equipment testing or training activities, and reporting to the department of any discharge of AFFF containing PFOS or PFOA to the environment.

Communication with the Public

DEC programs will maintain updated information on webpages and produce and distribute fact sheets and other information to:

- Convey to the public what DEC is doing to address this issue
- Provide clear and consistent messaging about our efforts
- Provide a means for the public to stay informed of PFAS issues in their area

In addition to providing information, DEC occasionally initiates meetings with representatives from

DEC programs, state and local officials, the regulated community, and other stakeholders. The purpose of these meetings is share information on evolving PFAS issues, convey important regulatory information, and respond to questions from the regulated community.

DEC will use press releases as needed to communicate with the general public and will respond to media inquiries in a timely manner.

Next Steps

As PFAS is anticipated to be a long term, evolving issue at both the state and national level, DEC programs will stay up to date with current health and regulatory information as it pertains to individual programs. DEC will continue to provide timely information to the public. This Action Plan, as well as guidance, technical and regulatory information maintained by DEC programs will be updated as new information becomes available.

For additional information or questions on this Action Plan please contact the following:

Contaminated Sites Program - Bill O'Connell at bill.connell@alaska.gov or 907-269-3057

Drinking Water Program – Cindy Christian at cindy.christian@alaska.gov or 907-451-2138

Water Quality Program – Brock Tabor at brock.tabor@alaska.gov or 907-465-5185

Solid Waste Program – Lori Aldrich at lori.aldrich@alaska.gov or 907-269-7622

Additional Materials

From the Alaska Department of Transportation and Public Facilities

The Alaska Department of Transportation and Public Facilities (DOT&PF) is conducting a comprehensive evaluation of Per- and Polyfluoroalkyl Substances (PFAS) contamination at state owned properties or sites that the Department is responsible for. Evaluation includes all past and present Part 139 airports and formerly known Department of Defense (DoD) sites. DEC is determining priority in sampling sites and conducting initial water sampling to establish whether or not PFAS is present above DEC action levels.

Once PFAS presence is established, DOT&PF will mobilize an independent environmental firm to assist with departmental response. This will include field sampling and analysis of ground water, surface water, drinking water, and soils; implementation of a temporary water solution for impacted property owners; public and stakeholder engagement, outreach, and support; engineering and design for remediation solutions, as well as alternative permanent water supply concepts; site characterization and plume identification.

To date, DOT&PF has responded in two communities where PFAS contamination has been identified. DOT&PF recognizes the importance of immediate corrective action as the health and safety of the public is of upmost importance. In both cases, an alternate source of drinking water was immediately supplied to impacted residents. In addition to contracting with an independent environmental firm to support DOT&PF's response across Alaska, the Department has created a position to manage the response efforts related to PFAS contamination. This includes but is not limited to interdepartmental coordination and travel logistics, public and stakeholder outreach, and contract management.

Additionally, DOT&PF has begun inventorying their Aqueous Film Forming Foam (AFFF) throughout the state in order to dispose of AFFF manufactured prior to 2015. The Department has been exploring alternate testing mechanisms that will allow airports to meet minimum petroleum firefighting training requirements mandated by the Federal Aviation Administration (FAA). DOT&PF is staying abreast of regulations requiring the FAA to produce a fluorine-free AFFF option for airports. DOT&PF will continue to work with the DEC, Division of Risk Management, Department of Health and Social Services and the environmental consulting firm to ensure response efforts are met fully.