# ACTION LEVELS FOR EMERGING CONSTITUENTS INCLUDING PFAS IN WATER

## PURPOSE

This document was prepared by the City of Nampa to provide clear guidance on responding to emerging constituent regulations regarding Per- and Polyfluoroalkyl Substances (PFAS) in the Nampa drinking water and wastewater treatment systems. This document will provide overview of the background information, the potential human health impacts, the most likely contributors of PFAS and how the City of Nampa is preparing for pending EPA rulemaking on emerging contaminants of interest.

## BASIS FOR GUIDANCE

### What is PFAS?

PFAS and its closely associated compounds are a wide-ranging class of man-made chemicals that have been utilized regularly in industrial sectors since the 1940s. These chemicals have earned the nickname "forever chemicals" due to their bioaccumulation abilities which are attributed to strong carbon-fluorine bonds. They are prominently used in industrial and consumer products for their heat, water, grease, oil and stain resistance capabilities. PFAS uses range from household products including adhesives, cosmetics, paints, food packaging, water repellent clothing and nonstick cookware, to industrial products such as fire-fighting foams and pesticides. PFAS are released from certain types of manufacturing discharges and are found regularly in commercial and consumer settings. Due to the desirable chemical properties for consumer goods, PFAS products can be found in almost every U.S. home and business. A compilation of these sources direct excess of these chemicals into the sewer system where it can pass-through the conventional treatment process and into the receiving waters or accumulate into the biosolids which are then disposed of in landfills. The prevalence of PFAS chemicals is vast and are found in the blood of people, animals, and fish, as well as in water, air and soil across the world.

### Potential Human Health Impacts

Select PFAS compounds such as perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) have been studied extensively, providing enough evidence of exposure to determine acute and chronic adverse human health outcomes. The majority of research on potential human health risks of PFAS is associated with ingestion of PFAS products rather than inhalation or dermal exposures.

PFOA and PFOS, two of the most widely studied PFAS, have been detected in the blood serum of up to 99% of samples collected between 1999 and 2012 in a representative U.S. population. Studies performed on laboratory test species indicate PFAS can cause reproductive, developmental, liver, kidney and immunological toxicity with more limited data relating to infant birth weights, cancers and thyroid hormone disruption. These studies have contributed to the creation of maximum and continuous criteria for protection of aquatic life for PFOA and PFOS.

In the Federal Register, Notices to the Public (F.R. Vol 87, No. 85 May 3, 2022), a Draft Recommended Freshwater Aquatic Life Water Quality Criteria for PFOA and PFOS was presented for comment. These draft-recommended criteria are based on observed effects of PFOA and PFOS to the survival, growth, and reproduction of aquatic organisms and based on the available ecotoxicity data, which determined that aquatic plants are generally less sensitive to PFOA and PFOS than fish and other aquatic life. These draft criteria reflect the maximum concentrations, frequency, and duration specifications that would support aquatic life from acute and chronic effects associated with PFOA and PFOS.

When reviewing this table, it is important to denote concentration units of parts per million, or ppm, as a common scientific unit of measurement that counts the number of units for one substance per one million units of another. This is commonly used in water measurements to express one milligram of substance per liter of water (mg/L) where 1 mg/L is equivalent to 1 ppm. This may be further visualized as four drops of food coloring into a 55-gallon barrel or one inch in 16 miles.

TABLE 1—DRAFT RECOMMENDED FRESHWATER AQUATIC LIFE WATER QUALITY CRITERIA FOR PFOA AND PFOS

| Criteria component | Acute water column (CMC) [1] | Chronic water column (CCC) [2] | Invertebrate whole-body (mg/kg ww[3]) | Fish whole-body (mg/kg ww) | Fish muscle (mg/kg ww) |
|---|---|---|---|---|---|
| PFOA Magnitude | 49 mg/L | 0.094 mg/L | 1.11 | 6.10 | 0.125 |
| PFOS Magnitude | 3.0 mg/L | 0.0084 mg/L | 0.937 | 6.75 | 2.91 |
| Duration | 1-hour average | 4-day average | Instantaneous.[4] | | |
| Frequency | Not to be exceeded more than once in three years, on average. | Not to be exceeded more than once in three years, on average. | Not to be exceeded more than once in ten years, on average. | | |

[1] Criterion Maximum Concentration.
[2] Criterion Continuous Concentration.
[3] Wet Weight.
[4] Tissue data provide instantaneous point measurements that reflect integrative accumulation of PFOA or PFOS over time and space in aquatic life population(s) at a given site.

## Where PFAS is found?

The EPA's top listed industries for PFAS proposed rules are expected for manufacturers between summer of 2023 and summer of 2024 for operations in Organic Chemicals & plastics & synthetic fibers (*40 CFR 414*), metal finishing operations (*40 CFR 433*), and electroplating operations (*40 CFR 413*). Other industries that have insufficient data sets for proper rule making, but are targeted for more studies, include electrical and electrical components (*40 CFR 469*), textile mills (*40 CFR 410*) and landfills (*40 CFR 445*). Some industries which are known users of PFAS have limited discharge information to

initiate rulemaking such as leather tanning & finishing (*40 CFR 425*), plastic molding and forming (*40 CFR 463*) and paint formulating (*40 CFR 446*) industries. Other industries have voluntarily phased out PFAS from their processes such as pulp, paper and paperboard (*40 CFR 430*) and airports (*40 CFR 449*).

The City of Nampa has industries that contribute wastewater discharge operations for metal finishing, electroplating, semiconductor assembly, and electric and electrical components which are all held to permitted discharge standards for other constituents of interest. Additionally, the plastic molding and forming industries in Nampa do not discharge to the wastewater system.

Several states have already taken action relating to decreasing the potential for PFAS contamination including product labeling, production laws, and designating select PFAS as hazardous wastes for mitigation. Furthering this notion to a local level, wastewater systems operating under National Pollutant Discharge Elimination System (NPDES) permits can control the discharges from point sources (industry) containing PFAS compounds, thus taking the burden of clean up off the citizens—the classic notion of the polluter pays.

Existing conventional drinking water and wastewater treatment technologies (e.g. coagulation, flocculation, clarification, filtration, and disinfection) do not exhibit an affinity for PFAS removal and could constitute sizeable capital improvements based on the existing infrastructure. Potential technologies that have been found effective in mitigation include granular activated carbon (GAC) adsorption, ion exchange resins (IX) and high-pressure membranes used at point of entry locations such as incoming water lines or introduction of wastewater effluent points (e.g. to the Indian Creek for the City of Nampa).

It is important to discern between cost functionality of maintaining these systems on an individual homeowner scale to that of a publicly owned wastewater treatment plant with effluent volumes of treated wastewater in the millions of gallons per day. Currently the City of Nampa wastewater facility treats and discharges approximately eleven million gallons of wastewater into the Indian Creek daily.

Understanding the sources of PFAS contamination can help the local community develop a plan for a long-term solution. Additional data driven studies are needed to determine the effects of surface water runoff entering the storm retention systems, leachate from landfills and groundwater areas where potential PFAS-based aqueous film-forming foam (AFFF) firefighting extinguishers are used. Prior to May 2019, PFAS containing AFFF was a requirement in fire extinguishers bearing the Department of Defense military specification (MIL-PRF-24385). This has subsequently been reduced to contain less than 800 parts per billion (ppb) of PFAS. For reference, parts per billion is equivalent to one drop of liquid in one full-sized swimming pool or one second in thirty-two years.

Fire suppressants that may be commonly used by organizations like fire training centers and airports are areas of importance necessitating that increased need in data

collection to make an informed decision on the level of impact. If a source can be identified, then actions can be taken to remediate the situation, reduce the source or address exposures.

## Current and Emerging Water Regulations

The Safe Drinking Water Act (SDWA) was passed by Congress in 1974, establishing public health regulations in the public drinking water supply. This Act authorizes the Environmental Protection Agency (EPA) to set national health-based standards to protect the public from naturally occurring and man-made contaminants that may be found in drinking waters. The EPA determines the drinking water maximum contaminant levels (MCLs), or the highest level of a contaminant that is allowed in drinking water.

The EPA has not yet established MCLs for PFAS but has established provisional Health Advisory Levels. In 2012, the EPA published the third Unregulated Contaminant Monitoring Rule (UCMR3) under the SDWA. This is a nationwide monitoring program designed to track chemicals lacking health-based standards that may be found in drinking water and to decide if the constituents occur at concentrations high enough to warrant future regulation. The rule required a subset of public drinking water systems to monitor for a variety of unregulated constituents, of which, six PFAS compounds were included. For simplicity, these compound acronyms are commonly established as PFOS, PFOA, PFHxS, PFNA, PFHpA, and PFBS. SDWA requires the EPA to issue a UCMR list once every 5 years of priority unregulated contaminants requiring monitoring.

The EPA is currently considering comments on UCMR5 to collect additional data found in drinking water systems which would also expand the number of systems participating in the study. The category of Large Systems, or systems servicing population sizes above 10,000 people, will have approximately 4,364 systems contributing to this UCMR 5 data set. The UCMR 5 study will span from 2022 through 2026 with the completion of data reporting in 2026.

The City of Nampa Waterworks is participating in this schedule with estimated samplings dates of July 2024 and January 2025 from thirteen Nampa ground wells. The public benefits from the information contained in these UCMR programs and improves consumer confidence into their drinking water source. If contaminants are found, related health effects may be avoided when subsequent actions, such as regulations, are implemented to reduce or eliminate those constituents. Information and data reports delivered to the EPA on UCMR results are stored in the National Contaminant Occurrence Database (NCOD).

In 2016, the EPA recommended people do not drink water containing a total concentration of PFOS+PFOA above 0.07 µg/L or 70 parts per trillion (ppt) establishing this limit as a lifetime drinking water health advisory limit. In June of 2022, the stringency of this limit was further reduced to 0.004 ppt for PFOA and 0.02 ppt for PFOS. This was published in the Federal Register, Notices to the Public (F.R. Vol 87, No. 118 June 21,

2022). For reference, approximately one single drop of water in 20 Olympic sized swimming pools is equivalent to parts per trillion (ppt), or one part per trillion parts. It is important to note that these health advisories are non-enforceable, non-regulatory values designated to provide technical information to the drinking water consumer population and are subject to change as new research information becomes available. In an EPA report on public water systems monitored during the UCMR3 study (2016's EPA health advisory), only 1.3% of water systems had concentrations of PFOA and PFOS greater than that timeframe established lifetime health advisory limit of 70 ppt.

Currently, there are only Action Levels established, or points at which certain proposed standards must be initiated to mitigate personnel exposure—such as determining an alternate source of water to be used. There is no currently established MCL for drinking water containing PFAS, as the scientific research on these compounds is still being developed. The process for determining an MCL involves whether a constituent may have adverse health effects; whether a constituent is found in public water systems with a frequency and at levels of interest; and whether in the sole judgement of the SDWA Administrator, there is a meaningful opportunity for health risk reduction through a national drinking water regulation. This process includes formal rule making and extensive public participation for scientific integrity and transparency to constituents in public water systems.

## Current and Emerging Wastewater Regulations

The EPA has started several research programs aimed at collecting toxicity and exposure information. Utilizing the Toxics Release Inventory (TRI) for the 2021 reporting year, 176 PFAS compounds were added to the database, which requires facilities that manufacture, process, and/or otherwise use these PFAS to report release and other waste management information to EPA. This is integral to discovery and mitigation at the point source rather than at the wastewater treatment facility.

The Toxic Substances Control Act (TSCA) of 1976 authorized the EPA to require reporting, record keeping, testing requirements, and restrictions relating to more than 83,000 chemical substances or mixtures that are manufactured domestically or imported where there is risk of exposure concerns. An amendment to this Act was ratified in June 2016, termed the Frank R. Lautenberg Chemical Safety for the 21st Century Act, to establish clear and enforceable deadlines for EPA review of prioritized chemicals as well as requiring risk-based chemical assessments of new, or significant new use, of existing chemicals prior to commencing manufacturing.

In June 2021, the EPA proposed a TSCA Section 8 rule that would require manufacturers and importers to report and identify any PFAS manufactured since January 1, 2011, as well as byproducts from the manufacturing process, categories of use, production volumes, disposal information, worker exposures, and any information concerning

environmental and human health effects. The EPA has identified at least 1,364 businesses that would potentially be subjected to the proposed rule.

## Treatment & Disposal Processes

The LOTT Clean Water Alliance (LOTT) is a non-profit group formed from the Cities of Lacey, Olympia, Tumwater and Thurston Counties in the State of Washington. In 2013, the LOTT group began a near ten-year scientific study on reclaimed water infiltration into the groundwater and its effects on residual chemicals that may persist through the process post treatment at the wastewater reclamation facility. This Class A reclaimed water met the constituent quality criteria by the Washington State Departments of Health and Ecology for groundwater replenishment. The primary study question focused on the risks from infiltrating reclaimed water into the groundwater because of residual chemicals the given population uses daily and if those risk assessments necessitate an immediate change to the currently practiced levels of treatment. In total, there were 127 residual chemicals analyzed in this study from wastewater, reclaimed water, surface waters and groundwaters. These constituents included artificial sweeteners, flame retardants, antiseizure medications, beta blockers, antidepressant medications, and pesticides.

Key findings of this investigation posited that under the current conditions of Class A reclaimed water infiltration into the groundwater data depicted very low risk to human health and no risk to ecological health. LOTT's treatment process was effective at removing many residual chemicals in wastewater, but some do remain post treatment. Residual chemicals identified from these constituent test groups indicated they were found in the environmental areas where reclaimed water is used for infiltration and, importantly, where it isn't indicating there are multiple sources for these chemicals. These chemical concentrations decrease with time and distance from the introduction source as they adhere to soils, are broken down by microorganisms or disperse with the receiving groundwater. The LOTT study intends to continue monitoring residual chemicals of interest such as PFAS which would provide a basis for emerging regulations.

There are certain levels of treatment technologies available that can serve to reduce residual chemicals, but with PFAS, it's important to note that this does not remove the chemical, only transfers it to another source. Reverse osmosis (R.O.) is a common example of advanced treatment that uses pressure to force water through a series of membranes that in turn leaves behind residual chemicals and minerals. Over time and usage, these membranes would need to be changed out for a fresh set for quality purposes and thus creates the new issue of how to dispose of the potential PFAS accumulated in the membrane. Depending on the volume of water that would pass through these membranes, this type of treatment can become a considerably costly pursuit for mitigation.

As it pertains to wastewater and the biosolids generated from the process, the City of Nampa Wastewater facility currently generates Class B biosolids through anaerobic digestion to significantly reduce pathogens to levels that protect public health and the environment prior to land application at the local landfills. Nampa is stiving to meet Class A biosolids in the future which meet specific criteria for high-level pathogen removal that do not fit the criteria for drinking water but do for community irrigation and fertilizers.

## Ongoing Citywide Actions

The City of Nampa has been working to actively identify and reduce emerging constituents prior to EPA rulemaking. The City is engaged in the following activities related to PFAS:

- Establishing public education regarding PFAS
- Conduct an audit of any potential PFAS containing products at the wastewater treatment facility
- Voluntarily testing wastewater influent and effluent, wastewater biosolids, Indian Creek, and the Phyllis Canal.
- Waterworks drinking well PFAS testing since 2014
- Identifying industrial sources and potential control mechanisms
- Identifying federal grant funding opportunities

The City of Nampa may revise this memorandum as new information becomes available.

For more information, please contact Nampa Public Works Office at (208) 565-5167.