State of Oregon Department of Environmental Quality

Oregon Environmental Quality Commission Meeting

Sept. 11-12, 2025

Rulemaking Action Item B
PFAS 2025 Rulemaking

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DEQ recommendation to the EQC

DEQ recommends that the Environmental Quality Commission adopt the proposed rules in Attachment A as part of Chapter 340 of the Oregon Administrative Rules.

Language of proposed EQC motion:

"I move that the Environmental Quality Commission finds that the six PFAS compounds identified on page 3 of the staff report may pose a present or future hazard to human health, safety, welfare or the environment should a release occur, and adopts the proposed rule amendments in Attachment A as part of chapter 340 of the Oregon Administrative Rules."

Introduction

Summary

Oregon Hazardous Substance Remedial Action Rules establish the standards and procedures for DEQ to investigate and cleanup releases of hazardous substances to the environment. The proposed rule amendments update the definition of hazardous substance to include six per- and poly-fluoroalkyl substances: perfluorooctanoic acid, perfluorooctane sulfonic acid, perfluorohexane sulfonic acid, perfluorononanoic acid, hexafluoropropylene oxide dimer acid, and perfluorobutane sulfonic acid, including their salts and structural isomers. These compounds are commonly referred to by the acronyms PFOA, PFOS, PFHxS, PFNA, HFPO-DA (or GenX), and PFBS, respectively. Additionally, these proposed rules would incorporate changes to the federal list of hazardous substances, which includes adding PFOA, PFOS, and 1-Bromopropane while also removing some waste definitions. These proposed rules would allow DEQ to conduct or require investigations and cleanup of these substances that pose an unacceptable risk to people or the environment.

Background

PFAS are a large class of fluorinated chemicals that are highly toxic, mobile, and persistent in the environment and readily bioaccumulate in fish, animals, and plants. Due to their long history and widespread use in industrial, commercial, and consumer products, PFAS are commonly detected in the environment and have gained national and international attention as awareness of their toxicity and presence in the environment has increased. PFAS have been detected in Oregon's drinking water, fish, groundwater, surface water, soil, and sediment, in many cases exceeding health-based screening levels. For example, according to the Oregon Health Authority, to date PFAS have been detected in 36 Oregon public water systems, with 24 systems exceeding drinking water standards. This rulemaking is needed for DEQ to investigate, assess risk, and cleanup PFAS releases that may pose an unacceptable risk to people or the environment.

Oregon Revised Statutes chapter 465 and related rules grant DEQ the authority to require investigations and remedial actions when hazardous substances have been, or may have been, released to protect people, safety, welfare, and the environment. The definition of hazardous substances in Oregon was last updated in 2006, when methane was added. Since then, federal regulations have changed and studies have identified toxic impacts of chemicals that are not currently on the hazardous substance list, particularly PFAS. For example, in 2024, the U.S. Environmental Protection Agency added PFOA and PFOS to the federal list of hazardous substances (under the Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as Superfund).It issued enforceable drinking water standards for PFOA, PFOS, PFHxS, PFNA, HFPO-DA, and PFBS under the Safe Drinking Water Act.

This rulemaking is needed for DEQ to be able to require responsible parties to investigate, assess, and cleanup PFAS releases that pose unacceptable risks to people or the environment.

PFAS toxicity

This section is intended to assist the commission in determining whether the proposed PFAS may pose a present or future hazard to human health, safety, welfare or the environment. According to ORS 465.400 (3), the commission may designate hazardous substances by rule when it finds "that the substance, because of its quantity, concentration, or physical, chemical or toxic characteristics, may pose a present or future hazard to human health, safety, welfare or the environment should a release occur." This section summarizes the research and reports that document the toxic effects of these substances and the human health effects. A more detailed version of this information is available in the technical memo in Attachment B, provided for optional review.

Some PFAS compounds in addition to the six proposed in this rulemaking also have toxicity research, data, and values available, indicating these compounds may also pose a hazard to human health, safety, welfare or the environment. Attachment B includes information related to those compounds.

Background on PFAS health effects

Many PFAS and/or their degradation products are highly persistent in the environment due to the strong carbon-fluorine bond. These substances can accumulate in soil and water, eventually making their way into food sources such as plants, produce, fish tissue, agricultural meat and milk. Many PFAS compounds bind to proteins, leading to their distribution throughout different tissues in the body and accumulation in protein-rich organs like the liver. Several PFAS can trigger adverse health effects at low concentrations in organs like the liver or immune system They are recognized as known or suspected human carcinogens and can be harmful to developing children. Cumulative adverse effects can arise from exposure to multiple PFAS compounds, as they share similar chemical structures and modes of action that lead to common health issues[1,2,3]

Exposure to PFAS have been linked to several adverse health effects, detailed by organ system below.

Liver

PFAS binding to proteins triggers molecular and cellular effects on organs such as the liver. These pathways are associated with PFAS-induced liver injury after exposure to perfluorobutanoic acid (PFBA), perfluorohexanoic acid (PFHxA), PFHxS, PFNA and perfluorodecanoic acid (PFDA) and cancer for PFOS.[4] The liver is a primary target for long-chain PFAS storage. PFAS-induced liver disease may occur because of changes

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[1] ATSDR, 2021
[2] EFSA et al., 2018
[3] EFSA et al., 2020
[4] EPA, 2021

in lipid metabolism, altered cholesterols, inflammation, necrosis, fatty acid accumulation, and serum enzymes. Metabolic effects include diabetes, gestational diabetes, insulin resistance, increased BMI and weight gain, and metabolic syndrome.

Cardiovascular

Cardiovascular effects are a result of an increase in blood lipids (cholesterol) from PFAS protein binding and activation as described above. This results in increased blood pressure and the buildup of fats, cholesterol and plaque in the artery walls, which may in turn result in an increased risk of heart attack and stroke.

Immune System

PFAS can alter immune cells and signaling, which results in reduced antibody production and immunity. This has been tested by evaluating the immune response to vaccinations in laboratory and epidemiological studies. PFAS exposure has also been shown to dysregulate the immune-inflammatory pathway and may result in autoimmune disease, such as gastroenteritis, irritable bowel disease (IBD), Crohn’s disease, and hypersensitivity disease such as asthma, allergy and dermatitis.

Kidney

The kidneys are a site of PFAS enrichment resulting from the circulation of plasma proteins in the body and their role in excretion and reabsorption.[5] PFAS, particularly long-chained compounds, are efficiently reabsorbed into the body as a part of the kidney’s role in conserving useful solutes before excretion. This maintains PFAS in circulation and increases exposure to other organs. Kidney injuries occur through induction of cell death, fibrosis, oxidative stress, inflammation, genetic changes, and metabolic disruptions. PFAS exposure has been linked to kidney cancer, chronic kidney disease, renal fibrosis, inflammation, changes in kidney function markers such as urine creatinine and albumin ratios, and the formation of kidney stones.[6]

Endocrine

PFAS interact with thyroid hormone binding proteins and disrupt thyroid hormone function. Thyroid hormones are instrumental in regulating metabolism and ensuring the liver processes fats in the blood. During fetal development and through early childhood, thyroid hormones play an important role in growth and development, immune function,[7,8] and cognitive function.[9,10] The adverse health effects associated with PFAS exposure on the thyroid include increase in cholesterol, changes in thyroid glands, increases in developmental and neurodevelopmental outcomes such as premature birth, preeclampsia, and miscarriage, low fetal weight, reduced IQ scores and elevated autism spectrum disorders.

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[5] Shearer et al, 2021
[6] Hanvoravongchai et al., 2024
[7] Rivera et al., 2024
[8] Funes et al., 2022
[9] Korevaar et al., 2016
[10] Haddow et al., 1999

Pancreas

Effects on the pancreas from PFAS exposure are related to its role in secreting digestive enzymes and hormones to aid in regulating blood sugar. PFAS binding interferes with metabolic process that regulate cell growth and energy use, leading to insulin resistance, pancreatic tumor formation and cancer development.[11,12]

Reproductive and developmental

PFAS have been associated with impacts on reproductive hormones, reproduction rate, and reduction in semen volume, sperm count, and motility. PFAS have also been found to accumulate in fetal tissues in the placenta, cord blood, and amniotic fluid, and transfer from nursing parents to their infants via breastmilk. PFAS exposure is associated with changes in birth size, gestational duration, birth defects, developmental effects, placental effects and fetal loss. PFAS are linked to increased incidence of cancers of the testicles and breast.

PFAS proposed for rulemaking

Federal agencies such as EPA and the Agency for Toxic Substances and Disease Registry rigorously evaluate human epidemiological studies and experimental animal-based exposure studies to publish toxicity assessments and calculate toxicity values. These quantitative toxicity values have been calculated for the six PFAS in this proposed rulemaking. Quantitative toxicity values include reference doses (RfDs) for non-cancer effects, and cancer slope factors (CSFs) for cancer effects. RfDs are estimates of daily exposure to the population that is likely to be without an appreciable lifetime risk of non-cancer effects, such as organ damage, biochemical, physiological, or pathologic changes and death. CSFs are an estimate of the probability of developing cancer over a lifetime, as a response per unit intake of a chemical. It is important to note that many of the health effects are cumulative, or additive, when mixtures of PFAS are present.

PFOA toxicity

EPA concluded that there is evidence from both epidemiological and animal studies to determine that oral PFOA exposure may result in adverse health effects across many health outcomes, including cancer.[13] There was significant information to develop quantitative RfDs based on immune anti-tetanus and diphtheria response,[14,15] decreased immune response,[16] decreased birth weight,[17,18,19,20] decreased offspring

[11] Kamendulis et al., 2022
[12] Caverly et al., 2014
[13] EPA, 2024
[14] Budtz-Jorgensen and Grandjean, 2018
[15] Timmerman et al., 2021
[16] DeWitt et al., 2008
[17] Chu et al., 2020
[18] Sagiv et al., 2018
[19] Starling et al., 2017
[20] Wikström et al, 2020

survival and delayed time to eye opening,[21,22] liver necrosis,[23] cardiovascular effects and increased total cholesterol,[24,25] and elevated enzymes reflective of liver damage.[26,27,28]

EPA determined that there is significant information to determine a quantitative association between PFOA exposure and development of cancer. CSFs were developed for kidney, teste, liver and pancreatic cancer.[5,23,29] Other cancers associated with PFOA exposure include uterine and breast cancer.[23,30,31] The International Agency for Research on Cancer classified PFOA as Group 1 carcinogenic to humans.[32]

PFOS toxicity

EPA concluded that there is evidence from both epidemiological and animal studies to determine that oral PFOS exposure may result in adverse health effects across many health outcomes, including cancer.[13] EPA developed quantitative RfDs for five non-cancer health outcomes including decreased immune response to some vaccines,[14,15] decreased antibody production,[33] increased blood cell production in the spleen,[34] developmental decreased fetal and infant birth weight,[18,19,20,35,36] increased total cholesterol,[24,25,37] and necrosis and elevated enzyme associated with liver disease.[26] [26,28,29,38]

EPA determined that there is significant information to determine a quantitative association between PFOS exposure and development of cancer in the liver and pancreas.[29,38] The International Agency for Research on Cancer has classified PFOS as Group 2B possibly carcinogenic to humans.[32]

PFHxS toxicity

EPA concluded that exposure to PFHxS may have an adverse effect on human health, including cancer.[13] EPA calculated quantitative RfDs for PFHxS based on thyroid

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21 Song et al., 2018
22 Lau et al, 2006
23 NTP, 2020
24 Dong et al., 2019
25 Steenland et al., 2009
26 Gallo et al, 2012
27 Darrow et al, 2016
28 Nian et al, 2019
29 Butenhoff et al., 2012
30 Mancini et al., 2020
31 Ghisari et al., 2017
32 Zahm et al., 2024
33 Zhong et al., 2016
34 NTP, 2019
35 Darrow et al., 2013
36 Luebker et al., 2005
37 Lin et al., 2010
38 Thomford, 2002

impacts on development[39] and immune endpoints.[14,40] Exposure to PFHxS has been linked with adverse effects on the liver, thyroid and development.[41] Specifically, PFHxS is associated with decreased thyroid function, decreased antibody formations, decreased birth weights and increased liver enzymes indicating damage and inflammation.

PFNA toxicity

EPA has determined that exposure to PFNA may have an adverse effect on human health.[13] Exposure to PFNA has been linked with adverse effects on the liver, immune function, development and reproduction. Specifically, PFNA is associated with thyroid and adrenal gland effects,[42] decreased immune response to some vaccines, decreased birth weight,[18] decreased survival,[43,44] delays in developmental landmarks,[43] altered testosterone levels, and impaired spermatogenesis. In addition, exposure to PFNA is associated with increased liver enzymes which indicates damage and inflammation,[28,45] liver toxicity, lesions and increased liver weights.[42,43,46]

HFPO-DA (or GenX) toxicity

EPA determined that exposure to HFPO-DA, or GenX, may have an adverse effect on human health.[13] EPA developed quantitative RfDs for GenX based on liver effects.[47] Exposure to GenX has been linked with adverse effects on the liver, kidney, immune function, reproduction, development and the hematological (blood) system. Specifically, GenX has been associated with increased liver size and liver necrosis; decreased red blood cells, hemoglobin and hematocrit;[48] increased kidney weight and necrosis; increased early deliveries, placental lesions and maternal gestational weight gain;[49] and suppressed immune response and lymphocyte increases.[50] EPA determined that there is suggestive evidence of GenX exposure resulting in cancer, although there was not enough information to quantify a CSF.

PFBS toxicity

EPA determined that exposure to PFBS in any mixture with PFHxS, PFNA, or GenX may have an adverse an effect on human health.[13] EPA developed quantitative RfDs for PFBS based on thyroid and kidney effects.[4] Exposure to PFBS has been linked with adverse effects on the thyroid, kidney, reproduction and development. Specifically,

[39] Ramhøj et al., 2018
[40] Grandjean et al, 2012
[41] EPA, 2025
[42] NTP, 2018
[43] Das et al., 2015
[44] Wolf et al., 2010
[45] Kim et al., 2023
[46] Wang et al., 2015
[47] DuPont, 2010
[48] DuPont, 2008
[49] Conley et al., 2019
[50] Rushing et al., 2017

PFBS has been associated with decreased thyroid hormones,[34,51] kidney toxicity,[52] developmental delays or abnormalities in growth,[51] and impacts to reproductive and immune systems.[53,54,55]

Documents relied on for PFAS toxicity

Document title	Document location
ATSDR, 2021. Toxicological Profile for Perfluoroalkyls.	https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf
ATSDR, 2024. How PFAS Impacts Your Health.	https://www.atsdr.cdc.gov/pfas/about/health-effects.html
Bao WW, Qian ZM, Geiger SD, et al. 2017. Gender-specific associations between serum isomers of perfluoroalkyl substances and blood pressure among Chinese: Isomers of C8 Health Project in China. Sci Total Environ 607-608:1304-1312.	http://doi.org/10.1016/j.scitotenv.2017.07.124
Budtz-Jorgensen, E., and Grandjean, P. 2018. Application of Benchmark Analysis for Mixed Contaminant Exposures: Mutual Adjustment of Perfluoroalkylate Substances Associated with Immunotoxicity	https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0205388&type=printable
Butenhoff, J.L., Chang, S.C., Olsen, G.W., and Thomford, P.J. 2012. Chronic Dietary Toxicity and Carcinogenicity Study with Potassium Perfluorooctane Sulfonate in Sprague Dawley Rats. Toxicology, 293:1– 15.	https://doi.org/10.1016/j.tox.2012.01.003
Caverly Rae, JM; Frame, S. R.; Kennedy, GL; Butenhoff, JL; Chang, SC. 2014. Pathology review of proliferative lesions of the exocrine pancreas in two chronic feeding studies in rats with ammonium perfluorooctanoate. Toxicology Reports 1: 85-91.	http://dx.doi.org/10.1016/j.toxrep.2014.04.005
CERI (Chemical Evaluation and Research Institute, Japan). 2002a. Bacterial reverse mutation test of T-7701. (3M-MPCA-00215756; K01-2703). Japan: Sumitomo 3M Limited.	
CERI (Chemical Evaluation and Research Institute, Japan). 2002b. Chromosomal	

[51] Feng et al., 2017
[52] Lieder et al., 2009
[53] Haddow et al., 1999
[54] Gilbert, 2011
[55] Gilbert et al., 2016

aberration test of T-7701. (3M-MCPA-00215776; K06-0937). Japan: Sumitomo 3M Limited.	
CERI (Chemical Evaluation and Research Institute, Japan). 2002c. Twenty-eight day repeated -dose oral toxicity study of T-7701 using cultured mammalian cells. 3M-MCPA-00215660; B11-0691). Japan: Sumitomo 3M Limited.	
Chemours. 2018. *Sustainability-GenX*. The Chemours Company, Wilmington, DE.	
Christensen et al., 2017. Perfluoroalkyl substances and fish consumption. Environmental Research. Volume 154.	https://www.sciencedirect.com/science/article/pii/S0013935116310726
Chu, C; Zhou, Y; Li, QQ; Bloom, MS; Lin, S; Yu, YJ, et al. (2020). Are perfluorooctane sulfonate alternatives safer? New insights from a birth cohort study. Environment International 135: 105365.	https://pubmed.ncbi.nlm.nih.gov/31830731/
Conley, J.M., C.S. Lambright, N. Evans, M.J. Strynar, J. McCord, B.S. McIntyre, G.S. Travlos, M.C. Cardon, E. Medlock-Kakaley, P.C. Hartig, V.S. Wilson, and L.E. Gray, Jr. 2019. Adverse maternal, fetal, and postnatal effects of hexafluoropropylene oxide dimer acid (GenX) from oral gestational exposure in Sprague-Dawley rats. *Environmental Health Perspectives* 127(3):037008. doi:10.1289/EHP4372.	https://pubmed.ncbi.nlm.nih.gov/30920876/
Crute, C.E., S.M. Hall, C.D. Landon, A. Garner, J.I. Everitt, S. Zhang, B. Blake, D. Olofsson, H. Chen, S.K. Murphy, H.M. Stapleton and L. Feng. 2022. Evaluating maternal exposure to an environmental per and polyfluoroalkyl substances (PFAS) mixture during pregnancy: Adverse maternal and fetoplacental effects in a New Zealand White (NZW) rabbit model. *Sci Total Environ* 838(Pt 4):156499.	https://pmc.ncbi.nlm.nih.gov/articles/PMC9374364/
Darrow LA, Groth AC, Winquist A, et al. 2016. Modeled perfluorooctanoic acid (PFOA) exposure and liver function in a mid-Ohio Valley community. Environ Health Perspect 124(8):1227-1233.	https://pubmed.ncbi.nlm.nih.gov/26978841/
Darrow LA, Stein CR, Steenland K. 2013. Serum perfluorooctanoic acid and perfluorooctane sulfonate concentrations in relation to birth	https://pmc.ncbi.nlm.nih.gov/articles/PMC3801459/

outcomes in the Mid-Ohio Valley, 2005-2010. Environ Health Perspect 121(10):1207-1213.	
Das KP, Grey BE, Rosen MB, et al. 2015. Developmental toxicity of perfluorononanoic acid in mice. Reprod Toxicol 51:133-144. 10.1016/j.reprotox.2014.12.012.	https://pubmed.ncbi.nlm.nih.gov/25543169/
Dewitt, JC; Copeland, CB; Strynar, MJ; Luebke, RW. 2008. Perfluorooctanoic acid-induced immunomodulation in adult C57BL/6J or C57BL/6N female mice. Environmental Health Perspectives 116: 644-650.	https://pubmed.ncbi.nlm.nih.gov/18470313/
Dong, Z., et al. 2019. Using 2003–2014 US NHANES data to determine the associations between per-and polyfluoroalkyl substances and cholesterol: Trend and implications.	https://www.sciencedirect.com/science/article/abs/pii/S0147651319302209?via%3Dihub
Duan, Y; Sun, H; Yao, Y; Meng, Y; Li, Y. (2020). Distribution of novel and legacy per-/polyfluoroalkyl substances in serum and its associations with two glycemic biomarkers among Chinese adult men and women with normal blood glucose levels. Environ Int 134: 105295.	http://dx.doi.org/10.1016/j.envint.2019.105295
DuPont-24447, 2008. Information on PFOA. April 07, 2008.	https://hero.epa.gov/hero/index.cfm/reference/download/reference_id/4221045
DuPont-18405-1037: E.I. du Pont de Nemours and Company. 2010. *An Oral (Gavage) Reproduction/Developmental Toxicity Screening Study of H-28548 in Mice*. U.S. EPA OPPTS 870.3550; OECD Test Guideline 421. Study conducted by WIL Research Laboratories, LLC (Study Completion Date: December 29, 2010), Ashland, OH.	https://hero.epa.gov/hero/index.cfm/reference/download/reference_id/4222148
DuPont-18405-1238: E.I. du Pont de Nemours and Company. 2013. *H-28548: Combined Chronic Toxicity/Oncogenicity Study 2-Year Oral Gavage Study in Rats*. U.S. EPA OPPTS 870.4300; OECD Test Guideline 453. Study conducted by MPI Research, Inc. (Study Completion Date: March 28, 2013), Mattawan, MI.	https://hero.epa.gov/hero/index.cfm/reference/download/reference_id/4222150
EFSA (European Food Safety Authority), 2018 H.K. Knutsen, J. Alexander, L. Barregard, M. Bignami, B. Bruschweiler, S. Ceccatelli, B.	https://efsa.onlinelibrary.wiley.com/doi/full/10.2903/j.efsa.2018.5333

Cottrill, M. Dinovi, L. Edler, B. Grasl-Kraupp, C. Hogstrand, L. R. Hoogenboom, C. S. Nebbia, I.P. Oswald, A. Petersen, M. Rose, A.C. Roudot, C. Vleminckx, G. Vollmer, H. Wallace, L. Bodin, J.P. Cravedi, T.I. Halldorsson, L.S. Haug, N. Johansson, H. van Loveren, P. Gergelova, K. Mackay, S. Levorato, M. van Manen, and T. Schwerdtle. Risk to human health related to the presence of perfluorooctane sulfonic acid and perfluorooctanoic acid in food. *EFSA Journal* 16(12):e05194.	
EFSA (European Food Safety Authority), 2020. D. Schrenk, M. Bignami, L. Bodin, J.K. Chipman, J. Del Mazo, B. Grasl-Kraupp, C. Hogstrand, L.R. Hoogenboom, J.C. Leblanc, C.S. Nebbia, E. Nielsen, E. Ntzani, A. Petersen, S. Sand, C. Vleminckx, H. Wallace, L. Barregard, S. Ceccatelli, J.P. Cravedi, T.I. Halldorsson, L.S. Haug, N. Johansson, H.K. Knutsen, M. Rose, A.C. Roudot, H. Van Loveren, G. Vollmer, K. Mackay, F. Riolo, and T. Schwerdtle. Risk to human health related to the presence of perfluoroalkyl substances in food. *EFSA Journal* 18(9):e06223.	https://www.efsa.europa.eu/en/efsajournal/pub/6223
EPA, 2021a. Human Health Toxicity Values for Perfluorobutane Sulfonic Acid and Related Compound Potassium Perfluorobutane Sulfonate. 600-F-20-345F	https://ordspub.epa.gov/ords/eims/eimscomm.getfile?p_download_id=542393
EPA, 2021b. Human Health Toxicity Values for Hexafluoropropylene Oxide (HFPO) Dimer Acid and Its Ammonium Salt. 822R-21-010	https://www.epa.gov/system/files/documents/2021-10/genx-chemicals-toxicity-assessment_tech-edited_oct-21-508.pdf
EPA, 2022. IRIS Toxicological Review of Perfluorobutonoic Acid (PFBA, CASRN 375-22-4) and Relatad Salts. Integrated Risk Information System, Center for Public Health and Environmental Assessment, Office of Research and Development, Washington, DC. EPA/635/R-22/277Fa	https://iris.epa.gov/static/pdfs/0701tr.pdf
EPA, June 2023. ORD Human Health Toxicity Value for Perfluoropropanioic Acid (CASRN 422-64-0 / DTXSID 8059970). Center for Public Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. EPA/600/R-22/042F.	

EPA, 2024[a]. Maximum Contaminant Level Goals for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) in Drinking Water. Office of Water, Health and Ecological Criteria Division, Washington, DC, EPA-815-R-24-010.	https://www.epa.gov/system/files/documents/2024-04/mclg-doc-for-pfoa-pfos_final-508.pdf
EPA, April 2024. Framework for Estimating Noncancer Health Risks Associated with Mixtures of Per- and Polyfluoroalkyl Substances (PFAS). Office of Water, Office of Research and Development, Washington DC. EPA-815-R-24-003.	https://www.epa.gov/system/files/documents/2024-04/final-pfas-mix-framework-3.25.24_final-508.pdf
EPA, July 2024. IRIS Toxicological Review of Perfluorodecanoic Acid (PFDA) and Related Salts, CASRN 335-76-2. Integrated Risk Information System, Center for Public Health and Environmental Assessment, Washington DC. EPA/635/R-24/172Fa	https://iris.epa.gov/document/&deid%3D361797
EPA, December 2024a. DRAFT Human Health Ambient Water Quality Criteria: Perfluorobutane Sulfonic Acid (PFBS) and Related Salts. Office of Water, Health and Ecological Criteria Division, Washington DC. EPA 822P24003	https://www.epa.gov/system/files/documents/2024-12/pfbs-hhc-draft.pdf
EPA, December 2024b. DRAFT Human Health Ambient Water Quality Criteria: Perfluorooctane Sulfonic Acid (PFOS) and Related Salts Office of Water, Health and Ecological Criteria Division, Washington DC. EPA 822P24003	https://www.epa.gov/system/files/documents/2024-12/pfos-hhc-draft.pdf
EPA, September. 2024a. Final Freshwater Aquatic Life Ambient Water Quality Criteria and Acute Saltwater Benchmark for Perfluorooctane Sulfonate (PFOS). Office of Water, Health and Ecological Criteria Division, Washington DC. EPA-842-R-24-003.	https://www.epa.gov/system/files/documents/2024-09/pfos-report-2024.pdf
EPA, September. 2024b. Final Freshwater Aquatic Life Ambient Water Quality Criteria and Acute Saltwater Benchmark for Perfluorooctanoic Acid (PFOA). Office of Water, Health and Ecological Criteria Division, Washington DC. EPA-842-R-24-002.	https://www.epa.gov/system/files/documents/2024-09/pfoa-report-2024.pdf
EPA, September. 2024c. Acute Freshwater Aquatic Life Benchmarks for Eight Data-Limited PFAS: PFBA, PFHxA, PFNA, PFDA, PFBS, PFHxS,	https://www.epa.gov/system/files/documents/2024-09/pfas-report-2024.pdf

8:2 FTUCA, and 7:3 FTCAOffice of Water, Health and Ecological Criteria Division, Washington DC. EPA-842-R-24-009.	
EPA, 2024a. PFAS National Primary Drinking Water Regulation, Final Rule.	https://www.govinfo.gov/content/pkg/FR-2024-04-26/pdf/2024-07773.pdf
EPA, 2024b. Maximum Contaminant Level Goals (MCLGs) for Three Individual Per- and Polyfluroalkyl Substances (PFAS) and a Mixture of Four PFAS. 815-R-24-004.	https://www.epa.gov/system/files/documents/2024-04/pfas-hi-mclg_final508.pdf
EPA, 2024c. Human Health Toxicity Assessment for Perfluorooctanoic Acid (PFOA) and Related Salts. 815-R-24-006	https://www.epa.gov/system/files/documents/2024-05/final-human-health-toxicity-assessment-pfoa.pdf
EPA, 2024c. Human Health Toxicity Assessment for Perfluorooctane Sulfonic Acid (PFOS) and Related Salts. 815-R-24-007	https://www.epa.gov/system/files/documents/2024-05/final-human-health-toxicity-assessment-pfos.pdf
EPA, 2024d. Maximum Contaminant Level Goals for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) in Drinking Water. 815-R-24-010	https://www.epa.gov/system/files/documents/2024-04/mclg-doc-for-pfoa-pfos_final-508.pdf
EPA, 2025. IRIS Toxicological Review of Perfluorohexanesulfonic Acid (PFHxS, CASRN 335-46-4) and Related Salts. EPA 635-R-25-012Fa	https://iris.epa.gov/static/pdfs/0705tr.pdf
Feng, X., Cao, X., Zhao, S., Wang, X., Hua, X., Chen, L., and Chen, L. 2017. Exposure of pregnant mice to perfluorobutanesulfonate causes hypothyroxinemia and developmental abnormalities in female offspring. Toxicological Sciences, 155:409–419.	http://dx.doi.org/10.1093/toxsci/kfw219
Funes, SC; Ríos, M; Fernández-Fierro, A; Rivera-Pérez, D; Soto, JA; Valbuena, JR; Altamirano-Lagos, MJ; Gómez-Santander, F; Jara, EL; Zoroquiain, P; Roa, JC; Kalergis, AM; Riedel, CA. (2022). Female offspring gestated in hypothyroxinemia and infected with human Metapneumovirus (hMPV) suffer a more severe infection and have a higher number of activated CD8+ T lymphocytes. Front Immunol 13: 966917.	http://dx.doi.org/10.3389/fimmu.2022.966917
Gallo V, Leonardi G, Genser B, et al. 2012. Serum perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS)	https://pubmed.ncbi.nlm.nih.gov/22289616/

concentrations and liver function biomarkers in a population with elevated PFOA exposure. Environ Health Perspect 120(5):655-660.	
Ghisari, M; Long, M; Røge, DM; Olsen, J; Bonefeld-Jørgensen, EC. 2017. Polymorphism in xenobiotic and estrogen metabolizing genes, exposure to perfluorinated compounds and subsequent breast cancer risk: A nested case-control study in the Danish National Birth Cohort. Environmental Research 154: 325-333.	https://pubmed.ncbi.nlm.nih.gov/28157646/
Gilbert, ME. (2011). Impact of low-level thyroid hormone disruption induced by propylthiouracil on brain development and function. Toxicol Sci 124: 432-445.	https://pubmed.ncbi.nlm.nih.gov/21964421/
Gilbert, ME; Sanchez-Huerta, K; Wood, C. (2016). Mild thyroid hormone insufficiency during development compromises activity-dependent neuroplasticity in the hippocampus of adult male rats. Endocrinology 157: 774-787.	http://dx.doi.org/10.1210/en.2015-1643
Grandjean P, Andersen EW, Budtz-Jorgensen E, et al. 2012. Serum vaccine antibody concentrations in children exposed to perfluorinated compounds. J Am Med Assoc 307(4):391-397.	https://pmc.ncbi.nlm.nih.gov/articles/PMC4402650/
Haddow, JE; Palomaki, GE; Allan, WC; Williams, JR; Knight, GJ; Gagnon, J; O'Heir, CE; Mitchell, ML; Hermos, RJ; Waisbren, SE; Faix, JD; Klein, RZ. (1999). Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. N Engl J Med 341: 549-555.	http://dx.doi.org/10.1056/NEJM199908193410801
Harbison, RD; Bourgeois, MM; Johnson, GT. (2015). Hamilton & Hardy's industrial toxicology (6th ed.). Hoboken, NJ: John Wiley & Sons, Inc.	http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470929731,subjectCd-CH50.html
Hanvoravongchai, J., Laochindawat, M., Kimura, Y., Mise, N. and S. Ichinara. 2024. Clinical, histological, molecular, and toxicokinetic renal outcomes of per-/polyfluoroalkyl substances (PFAS) exposure: Systematic review and meta-analysis. Chemosphere 368: 143745.	https://doi.org/10.1016/j.chemosphere.2024.143745
Hoover et al., 2012. Indigenous peoples of North America: Environmental exposures and reproductive justice. Environmental Health Perspectives, Volume 120.	https://pubmed.ncbi.nlm.nih.gov/22899635/

Kim, OJ; Kim, S; Park, EY; Oh, JK; Jung, SK; Park, S; Hong, S; Jeon, HL; Kim, HJ; Park, B; Park, B; Kim, S; Kim, B. (2023). Exposure to serum perfluoroalkyl substances and biomarkers of liver function: The Korean national environmental health survey 2015-2017. Chemosphere 322: 138208.	http://dx.doi.org/10.1016/j.chemosphere.2023.138208
Kamedulis, L., J. Hocevar, M. Stevens, G. Sandusky, and B. Hocevar. Exposure to perfluorooctanoic acid leads to promotion of pancreatic cancer. Carcinogenesis 43 (5): 469-478.	https://doi.org/10.1093/carcin/bgac005
Klaunig, JE; Shinohara, M; Iwai, H; Chengelis, CP; Kirkpatrick, JB; Wang, Z; Bruner, RH. 2015. Evaluation of the chronic toxicity and carcinogenicity of perfluorohexanoic acid (PFHxA) in Sprague-Dawley rats. Toxicol Pathol 43: 209-220	http://dx.doi.org/10.1177/0192623314530532
Korevaar, TIM; Muetzel, R; Medici, M; Chaker, L; Jaddoe, VWV; de Rijke, YB; Steegers, EAP; Visser, TJ; White, T; Tiemeier, H; Peeters, RP. (2016). Association of maternal thyroid function during early pregnancy with offspring IQ and brain morphology in childhood: A population-based prospective cohort study. Lancet Diabetes Endocrinol 4: 35-43.	http://dx.doi.org/10.1016/S2213-8587(15)00327-7
Kotthoff, M; Müller, J; Jürling, H; Schlummer, M; Fiedler, D. (2015). Perfluoroalkyl and polyfluoroalkyl substances in consumer products. Environ Sci Pollut Res Int 22: 14546-14559.	http://dx.doi.org/10.1007/s11356-015-4202-7
Lau C, Thibodeaux JR, Hanson RG, et al. 2006. Effects of perfluorooctanoic acid exposure during pregnancy in the mouse. Toxicol Sci 90(2):510-518.	https://pubmed.ncbi.nlm.nih.gov/16415327/
Li, Y; Cheng, Y; Xie, Z; Zeng, F. (2017). Perfluorinated alkyl substances in serum of the southern Chinese general population and potential impact on thyroid hormones. Sci Rep 7: 43380	http://dx.doi.org/10.1038/srep43380
Li, Zengqiang et al., 2021. Perfluoroheptanoic acid induces Leydig cell hyperplasia but inhibits spermatogenesis in rats after pubertal exposure.	https://pubmed.ncbi.nlm.nih.gov/33220336/

Toxicology 448:152633. doi: 10.1016/j.tox.2020.152633	
Lieder, PH; Chang, SC; York, RG; Butenhoff, JL. (2009). Toxicological evaluation of potassium perfluorobutanesulfonate in a 90-day oral gavage study with Sprague-Dawley rats. Toxicology 255: 45-52.	http://dx.doi.org/10.1016/j.tox.2008.10.002
Lin CY, Lin LY, Chiang CK, et al. 2010. Investigation of the associations between low-dose serum perfluorinated chemicals and liver enzymes in US adults. Am J Gastroenterol 105(6):1354-1363.	https://pubmed.ncbi.nlm.nih.gov/20010922/
Loveless, SE; Slezak, B; Serex, T; Lewis, J; Mukerji, P; O'Connor, JC; Donner, EM; Frame, S. R.;Korzeniowski, SH; Buck, RC. 2009. Toxicological evaluation of sodium perfluorohexanoate. Toxicology 264: 32-44.	http://dx.doi.org/10.1016/j.tox.2009.07.011
Mancini, FR; Cano-Sancho, G; Gambaretti, J; Marchand, P; Boutron-Ruault, MC; Severi, G, et al. 2020. Perfluorinated alkylated substances serum concentration and breast cancer risk: Evidence from a nested case-control study in the French E3N cohort. International Journal of Cancer 146: 917-928.	https://pubmed.ncbi.nlm.nih.gov/31008526/
Maine DEP (Maine Department of Environmental Protection). 2021. *Maine PFAS Screening Levels.* Accessed July 2021.	https://www.maine.gov/dep/spills/topics/pfas/Maine-PFAS-Screening-Levels-Rev-6.28.21.pdf
Mass DEP (Massachusetts Department of Environmental Protection). 2019. *Technical Support Document, Per- and Polyfluoroalkyl Substances (PFAS): An Updated Subgroup Approach to Groundwater and Drinking Water Values.* Accessed July 2019.	https://www.mass.gov/files/documents/2019/12/27/PFAS%20TSD%202019-12-26%20FINAL.pdf
Nian, M., et al. 2019. Liver function biomarkers disorder is associated with exposure to perfluoroalkyl acids in adults: Isomers of C8 Health Project in China.	https://doi.org/10.1016/j.envres.2019.02.013
NTP (National Toxicology Program). (2018). 28-day evaluation of the toxicity (C20613) of perfluorohexanoic acid (PFHxA) (307-24-4) on Harlan Sprague-Dawley rats exposed via gavage.	https://cebs.niehs.nih.gov/cebs/study/002-02654-0003-0000-2

NTP. 2020. NTP technical report on the toxicology and carcinogenesis studies of perfluorooctanoic acid (CASRN 335-67-1) administered in feed to Sprague Dawley (Hsd:Sprague Dawley SD) rats [NTP]. (Technical Report 598). Research Triangle Park, NC.	https://tools.niehs.nih.gov/cebs3/views/?action=main.dataReview&bin_id=3879
NTP (National Toxicology Program). (2018). 28-day evaluation of the toxicity (C04049) of perfluorononaoic acid (PFNA) (375-95-1) on Harlan Sprague-Dawley rats exposed via gavage [NTP].	http://dx.doi.org/10.22427/NTP-DATA-002-02655-0003-0000-3
NTP (National Toxicology Program). (2018). 28-day evaluation of the toxicity (C20615) of perfluorodecanoic acid (PFDA) (335-76-2) on Harlan Sprague-Dawley rats exposed via gavage [NTP]. U.S. Department of Health and Human Services.	http://dx.doi.org/10.22427/NTP-DATA-002-02652-0004-0000-1
NTP (National Toxicology Program). (2019). NTP technical report on the toxicity studies of perfluoroalkyl sulfonates (perfluorobutane sulfonic acid, perfluorohexane sulfonate potassium salt, and perfluorooctane sulfonic acid) administered by gavage to Sprague Dawley (Hsd:Sprague Dawley SD) rats. (Toxicity Report 96). Research Triangle Park, NC.	https://ntp.niehs.nih.gov/ntp/htdocs/st_rpts/tox096_508.pdf
NTP (National Toxicology Program). 2019b. *Pathology Peer Review of Liver Findings for H-28548: Subchronic Toxicity 90 Day Gavage Study in Mice (DuPont-18405-1307)*. Study Number WIL-189225. National Institute of Environmental Health Sciences, NTP Pathology Working Group, Research Triangle Park, NC.	https://hero.epa.gov/hero/index.cfm/reference/details/reference_id/6985027
Obsekov et al., 2022. Leveraging systematic reviews to explore disease burden and costs of per- and polyfluoroalkyl substance exposures in the United States. Exposure and Health, Volume 15.	https://link.springer.com/content/pdf/10.1007/s12403-022-00496-y.pdf
Rivera, JC; Opazo, MC; Hernández-Armengol, R; Alvarez, O; Mendoza-León, MJ; Caamaño, E; Gatica, S; Bohmwald, K; Bueno, SM; González, PA; Neunlist, M; Boudin, H; Kalergis, AM; Riedel, CA. (2024). Transient gestational hypothyroxinemia accelerates and enhances ulcerative colitis-like disorder in the male	http://dx.doi.org/10.3389/fendo.2023.1269121

offspring. Front Endocrinol (Lausanne) 14: 1269121.	
Rushing, B., Q. Hu, J. N. Franklin, R. L. McMahen, S. Dagnio, C. P. Higgins, M. J. Strynar, and J.C. DeWitt. 2017. Evaluation of the immunomodulatory effects of 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoate in C57BL/6 mice. *Toxicological Sciences* 156(1):179–189. doi:10.1093/toxsci/kfw251.	https://pubmed.ncbi.nlm.nih.gov/28115649/
Sagiv, S.K., Rifas-Shiman, S.L., Fleisch, A.F., Webster, T.F., Calafat, A.M., Ye, X., Gillman, M.W., and Oken, E. 2018. Early Pregnancy Perfluoroalkyl Substance Plasma Concentrations and Birth Outcomes in Project Viva: Confounded by Pregnancy Hemodynamics? American Journal of Epidemiology, 187:793–802.	https://doi.org/10.1093%2Faje%2 Fkwx332
Shearer, JJ; Callahan, CL; Calafat, AM; Huang, WY; Jones, RR; Sabbisetti, VS, et al. 2021. Serum concentrations of per- and polyfluoroalkyl substances and risk of renal cell carcinoma. Journal of the National Cancer Institute 113: 580-587.	http://dx.doi.org/10.1093/jnci/djaa143
Song, P; Li, D; Wang, X; Zhong, X. (2018). Effects of perfluorooctanoic acid exposure during pregnancy on the reproduction and development of male offspring mice. Andrologia 50: e13059.	https://pubmed.ncbi.nlm.nih.gov/29862542/
Song, X; Tang, S; Zhu, H; Chen, Z; Zang, Z; Zhang, Y; Niu, X; Wang, X; Yin, H; Zeng, F; He, C. (2018). Biomonitoring PFAAs in blood and semen samples: Investigation of a potential link between PFAAs exposure and semen mobility in China. Environ Int 113: 50-54.	http://dx.doi.org/10.1016/j.envint.2018.01.010
Starling et al., 2017. Perfluoroalkyl substances during pregnancy and offspring weight and adiposity at birth: examining mediation by maternal fasting glucose in the Healthy Start Study.	https://ehp.niehs.nih.gov/doi/10.1289/EHP641
Steenland, K., et al., 2009. Association of Perfluorooctanoic Acid and Perfluorooctane Sulfonate with Serum Lipids among Adults Living Near a Chemical Plant.	https://doi.org/10.1093/aje/kwp279

Thomford, PJ. (2002). 104-week dietary chronic toxicity and carcinogenicity study with perfluorooctane sulfonic acid potassium salt (PFOS; T-6295) in rats (pp. 002148-002363). (Study No. 6329-183). Madison, WI: Covance Laboratories.	https://hero.epa.gov/hero/index.cfm/reference/details/reference_id/5029075
Timmermann, CAG; Pedersen, HS; Weihe, P; Bjerregaard, P; Nielsen, F; Heilmann, C; Grandjean, P. (2021). Concentrations of tetanus and diphtheria antibodies in vaccinated Greenlandic children aged 7-12 years exposed to marine pollutants, a cross sectional study. Environmental Research 203: 111712.	http://dx.doi.org/10.1016/j.envres.2021.111712
United States Office of Science and Technology Policy (OSTP), 2023. *Per and Polyfluoroalkyl Substances (PFAS) Report,* A Report by the Joint Subcommittee on Environment, Innovation, and Public Health.	https://bidenwhitehouse.archives.gov/wp-content/uploads/2023/03/OSTP-March-2023-PFAS-Report.pdf
Wang J, Yan S, Zhang W, et al. 2015. Integrated proteomic and miRNA transcriptional analysis reveals the hepatotoxicity mechanism of PFNA exposure in mice. J Proteome Res 14(1):330-341. 10.1021/pr500641b.	https://pubmed.ncbi.nlm.nih.gov/25181679/
Wikstrom, et al., 2020. Maternal Serum Levels of Perfluoroalkyl Substances in Early Pregnancy and Offspring Birth Weight.	https://doi.org/10.1038/s41390-019-0720-1
Wolf CJ, Zehr RD, Schmid JE, et al. 2010. Developmental effects of perfluorononanoic Acid in the mouse are dependent on peroxisome proliferator-activated receptor-alpha. PPAR Res 2010 10.1155/2010/282896.	https://pmc.ncbi.nlm.nih.gov/articles/PMC2948904/
Zahm et al., 2024. Carcinogenicity of perfluorooctanoic acid and perfluorooctanesulfonic acid. The Lance Oncology. Volume 25, Issue 1.	https://doi.org/10.1016/S1470-2045(23)00622-8
Zhong, SQ; Chen, ZX; Kong, ML; Xie, YQ; Zhou, Y; Qin, XD, et al. (2016). Testosterone-Mediated Endocrine Function and TH1/TH2 Cytokine Balance after Prenatal Exposure to Perfluorooctane Sulfonate: By Sex Status. International Journal of Molecular Sciences 17.	https://pubmed.ncbi.nlm.nih.gov/27626407/

Statement of need

What need would the proposed rule address?

The current definition of hazardous substances has not been updated in Oregon rule since 2006 and does not reflect current science demonstrating that PFAS are toxic, mobile, and persistent. This list needs to be updated to include proposed PFAS chemicals as these chemicals are toxic and known to cause adverse health impacts to people and the environment.

How would the proposed rule address the need?

This proposed rule will update the definition of Oregon hazardous substances to include six commonly detected PFAS (PFOA, PFOS, PFHxS, PFNA, HFPO-DA (GenX) and PFBS), as well as incorporate the changes in EPA's federal designation of hazardous substances made since the last time this rule was updated in 2006. Two of these PFAS compounds are already designated as federal hazardous substances (PFOA and PFOS), while all six have established drinking water standards under the Safe Drinking Water Act.

How will DEQ know the rule addressed the need?

If adopted, PFAS will be incorporated into the DEQ Cleanup Program's existing processes for addressing environmental contamination, such as site investigations, risk assessments, and cleanup actions. PFAS data characterizing the locations and magnitudes of PFAS releases and risks posed to people and the environment will be generated. PFAS exposure risks to people and the environment will be considered, mitigated, and removed at contaminated sites, to protect people and the environment.

Federal relationship

ORS 183.332, 468A.327 and OAR 340-011-0029 require DEQ to adopt rules that correspond with existing equivalent federal laws and rules unless there are reasons not to do so.

The proposed rules would adopt federal requirements by reference and impose new state requirements in addition to federal requirements.

The Oregon definition of hazardous substances in OAR 340-122-0115 (30) subsection (b) references the federal CERCLA list of hazardous substances (“Any substance defined as a hazardous substance pursuant to section 101(14) of the federal Comprehensive Environmental Response, Compensation and Liability Act, P.L. 96-510, as amended, and P.L. 99-499”). Completing this rulemaking would readopt the current list of CERCLA hazardous substances. This would result in Oregon’s definition of hazardous substances including two PFAS compounds, PFOA and PFOS, including their salts and structural isomers.

In addition, the proposed rule would include four other PFAS compounds (PFHxS, PFNA, HFPO-DA, and PFBS) in the Oregon definition of hazardous substances.

What are the scientific, economic, technological, administrative and other reasons for exceeding applicable federal requirements?

PFAS chemicals are highly toxic, mobile, and persistent in the environment, and readily bioaccumulate within the bodies of people, fish, and wildlife. Due to their long history and widespread use in industrial, commercial, and consumer products, PFAS are commonly detected in the environment and have gained national and international attention as awareness of their toxicity and presence in the environment has increased. As a result, in 2024 the EPA added PFOA and PFOS to the federal list of CERCLA hazardous substances and created enforceable drinking water standards for PFOA, PFOS, PFHxS, PFNA, HFPO-DA (GenX), and PFBS. Public water systems across the country will be required to meet the EPA’s PFAS drinking water standards and the Oregon Health Authority is in the process of adopting these standards into Oregon rule.

PFAS have been detected in Oregon’s drinking water, fish, groundwater, surface water, soil, and sediment, in many cases at amounts exceeding health-based screening levels. For example, to date PFAS have been detected in 32 Oregon public water systems, with 23 systems exceeding drinking water standards. Without this rulemaking, DEQ will be unable to require parties responsible for contamination to investigate, assess risk, and cleanup the contamination, even if an unacceptable risk to people or the environment is known.

Oregon statutes and rule provide DEQ the authority to require investigation and remedial actions where hazardous substances have been released to protect people and the environment. Adding these six PFAS as hazardous substances in Oregon rule is needed to allow DEQ to address releases of these compounds to the environment to protect drinking water and other important natural resources; protect people and the environment; and ensure that costs related to testing, treatment, and cleanup are placed onto parties responsible for causing the contamination, rather than Oregon's communities.

What alternatives did DEQ consider?

DEQ considered the following alternatives:

- Not proposing this rule update.
- Adding PFOA and PFOS by either (1) updating the date of the rule to readopt the current list of CERCLA hazardous substances, with no language changes, or (2) adding PFOA and PFOS as a separate line item in Oregon's rule to provide clarity to those reading the rules.
- Adding the six PFAS compounds with enforceable drinking water standards.
- Adding PFAS compounds in addition to the six with enforceable drinking water standards.

DEQ did not pursue the alternative of not proposing this rule update because DEQ would be unable to require investigation and cleanup, even if an unacceptable risk to people or the environment is known.

Initially, DEQ proposed readopting the current list of CERCLA hazardous substances, which would result in adding PFOA and PFOS to Oregon's list of hazardous substances. At the first rulemaking advisory committee meeting, several committee members suggested DEQ broaden the scope to include additional PFAS compounds in the rulemaking, such as those with enforceable drinking water standards. At the second rulemaking advisory committee meeting, the scope of the rulemaking was discussed in more detail, including the alternatives listed above. Some committee members preferred maintaining the initial proposal to maintain consistency with the EPA and some committee members preferred adding the entire PFAS chemical class. However, most committee members preferred adding the six PFAS compounds with enforceable drinking water standards.

Based on discussions with the rulemaking advisory committee, well-established toxicity research, and the need for public water systems to comply with new drinking water standards, DEQ has determined that adding the six PFAS with enforceable drinking water standards would be more protective to the people and environment of Oregon. Listing these six PFAS will help protect drinking water resources and benefit systems required to test and treat for these compounds by reducing contaminant load to the systems and identifying parties responsible. These compounds can be analyzed and treated using the same methods and technologies.

DEQ acknowledges there is research indicating additional PFAS compounds, and perhaps the entire class, have toxic characteristics. However, currently there is not sufficient scientific research available to provide the tools necessary to investigate and cleanup the entire class of PFAS compounds, such as analytical methods to quantify all PFAS compounds and screening levels based on toxicity data. The six PFAS with enforceable drinking water standards are among the best studied and understood PFAS compounds, with regulatory precedent, toxicity information, and analytical methods available. DEQ may evaluate additional PFAS compounds and the associated science on their toxic and chemical characteristics in a future rulemaking process.

Rules affected, authorities, supporting documents

Lead division

Land Quality

Program or activity

Cleanup Program

Chapter 340 action

Amend				
340-122-0115				

Statutory Authority - ORS				
465.400	465.315			

Statutes Implemented - ORS				
465.200-455	465.900	466.706-835	466.895	

Documents relied on for rulemaking

Document title	Document location
ATSDR, 2024. How PFAS Impacts Your Health.	https://www.atsdr.cdc.gov/pfas/about/health-effects.html
Barbo et al., 2023. Locally caught freshwater fish across the United States are likely a significant source of exposure to PFOS and other perfluorinated compounds. Environmental Research, Volume 220.	https://www.sciencedirect.com/science/article/pii/S0013935122024926?via%3Dihub
Christensen et al., 2017. Perfluoroalkyl substances and fish consumption. Environmental Research. Volume 154.	https://www.sciencedirect.com/science/article/pii/S0013935116310726
Commission for Racial Justice, 1987. Toxic Waste and Race in the United States.	https://www.nrc.gov/docs/ml1310/ml13109a339.pdf

Cordner et al., 2021. Environmental Science & Technology, Volume 55.	https://pubs.acs.org/doi/full/10.1021/acs.est.1c03565
George et al., 2023. Nonlethal detection of PFAS bioaccumulation and biomagnification within fishes in an urban- and wastewater-dominant Great Lakes watershed. Environmental Pollution, doi: 10.1016/j.envpol.2023.121123.	https://www.sciencedirect.com/science/article/pii/S0269749123001252
Hamade, 2024. Fish consumption benefits and PFAS risks: Epidemiology and public health recommendations. Toxicology Reports, Volume 13.	https://www.sciencedirect.com/science/article/pii/S2214750024001197
Hoover et al., 2012. Indigenous peoples of North America: Environmental exposures and reproductive justice. Environmental Health Perspectives, Volume 120.	https://pubmed.ncbi.nlm.nih.gov/22899635/
Nilsen et al., 2024. Target and suspect per- and polyfluoroalkyl substances in fish from an AFFF-impacted waterway. Science of the Total Environment. Volume 906.	https://www.sciencedirect.com/science/article/pii/S0048969723064252
Obsekov et al., 2022. Leveraging systematic reviews to explore disease burden and costs of per- and polyfluoroalkyl substance exposures in the United States. Exposure and Health, Volume 15.	https://link.springer.com/content/pdf/10.1007/s12403-022-00496-y.pdf
Oregon Department of Environmental Quality, 2012. Off-Site Contaminant Migration Policy.	https://www.oregon.gov/deq/FilterDocs/OffSiteContaminantMigrationPolicy.pdf
Oregon Health Authority. Per- and polyfluoroalkyl substances (PFAS).	https://www.oregon.gov/oha/ph/healthyenvironments/drinkingwater/operations/pages/pfas.aspx
PM Environmental, 2023. Phase 1 vs. Phase 2 Environmental Site Assessments.	https://www.pmenv.com/articles/phase-1-vs-phase-2-environmental-site-assessments/
U.S. EPA About EPA's Work in the Columbia River Basin.	https://www.epa.gov/columbiariver/about-epas-work-columbia-river-basin#crbrp
U.S. EPA EJScreen: Environmental justice screening and mapping tool.	https://www.epa.gov/ejscreen
U.S. EPA Method 1633	https://www.epa.gov/cwa-methods/cwa-analytical-methods-and-polyfluorinated-alkyl-substances-pfas

U.S. EPA National Rivers and Streams Assessment.	https://www.epa.gov/national-aquatic-resource-surveys/nrsa
Zahm et al., 2024. Carcinogenicity of perfluorooctanoic acid and perfluorooctanesulfonic acid. The Lance Oncology. Volume 25, Issue 1.	https://doi.org/10.1016/S1470-2045(23)00622-8
ATSDR, 2021. Toxicological Profile for Perfluoroalkyls.	https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf
ATSDR, 2024. How PFAS Impacts Your Health.	https://www.atsdr.cdc.gov/pfas/about/health-effects.html
Bao WW, Qian ZM, Geiger SD, et al. 2017. Gender-specific associations between serum isomers of perfluoroalkyl substances and blood pressure among Chinese: Isomers of C8 Health Project in China. Sci Total Environ 607-608:1304-1312.	http://doi.org/10.1016/j.scitotenv.2017.07.124
Budtz-Jorgensen, E., and Grandjean, P. 2018. Application of Benchmark Analysis for Mixed Contaminant Exposures: Mutual Adjustment of Perfluoroalkylate Substances Associated with Immunotoxicity	https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0205388&type=printable
Butenhoff, J.L., Chang, S.C., Olsen, G.W., and Thomford, P.J. 2012. Chronic Dietary Toxicity and Carcinogenicity Study with Potassium Perfluorooctane Sulfonate in Sprague Dawley Rats. Toxicology, 293:1– 15.	https://doi.org/10.1016/j.tox.2012.01.003
Caverly Rae, JM; Frame, S. R.; Kennedy, GL; Butenhoff, JL; Chang, SC. 2014. Pathology review of proliferative lesions of the exocrine pancreas in two chronic feeding studies in rats with ammonium perfluorooctanoate. Toxicology Reports 1: 85-91.	http://dx.doi.org/10.1016/j.toxrep.2014.04.005
CERI (Chemical Evaluation and Research Institute, Japan). 2002a. Bacterial reverse mutation test of T-7701. (3M-MPCA-00215756; K01-2703). Japan: Sumitomo 3M Limited.	
CERI (Chemical Evaluation and Research Institute, Japan). 2002b. Chromosomal aberration test of T-7701. (3M-MCPA-00215776; K06-0937). Japan: Sumitomo 3M Limited.	
CERI (Chemical Evaluation and Research Institute, Japan). 2002c. Twenty-eight day repeated -dose oral toxicity study of T-7701 using cultured mammalian cells. 3M-MCPA-	

00215660; B11-0691). Japan: Sumitomo 3M Limited.	
Chemours. 2018. *Sustainability-GenX*. The Chemours Company, Wilmington, DE.	
Christensen et al., 2017. Perfluoroalkyl substances and fish consumption. Environmental Research. Volume 154.	https://www.sciencedirect.com/science/article/pii/S0013935116310726
Chu, C; Zhou, Y; Li, QQ; Bloom, MS; Lin, S; Yu, YJ, et al. (2020). Are perfluorooctane sulfonate alternatives safer? New insights from a birth cohort study. Environment International 135: 105365.	https://pubmed.ncbi.nlm.nih.gov/31830731/
Conley, J.M., C.S. Lambright, N. Evans, M.J. Strynar, J. McCord, B.S. McIntyre, G.S. Travlos, M.C. Cardon, E. Medlock-Kakaley, P.C. Hartig, V.S. Wilson, and L.E. Gray, Jr. 2019. Adverse maternal, fetal, and postnatal effects of hexafluoropropylene oxide dimer acid (GenX) from oral gestational exposure in Sprague-Dawley rats. *Environmental Health Perspectives* 127(3):037008. doi:10.1289/EHP4372.	https://pubmed.ncbi.nlm.nih.gov/30920876/
Crute, C.E., S.M. Hall, C.D. Landon, A. Garner, J.I. Everitt, S. Zhang, B. Blake, D. Olofsson, H. Chen, S.K. Murphy, H.M. Stapleton and L. Feng. 2022. Evaluating maternal exposure to an environmental per and polyfluoroalkyl substances (PFAS) mixture during pregnancy: Adverse maternal and fetoplacental effects in a New Zealand White (NZW) rabbit model. *Sci Total Environ* 838(Pt 4):156499.	https://pmc.ncbi.nlm.nih.gov/articles/PMC9374364/
Darrow LA, Groth AC, Winquist A, et al. 2016. Modeled perfluorooctanoic acid (PFOA) exposure and liver function in a mid-Ohio Valley community. Environ Health Perspect 124(8):1227-1233.	https://pubmed.ncbi.nlm.nih.gov/26978841/
Darrow LA, Stein CR, Steenland K. 2013. Serum perfluorooctanoic acid and perfluorooctane sulfonate concentrations in relation to birth outcomes in the Mid-Ohio Valley, 2005-2010. Environ Health Perspect 121(10):1207-1213.	https://pmc.ncbi.nlm.nih.gov/articles/PMC3801459/
Das KP, Grey BE, Rosen MB, et al. 2015. Developmental toxicity of perfluorononanoic acid in mice. Reprod Toxicol 51:133-144. 10.1016/j.reprotox.2014.12.012.	https://pubmed.ncbi.nlm.nih.gov/25543169/

Dewitt, JC; Copeland, CB; Strynar, MJ; Luebke, RW. 2008. Perfluorooctanoic acid-induced immunomodulation in adult C57BL/6J or C57BL/6N female mice. Environmental Health Perspectives 116: 644-650.	https://pubmed.ncbi.nlm.nih.gov/18470313/
Dong, Z., et al. 2019. Using 2003–2014 US NHANES data to determine the associations between per-and polyfluoroalkyl substances and cholesterol: Trend and implications.	https://www.sciencedirect.com/science/article/abs/pii/S0147651319302209?via%3Dihub
Duan, Y; Sun, H; Yao, Y; Meng, Y; Li, Y. (2020). Distribution of novel and legacy per-/polyfluoroalkyl substances in serum and its associations with two glycemic biomarkers among Chinese adult men and women with normal blood glucose levels. Environ Int 134: 105295.	http://dx.doi.org/10.1016/j.envint.2019.105295
DuPont-24447, 2008. Information on PFOA. April 07, 2008.	https://hero.epa.gov/hero/index.cfm/reference/download/reference_id/4221045
DuPont-18405-1037: E.I. du Pont de Nemours and Company. 2010. *An Oral (Gavage) Reproduction/Developmental Toxicity Screening Study of H-28548 in Mice*. U.S. EPA OPPTS 870.3550; OECD Test Guideline 421. Study conducted by WIL Research Laboratories, LLC (Study Completion Date: December 29, 2010), Ashland, OH.	https://hero.epa.gov/hero/index.cfm/reference/download/reference_id/4222148
DuPont-18405-1238: E.I. du Pont de Nemours and Company. 2013. *H-28548: Combined Chronic Toxicity/Oncogenicity Study 2-Year Oral Gavage Study in Rats*. U.S. EPA OPPTS 870.4300; OECD Test Guideline 453. Study conducted by MPI Research, Inc. (Study Completion Date: March 28, 2013), Mattawan, MI.	https://hero.epa.gov/hero/index.cfm/reference/download/reference_id/4222150
EFSA (European Food Safety Authority), 2018 H.K. Knutsen, J. Alexander, L. Barregard, M. Bignami, B. Bruschweiler, S. Ceccatelli, B. Cottrill, M. Dinovi, L. Edler, B. Grasl-Kraupp, C. Hogstrand, L. R. Hoogenboom, C. S. Nebbia, I.P. Oswald, A. Petersen, M. Rose, A.C. Roudot, C. Vleminckx, G. Vollmer, H. Wallace, L. Bodin, J.P. Cravedi, T.I. Halldorsson, L.S. Haug, N. Johansson, H. van Loveren, P. Gergelova, K.	https://efsa.onlinelibrary.wiley.com/doi/full/10.2903/j.efsa.2018.5333

Mackay, S. Levorato, M. van Manen, and T. Schwerdtle. Risk to human health related to the presence of perfluorooctane sulfonic acid and perfluorooctanoic acid in food. *EFSA Journal* 16(12):e05194.	
EFSA (European Food Safety Authority), 2020. D. Schrenk, M. Bignami, L. Bodin, J.K. Chipman, J. Del Mazo, B. Grasl-Kraupp, C. Hogstrand, L.R. Hoogenboom, J.C. Leblanc, C.S. Nebbia, E. Nielsen, E. Ntzani, A. Petersen, S. Sand, C. Vleminckx, H. Wallace, L. Barregard, S. Ceccatelli, J.P. Cravedi, T.I. Halldorsson, L.S. Haug, N. Johansson, H.K. Knutsen, M. Rose, A.C. Roudot, H. Van Loveren, G. Vollmer, K. Mackay, F. Riolo, and T. Schwerdtle. Risk to human health related to the presence of perfluoroalkyl substances in food. *EFSA Journal* 18(9):e06223.	https://www.efsa.europa.eu/en/efsajournal/pub/6223
EPA, 2021a. Human Health Toxicity Values for Perfluorobutane Sulfonic Acid and Related Compound Potassium Perfluorobutane Sulfonate. 600-F-20-345F	https://ordspub.epa.gov/ords/eims/eimscomm.getfile?p_download_id=542393
EPA, 2021b. Human Health Toxicity Values for Hexafluoropropylene Oxide (HFPO) Dimer Acid and Its Ammonium Salt. 822R-21-010	https://www.epa.gov/system/files/documents/2021-10/genx-chemicals-toxicity-assessment_tech-edited_oct-21-508.pdf
EPA, 2022. IRIS Toxicological Review of Perfluorobutonoic Acid (PFBA, CASRN 375-22-4) and Relatad Salts. Integrated Risk Information System, Center for Public Health and Environmental Assessment, Office of Research and Development, Washington, DC. EPA/635/R-22/277Fa	https://iris.epa.gov/static/pdfs/0701tr.pdf
EPA, June 2023. ORD Human Health Toxicity Value for Perfluoropropanioic Acid (CASRN 422-64-0 / DTXSID 8059970). Center for Public Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. EPA/600/R-22/042F.	
EPA, 2024[a]. Maximum Contaminant Level Goals for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) in Drinking Water. Office of Water, Health and	https://www.epa.gov/system/files/documents/2024-04/mclg-doc-for-pfoa-pfos_final-508.pdf

Ecological Criteria Division, Washington, DC, EPA-815-R-24-010.	
EPA, April 2024. Framework for Estimating Noncancer Health Risks Associated with Mixtures of Per- and Polyfluoroalkyl Substances (PFAS). Office of Water, Office of Research and Development, Washington DC. EPA-815-R-24-003.	https://www.epa.gov/system/files/documents/2024-04/final-pfas-mix-framework-3.25.24_final-508.pdf
EPA, July 2024. IRIS Toxicological Review of Perfluorodecanoic Acid (PFDA) and Related Salts, CASRN 335-76-2. Integrated Risk Information System, Center for Public Health and Environmental Assessment, Washington DC. EPA/635/R-24/172Fa	https://iris.epa.gov/document/&deid%3D361797
EPA, December 2024a. DRAFT Human Health Ambient Water Quality Criteria: Perfluorobutane Sulfonic Acid (PFBS) and Related Salts. Office of Water, Health and Ecological Criteria Division, Washington DC. EPA 822P24003	https://www.epa.gov/system/files/documents/2024-12/pfbs-hhc-draft.pdf
EPA, December 2024b. DRAFT Human Health Ambient Water Quality Criteria: Perfluorooctane Sulfonic Acid (PFOS) and Related Salts Office of Water, Health and Ecological Criteria Division, Washington DC. EPA 822P24003	https://www.epa.gov/system/files/documents/2024-12/pfos-hhc-draft.pdf
EPA, September. 2024a. Final Freshwater Aquatic Life Ambient Water Quality Criteria and Acute Saltwater Benchmark for Perfluorooctane Sulfonate (PFOS). Office of Water, Health and Ecological Criteria Division, Washington DC. EPA-842-R-24-003.	https://www.epa.gov/system/files/documents/2024-09/pfos-report-2024.pdf
EPA, September. 2024b. Final Freshwater Aquatic Life Ambient Water Quality Criteria and Acute Saltwater Benchmark for Perfluorooctanoic Acid (PFOA). Office of Water, Health and Ecological Criteria Division, Washington DC. EPA-842-R-24-002.	https://www.epa.gov/system/files/documents/2024-09/pfoa-report-2024.pdf
EPA, September. 2024c. Acute Freshwater Aquatic Life Benchmarks for Eight Data-Limited PFAS: PFBA, PFHxA, PFNA, PFDA, PFBS, PFHxS, 8:2 FTUCA, and 7:3 FTCAOffice of Water, Health and Ecological Criteria Division, Washington DC. EPA-842-R-24-009.	https://www.epa.gov/system/files/documents/2024-09/pfas-report-2024.pdf

EPA, 2024a. PFAS National Primary Drinking Water Regulation, Final Rule.	https://www.govinfo.gov/content/pkg/FR-2024-04-26/pdf/2024-07773.pdf
EPA, 2024b. Maximum Contaminant Level Goals (MCLGs) for Three Individual Per- and Polyfluroalkyl Substances (PFAS) and a Mixture of Four PFAS. 815-R-24-004.	https://www.epa.gov/system/files/documents/2024-04/pfas-hi-mclg_final508.pdf
EPA, 2024c. Human Health Toxicity Assessment for Perfluorooctanoic Acid (PFOA) and Related Salts. 815-R-24-006	https://www.epa.gov/system/files/documents/2024-05/final-human-health-toxicity-assessment-pfoa.pdf
EPA, 2024c. Human Health Toxicity Assessment for Perfluorooctane Sulfonic Acid (PFOS) and Related Salts. 815-R-24-007	https://www.epa.gov/system/files/documents/2024-05/final-human-health-toxicity-assessment-pfos.pdf
EPA, 2024d. Maximum Contaminant Level Goals for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) in Drinking Water. 815-R-24-010	https://www.epa.gov/system/files/documents/2024-04/mclg-doc-for-pfoa-pfos_final-508.pdf
EPA, 2025. IRIS Toxicological Review of Perfluorohexanesulfonic Acid (PFHxS, CASRN 335-46-4) and Related Salts. EPA 635-R-25-012Fa	https://iris.epa.gov/static/pdfs/0705tr.pdf
Feng, X., Cao, X., Zhao, S., Wang, X., Hua, X., Chen, L., and Chen, L. 2017. Exposure of pregnant mice to perfluorobutanesulfonate causes hypothyroxinemia and developmental abnormalities in female offspring. Toxicological Sciences, 155:409–419.	http://dx.doi.org/10.1093/toxsci/kfw219
Funes, SC; Ríos, M; Fernández-Fierro, A; Rivera-Pérez, D; Soto, JA; Valbuena, JR; Altamirano-Lagos, MJ; Gómez-Santander, F; Jara, EL; Zoroquiain, P; Roa, JC; Kalergis, AM; Riedel, CA. (2022). Female offspring gestated in hypothyroxinemia and infected with human Metapneumovirus (hMPV) suffer a more severe infection and have a higher number of activated CD8+ T lymphocytes. Front Immunol 13: 966917.	http://dx.doi.org/10.3389/fimmu.2022.966917
Gallo V, Leonardi G, Genser B, et al. 2012. Serum perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS) concentrations and liver function biomarkers in a population with elevated PFOA exposure. Environ Health Perspect 120(5):655-660.	https://pubmed.ncbi.nlm.nih.gov/22289616/

Ghisari, M; Long, M; Røge, DM; Olsen, J; Bonefeld-Jørgensen, EC. 2017. Polymorphism in xenobiotic and estrogen metabolizing genes, exposure to perfluorinated compounds and subsequent breast cancer risk: A nested case-control study in the Danish National Birth Cohort. Environmental Research 154: 325-333.	https://pubmed.ncbi.nlm.nih.gov/28157646/
Gilbert, ME. (2011). Impact of low-level thyroid hormone disruption induced by propylthiouracil on brain development and function. Toxicol Sci 124: 432-445.	https://pubmed.ncbi.nlm.nih.gov/21964421/
Gilbert, ME; Sanchez-Huerta, K; Wood, C. (2016). Mild thyroid hormone insufficiency during development compromises activity-dependent neuroplasticity in the hippocampus of adult male rats. Endocrinology 157: 774-787.	http://dx.doi.org/10.1210/en.2015-1643
Grandjean P, Andersen EW, Budtz-Jorgensen E, et al. 2012. Serum vaccine antibody concentrations in children exposed to perfluorinated compounds. J Am Med Assoc 307(4):391-397.	https://pmc.ncbi.nlm.nih.gov/articles/PMC4402650/
Haddow, JE; Palomaki, GE; Allan, WC; Williams, JR; Knight, GJ; Gagnon, J; O'Heir, CE; Mitchell, ML; Hermos, RJ; Waisbren, SE; Faix, JD; Klein, RZ. (1999). Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. N Engl J Med 341: 549-555.	http://dx.doi.org/10.1056/NEJM199908193410801
Harbison, RD; Bourgeois, MM; Johnson, GT. (2015). Hamilton & Hardy's industrial toxicology (6th ed.). Hoboken, NJ: John Wiley & Sons, Inc.	http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470929731,subjectCd-CH50.html
Hanvoravongchai, J., Laochindawat, M., Kimura, Y., Mise, N. and S. Ichinara. 2024. Clinical, histological, molecular, and toxicokinetic renal outcomes of per-/polyfluoroalkyl substances (PFAS) exposure: Systematic review and meta-analysis. Chemosphere 368: 143745.	https://doi.org/10.1016/j.chemosphere.2024.143745
Hoover et al., 2012. Indigenous peoples of North America: Environmental exposures and reproductive justice. Environmental Health Perspectives, Volume 120.	https://pubmed.ncbi.nlm.nih.gov/22899635/
Kim, OJ; Kim, S; Park, EY; Oh, JK; Jung, SK; Park, S; Hong, S; Jeon, HL; Kim, HJ; Park, B; Park, B; Kim, S; Kim, B. (2023). Exposure to	http://dx.doi.org/10.1016/j.chemosphere.2023.138208

serum perfluoroalkyl substances and biomarkers of liver function: The Korean national environmental health survey 2015-2017. Chemosphere 322: 138208.	
Kamedulis, L., J. Hocevar, M. Stevens, G. Sandusky, and B. Hocevar. Exposure to perfluorooctanoic acid leads to promotion of pancreatic cancer. Carcinogenesis 43 (5): 469-478.	https://doi.org/10.1093/carcin/bgac005
Klaunig, JE; Shinohara, M; Iwai, H; Chengelis, CP; Kirkpatrick, JB; Wang, Z; Bruner, RH. 2015. Evaluation of the chronic toxicity and carcinogenicity of perfluorohexanoic acid (PFHxA) in Sprague-Dawley rats. Toxicol Pathol 43: 209-220	http://dx.doi.org/10.1177/0192623314530532
Korevaar, TIM; Muetzel, R; Medici, M; Chaker, L; Jaddoe, VWV; de Rijke, YB; Steegers, EAP; Visser, TJ; White, T; Tiemeier, H; Peeters, RP. (2016). Association of maternal thyroid function during early pregnancy with offspring IQ and brain morphology in childhood: A population-based prospective cohort study. Lancet Diabetes Endocrinol 4: 35-43.	http://dx.doi.org/10.1016/S2213-8587(15)00327-7
Kotthoff, M; Müller, J; Jürling, H; Schlummer, M; Fiedler, D. (2015). Perfluoroalkyl and polyfluoroalkyl substances in consumer products. Environ Sci Pollut Res Int 22: 14546-14559.	http://dx.doi.org/10.1007/s11356-015-4202-7
Lau C, Thibodeaux JR, Hanson RG, et al. 2006. Effects of perfluorooctanoic acid exposure during pregnancy in the mouse. Toxicol Sci 90(2):510-518.	https://pubmed.ncbi.nlm.nih.gov/16415327/
Li, Y; Cheng, Y; Xie, Z; Zeng, F. (2017). Perfluorinated alkyl substances in serum of the southern Chinese general population and potential impact on thyroid hormones. Sci Rep 7: 43380	http://dx.doi.org/10.1038/srep43380
Li, Zengqiang et al., 2021. Perfluoroheptanoic acid induces Leydig cell hyperplasia but inhibits spermatogenesis in rats after pubertal exposure. Toxicology 448:152633. doi: 10.1016/j.tox.2020.152633	https://pubmed.ncbi.nlm.nih.gov/33220336/

Lieder, PH; Chang, SC; York, RG; Butenhoff, JL. (2009). Toxicological evaluation of potassium perfluorobutanesulfonate in a 90-day oral gavage study with Sprague-Dawley rats. Toxicology 255: 45-52.	http://dx.doi.org/10.1016/j.tox.2008.10.002
Lin CY, Lin LY, Chiang CK, et al. 2010. Investigation of the associations between low-dose serum perfluorinated chemicals and liver enzymes in US adults. Am J Gastroenterol 105(6):1354-1363.	https://pubmed.ncbi.nlm.nih.gov/20010922/
Loveless, SE; Slezak, B; Serex, T; Lewis, J; Mukerji, P; O'Connor, JC; Donner, EM; Frame, S. R.;Korzeniowski, SH; Buck, RC. 2009. Toxicological evaluation of sodium perfluorohexanoate. Toxicology 264: 32-44.	http://dx.doi.org/10.1016/j.tox.2009.07.011
Mancini, FR; Cano-Sancho, G; Gambaretti, J; Marchand, P; Boutron-Ruault, MC; Severi, G, et al. 2020. Perfluorinated alkylated substances serum concentration and breast cancer risk: Evidence from a nested case-control study in the French E3N cohort. International Journal of Cancer 146: 917-928.	https://pubmed.ncbi.nlm.nih.gov/31008526/
Maine DEP (Maine Department of Environmental Protection). 2021. *Maine PFAS Screening Levels.* Accessed July 2021.	https://www.maine.gov/dep/spills/topics/pfas/Maine-PFAS-Screening-Levels-Rev-6.28.21.pdf
Mass DEP (Massachusetts Department of Environmental Protection). 2019. *Technical Support Document, Per- and Polyfluoroalkyl Substances (PFAS): An Updated Subgroup Approach to Groundwater and Drinking Water Values.* Accessed July 2019.	https://www.mass.gov/files/documents/2019/12/27/PFAS%20TSD%202019-12-26%20FINAL.pdf
Nian, M., et al. 2019. Liver function biomarkers disorder is associated with exposure to perfluoroalkyl acids in adults: Isomers of C8 Health Project in China.	https://doi.org/10.1016/j.envres.2019.02.013
NTP (National Toxicology Program). (2018). 28-day evaluation of the toxicity (C20613) of perfluorohexanoic acid (PFHxA) (307-24-4) on Harlan Sprague-Dawley rats exposed via gavage.	https://cebs.niehs.nih.gov/cebs/study/002-02654-0003-0000-2
NTP. 2020. NTP technical report on the toxicology and carcinogenesis studies of perfluorooctanoic acid (CASRN 335-67-1) administered in feed to Sprague Dawley	https://tools.niehs.nih.gov/cebs3/views/?action=main.dataReview&bin_id=3879

(Hsd:Sprague Dawley SD) rats [NTP]. (Technical Report 598). Research Triangle Park, NC.	
NTP (National Toxicology Program). (2018). 28-day evaluation of the toxicity (C04049) of perfluorononaoic acid (PFNA) (375-95-1) on Harlan Sprague-Dawley rats exposed via gavage [NTP].	http://dx.doi.org/10.22427/NTP-DATA-002-02655-0003-0000-3
NTP (National Toxicology Program). (2018). 28-day evaluation of the toxicity (C20615) of perfluorodecanoic acid (PFDA) (335-76-2) on Harlan Sprague-Dawley rats exposed via gavage [NTP]. U.S. Department of Health and Human Services.	http://dx.doi.org/10.22427/NTP-DATA-002-02652-0004-0000-1
NTP (National Toxicology Program). (2019). NTP technical report on the toxicity studies of perfluoroalkyl sulfonates (perfluorobutane sulfonic acid, perfluorohexane sulfonate potassium salt, and perfluorooctane sulfonic acid) administered by gavage to Sprague Dawley (Hsd:Sprague Dawley SD) rats. (Toxicity Report 96). Research Triangle Park, NC.	https://ntp.niehs.nih.gov/ntp/htdocs/st_rpts/tox096_508.pdf
NTP (National Toxicology Program). 2019b. *Pathology Peer Review of Liver Findings for H-28548: Subchronic Toxicity 90 Day Gavage Study in Mice (DuPont-18405-1307)*. Study Number WIL-189225. National Institute of Environmental Health Sciences, NTP Pathology Working Group, Research Triangle Park, NC.	https://hero.epa.gov/hero/index.cfm/reference/details/reference_id/6985027
Obsekov et al., 2022. Leveraging systematic reviews to explore disease burden and costs of per- and polyfluoroalkyl substance exposures in the United States. Exposure and Health, Volume 15.	https://link.springer.com/content/pdf/10.1007/s12403-022-00496-y.pdf
Rivera, JC; Opazo, MC; Hernández-Armengol, R; Alvarez, O; Mendoza-León, MJ; Caamaño, E; Gatica, S; Bohmwald, K; Bueno, SM; González, PA; Neunlist, M; Boudin, H; Kalergis, AM; Riedel, CA. (2024). Transient gestational hypothyroxinemia accelerates and enhances ulcerative colitis-like disorder in the male offspring. Front Endocrinol (Lausanne) 14: 1269121.	http://dx.doi.org/10.3389/fendo.2023.1269121
Rushing, B., Q. Hu, J. N. Franklin, R. L. McMahen, S. Dagnio, C. P. Higgins, M. J.	https://pubmed.ncbi.nlm.nih.gov/28115649/

Strynar, and J.C. DeWitt. 2017. Evaluation of the immunomodulatory effects of 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoate in C57BL/6 mice. *Toxicological Sciences* 156(1):179–189. doi:10.1093/toxsci/kfw251.	
Sagiv, S.K., Rifas-Shiman, S.L., Fleisch, A.F., Webster, T.F., Calafat, A.M., Ye, X., Gillman, M.W., and Oken, E. 2018. Early Pregnancy Perfluoroalkyl Substance Plasma Concentrations and Birth Outcomes in Project Viva: Confounded by Pregnancy Hemodynamics? American Journal of Epidemiology, 187:793–802.	https://doi.org/10.1093%2Faje%2 Fkwx332
Shearer, JJ; Callahan, CL; Calafat, AM; Huang, WY; Jones, RR; Sabbisetti, VS, et al. 2021. Serum concentrations of per- and polyfluoroalkyl substances and risk of renal cell carcinoma. Journal of the National Cancer Institute 113: 580-587.	http://dx.doi.org/10.1093/jnci/djaa143
Song, P; Li, D; Wang, X; Zhong, X. (2018). Effects of perfluorooctanoic acid exposure during pregnancy on the reproduction and development of male offspring mice. Andrologia 50: e13059.	https://pubmed.ncbi.nlm.nih.gov/29862542/
Song, X; Tang, S; Zhu, H; Chen, Z; Zang, Z; Zhang, Y; Niu, X; Wang, X; Yin, H; Zeng, F; He, C. (2018). Biomonitoring PFAAs in blood and semen samples: Investigation of a potential link between PFAAs exposure and semen mobility in China. Environ Int 113: 50-54.	http://dx.doi.org/10.1016/j.envint.2018.01.010
Starling et al., 2017. Perfluoroalkyl substances during pregnancy and offspring weight and adiposity at birth: examining mediation by maternal fasting glucose in the Healthy Start Study.	https://ehp.niehs.nih.gov/doi/10.1289/EHP641
Steenland, K., et al., 2009. Association of Perfluorooctanoic Acid and Perfluorooctane Sulfonate with Serum Lipids among Adults Living Near a Chemical Plant.	https://doi.org/10.1093/aje/kwp279
Thomford, PJ. (2002). 104-week dietary chronic toxicity and carcinogenicity study with perfluorooctane sulfonic acid potassium salt (PFOS; T-6295) in rats (pp. 002148-002363).	https://hero.epa.gov/hero/index.cfm/reference/details/reference_id/5029075

(Study No. 6329-183). Madison, WI: Covance Laboratories.	
Timmermann, CAG; Pedersen, HS; Weihe, P; Bjerregaard, P; Nielsen, F; Heilmann, C; Grandjean, P. (2021). Concentrations of tetanus and diphtheria antibodies in vaccinated Greenlandic children aged 7-12 years exposed to marine pollutants, a cross sectional study. Environmental Research 203: 111712.	http://dx.doi.org/10.1016/j.envres.2021.111712
United States Office of Science and Technology Policy (OSTP), 2023. *Per and Polyfluoroalkyl Substances (PFAS) Report,* A Report by the Joint Subcommittee on Environment, Innovation, and Public Health.	https://bidenwhitehouse.archives.gov/wp-content/uploads/2023/03/OSTP-March-2023-PFAS-Report.pdf
Wang J, Yan S, Zhang W, et al. 2015. Integrated proteomic and miRNA transcriptional analysis reveals the hepatotoxicity mechanism of PFNA exposure in mice. J Proteome Res 14(1):330-341. 10.1021/pr500641b.	https://pubmed.ncbi.nlm.nih.gov/25181679/
Wikstrom, et al., 2020. Maternal Serum Levels of Perfluoroalkyl Substances in Early Pregnancy and Offspring Birth Weight.	https://doi.org/10.1038/s41390-019-0720-1
Wolf CJ, Zehr RD, Schmid JE, et al. 2010. Developmental effects of perfluorononanoic Acid in the mouse are dependent on peroxisome proliferator-activated receptor-alpha. PPAR Res 2010 10.1155/2010/282896.	https://pmc.ncbi.nlm.nih.gov/articles/PMC2948904/
Zahm et al., 2024. Carcinogenicity of perfluorooctanoic acid and perfluorooctanesulfonic acid. The Lance Oncology. Volume 25, Issue 1.	https://doi.org/10.1016/S1470-2045(23)00622-8
Zhong, SQ; Chen, ZX; Kong, ML; Xie, YQ; Zhou, Y; Qin, XD, et al. (2016). Testosterone-Mediated Endocrine Function and TH1/TH2 Cytokine Balance after Prenatal Exposure to Perfluorooctane Sulfonate: By Sex Status. International Journal of Molecular Sciences 17.	https://pubmed.ncbi.nlm.nih.gov/27626407/

Fee analysis

This rulemaking does not involve fees.

Statement of fiscal and economic impact

The sections below describe the potential fiscal and economic impacts to parties that may be impacted by this rulemaking. The parties expected to incur the greatest costs are those who used, stored, or manufactured products containing PFAS that have resulted in releases or possible releases to the environment. These responsible parties would be required to investigate, assess, and cleanup PFAS contamination if there is an unacceptable risk to people or the environment. The parties expected to benefit the most financially are communities, particularly communities disproportionately impacted by environmental contamination, and society at large. The statement of cost compliance section below discusses additional parties that this rulemaking may financially impact.

The financial impact on responsible parties is difficult to fully quantify because the costs to investigate, assess, and cleanup contamination are dependent on site-specific factors and the variable past uses of PFAS compounds that resulted in the release to the environment. However, for the Fiscal Impact Statement, some example costs for investigation and cleanup efforts are provided in sections below. The Cleanup Program focuses on releases or potential releases to the environment, so there is no anticipated economic impact to parties for simply using, storing, or transporting products containing PFAS. Costs for cleanup would only occur if environmental releases were found that pose unacceptable risk to people or the environment.

Fiscal and economic impact

Releases from facilities using PFAS

Impacted parties

Parties that are designated as liable for releases of hazardous substances under ORS 465.255 are potentially impacted by this rulemaking. Parties that have used, stored, or manufactured products containing PFAS that have resulted in releases or possible releases to the environment may be impacted by this rulemaking. The economic impact on parties for using, storing, or transporting products containing PFAS is expected to be none or minimal. This is also the case for facilities that have used any of the approximately 800 other hazardous substances DEQ already regulates. PFAS use, and the potential for environmental release, is expected to be highly variable within the range of sites that could come to the attention of the Cleanup Program. Certain industries/properties (e.g., commercial airports, fire training facilities, plating facilities, bulk fuel facilities, and electronics and paper products manufacturing) either have known or highly likely PFAS use and potential for release. Conversely, for many or most sites in the Cleanup Program, PFAS are unlikely to be of concern because they either do not have a history of PFAS use or environmental releases are not expected to have occurred. In between are a range of sites with varying PFAS use and potential environmental impact. For sites entering the Cleanup Program, either voluntarily or otherwise, the need for environmental investigation and cleanup will be assessed on a site-by-site basis, with priority placed on sites with the highest likelihood of release and potential impact to people and the environment. In addition, facilities may be more proactive in preventing releases of PFAS-containing materials to the environment if they are aware that PFAS are hazardous substances and of the consequences and liability of releases to the environment.

Potentially required work

This rulemaking does not include any changes to the Cleanup Program's processes or procedures. As such, the same methods and procedures applied to all approximately 800 hazardous substances already regulated will also be applied to PFAS. The Cleanup Program's Site Assessment section will use its existing process to discover and assess PFAS contamination at sites and prioritize them based on the risk to people and the environment. In these cases, the direct economic impact of this rulemaking to facilities using PFAS will likely be: 1) time spent to assemble information on PFAS storage, use, and potential releases and 2) collection of soil and groundwater samples for testing if releases are known or suspected. If compiled information or the results of sampling indicate no release has occurred, additional work will not be required and there will be no further financial impact.

Cleanup work would only be required if it is determined that contamination exists and that there are unacceptable exposure risks to people and/or the environment. All potential exposure scenarios are considered, such as people potentially drinking contaminated water, eating contaminated fish, and ingesting contaminated soil. DEQ does not require parties to investigate all hazardous substances, but rather only those associated with current or historical activities at a site that may have led to a release.

Cost uncertainties

Estimating the costs of this rulemaking is challenging for several reasons. The number of sites that will require investigations and cleanup actions is difficult to quantify. While some industries are known to be associated with PFAS use, some individual facilities may require little action, based on limited use of PFAS, low potential for environmental releases, or releases being unlikely to impact people or the environment.

At individual sites, the costs to address PFAS releases could range from the low thousands of dollars (for sites requiring limited sampling) to several millions of dollars (for highly contaminated, complex sites requiring extensive cleanup). The costs to investigate and cleanup contamination at a given site is highly variable, depending on the following factors:

- Site location and use
- Local geology and depth to groundwater
- Type of PFAS use and likelihood of release
- The magnitude and extent of PFAS release, if one has occurred
- Whether people or the environment are impacted by releases, and to what extent
- Cleanup and treatment options

Costs related to investigation and cleanup may change over time, depending on market and economic trends and advancements with research and technology, such as costs for sample analysis, treatment and disposal, and contractors and labor.

General scenarios and cost ranges

Provided below are examples illustrating the range of PFAS contaminant conditions that are expected to be encountered; the level of effort that may be necessary to identify the extent of contamination, define risk, and complete cleanup if required; and broad estimates of financial/economic costs. The cost estimates presented below generally assume new investigation activities (except Scenario 1). It is also important to note that the six compounds proposed in this rulemaking can be analyzed and treated using the same methods and technologies. In many cases, addressing all six compounds will incur no additional costs compared toa smaller subset.

It is important to note that costs for PFAS investigations are anticipated to be like other types of contaminants already regulated and commonly encountered, such as chlorinated solvents, dioxins, and petroleum products.

Table 1. Scenarios necessitating possible PFAS investigation or cleanup action and costs

Scenario 1: Existing investigation for releases of other hazardous substances	
Description	Sites with ongoing or active investigations for other contaminants that may have current or historical practices associated with PFAS use and potential release.
Priority	The priority for including PFAS in an active investigation depends on the likelihood of release.
Likely required actions	Review of historical chemicals used and released on site. If likely released, inclusion of PFAS to the suite of compounds being analyzed in samples.
Costs	PFAS analytical testing is approximately $400 per sample; for a relatively small site already investigating soil and groundwater for other contamination, the addition of PFAS to the analytical suite is expected to cost in the low thousands of dollars and would be a fraction of the total investigation cost. Costs to investigate and cleanup PFAS are mitigated at sites already conducting investigation and cleanup actions, and incorporating PFAS may not significantly increase total costs.
Possible additional actions	If PFAS are not detected, further action would not be required. If PFAS are detected, additional investigation may be needed to determine the extent of contamination and risk to people or the environment. The site would transition into Scenario 3 or 4 below.
Scenario 2: No Known or Suspected PFAS Use	
Description	No historical or current PFAS use is known or suspected.
Examples	Residential and most commercial and agricultural properties.
Priority	Low priority.

Likely required actions	In most cases, no actions will be required. In rare cases, for example if a site is near a PFAS-contaminated drinking water aquifer, DEQ may request documentation to rule out a PFAS release from the site.
Costs	In most cases, there will be no cost for sites with no known historical or current PFAS use.
Possible additional actions	If initial assessments do indicate a likely PFAS release, the site would transition into Scenario 3 below.
Scenario 3: Some PFAS Use, Low Release Concern	
Description	Sites where limited PFAS use is documented or suspected, but the overall likelihood of release is low.
Examples	Commercial businesses and manufacturing where PFAS-containing material may be used, but not stored, applied, or potentially released in volume.
Priority	Low to medium priority.
Likely required actions	For most sites, no actions will be required. For sites voluntarily entering the DEQ Cleanup Program for a No Further Action determination, PFAS would be investigated along with any other hazardous substances that may have been used on site. For certain sites, such as those near known PFAS-contamination or important groundwater or surface water resources, DEQ may require an evaluation of whether a PFAS release may have occurred. This could include a description of historical site uses, a review of records and databases, and interviews with current or past owners or operators, similar to a Phase 1 Environmental Site Assessment, which is a standard process in the purchase of commercial/industrial properties. [56] If initial evaluations indicate a PFAS release may have occurred, environmental sampling may be required, similar to a Phase II ESA. Completing sampling activities usually entails completing a work plan, mobilizing field equipment, conducting field work, collecting and analyzing samples, disposing of materials generated from sampling, and reporting of findings. Environmental consulting companies are usually hired to complete this work, including sending samples to an accredited analytical laboratory. At most sites, initial sampling work begins with fewer than 10 soil and groundwater samples.
Costs	The estimated cost for information collection or a Phase 1 ESA is typically less than $10,000. If no PFAS releases are suspected, there would be no further cost. The estimated cost for a simple environmental investigation with a limited number of soil and groundwater samples, such as a Phase II investigation, ranges from approximately $10,000 to $50,000,

[56] PM Environmental, 2023. Phase 1 vs. Phase 2 Environmental Site Assessments. https://www.pmenv.com/articles/phase-1-vs-phase-2-environmental-site-assessments/

	depending on site conditions, such as geology and depth to groundwater. Typically, sampling investigations begin with a limited scope and may expand if contamination is found.
Possible additional actions	Detection of contaminants that may pose a risk to people or the environment would likely require additional investigation; the site would transition into Scenario 4 below.
Scenario 4: Significant PFAS Use, Releases Documented or Likely	
Description	Sites where significant PFAS use is known, and environmental impacts are considered highly likely or have been observed.
Examples	Facilities manufacturing PFAS or PFAS products, commercial airports, municipal fire training, paper manufacturing, semi-conductor manufacturing, electroplating, and bulk fuel storage.
Priority	Medium to high priority, with highest priority to sites where PFAS releases are documented and in proximity to people, habitat or species, or environmental resources.
Likely required actions	In most cases, a thorough environmental investigation and risk screening will be required to determine the extent of PFAS contamination (amount and area impacted) and determine whether there is a risk to people or the environment. The extent of sampling needed depends on site-specific factors, such as site history, geology, and depth to groundwater. As with Scenario 3, activities usually include completing a work plan, mobilizing field equipment, conducting field work, collecting and analyzing samples, disposing of materials generated from sampling, and reporting of findings.
Costs	Completion of a thorough environmental investigation and risk screening could start at $100,000 and range significantly higher, depending on site size and complexity, number of sources, and depth to groundwater. Some large, complex, and highly contaminated sites have reported investigation costs exceeding $1 million.
Possible additional actions	If excess risk to people or the environment is confirmed, the site would transition into Scenario 5 below.
Scenario 5: Cleanup Required	
Description	Sites with confirmed PFAS releases that pose risks to people or the environment.
Examples	In most cases, these sites will be those with a history of significant PFAS use, such as the examples in Scenario 4 above.
Priority	High priority.
Likely required actions	Following a thorough environmental investigation and risk screening, cleanup actions to address contamination and risks will be required. The appropriate actions are highly site-dependent and may include implementation of best management practices, infrastructure upgrades, removal actions (e.g., excavation), installation of treatment or containment systems, restrictions on site use, source control, and operations and maintenance.

Costs	In some cases, simple or limited-scope actions may be sufficient to address contamination at a site, such as limited excavation, implementation of best management practices for material handling and disposal, and simple infrastructure upgrades. In these cases, cleanup costs may range from approximately $100,000 to $150,000. In some cases, more involved actions may be needed to address contamination, such as installation of treatment or containment systems, large infrastructure upgrades, and long-term operations and maintenance activities. Common water treatment technologies include granular activated carbon, ion exchange resins, reverse osmosis, and blending. In these cases, costs may range from approximately $250,000 to millions of dollars (for highly contaminated complex sites). For the most complicated sites, costs could range from approximately $500,000 to $15 million or more. As described above, costs to investigate and cleanup contamination at a given site is highly variable and dependent on many site-specific factors (e.g., site location and use, geology and depth to groundwater, magnitude and extent of release, impacted people or environment, and available treatment options). Further, remediation technologies for PFAS are rapidly evolving.
Possible additional actions	Additional actions are not expected and will only be required if the cleanup implemented did not adequately address contamination and risks to people and ecosystems.

Case Studies

The case studies below provide examples of investigation and remediation costs incurred or projected at real sites. However, as noted above, costs depend on many site-specific factors. Similar facilities with similar histories as those in the examples may have different costs depending on the characteristics and complexity of the specific site.

Example Project #1:[57] Commercial/light industrial facility
The facility had no documented PFAS storage, use, or release. Historic fill material and a fire system were identified as potential PFAS sources, though the fire system had no record of using PFAS-containing firefighting foams. Soil and groundwater samples were collected from seven soil borings. Samples were analyzed for volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls, total petroleum hydrocarbons, metals, and PFAS; PFAS were the only detected contaminants. PFAS were detected in most soil samples and all groundwater samples at concentrations above drinking water standards. The results indicated a potential upgradient source and a desktop review for potential sources was conducted, as well as an evaluation for potential risks to people or the environment. Three permanent

[57] Information provided by an Oregon licensed Geologist with several years of experience and expertise working with PFAS-contaminated sites.

monitoring wells were installed to confirm the detections and similar PFAS detections were observed. Total costs to date related to PFAS work are $100,000 (however, note that some initial site assessment, sampling, analysis, and reporting costs included other contaminants as well). Additional work will consist of upgradient investigation and quarterly sampling and reporting.

Example Project #2:[57] Medium-size industrial facility
A historical release from a fuel tank farm was identified at the facility. PFAS-containing firefighting foam was applied at the tank farm within the surrounding berm intended to capture potential spills; however, the tank farm's concrete flooring contained significant cracking. PFAS were detected in most of the soil and groundwater samples collected beneath the tank farm. An initial cost estimate of approximately $3,000,000 to clean up the contamination was prepared. Assumed cleanup actions included excavation and disposal of the highest contaminated soil, followed by replacement with clean fill, decommissioning site wells, repairing an existing concrete cap, injection of sorptive material (such as colloidal activated carbon) to treat groundwater, as well as additional sampling, monitoring, and reporting.

Example Project #3:[57] Small community fire training facility
Firefighting foam was known to have been historically used at the facility, and a limited investigation, including installation and soil and groundwater sampling at four soil borings, was completed. PFAS were detected in most soil samples and all groundwater samples. An evaluation was conducted to determine if nearby and adjacent people or the environment may be at risk. Additional follow-up sampling was conducted to determine if the site pavement and storm drains were also impacted, and PFAS was detected in several of these samples as well. Initial investigation activities, such as sampling, limited disposal of contaminated material generated during investigation, and reporting activities, totaled approximately $60,000. Additional work may include installation of permanent monitoring wells, quarterly sampling, delineation of PFAS impacts, and remediation.

Releases from passive receivers

Facilities such as landfills and wastewater treatment plants are called passive receivers because they may receive wastes or materials containing PFAS, but never used or manufactured products containing the compounds themselves. Other DEQ programs permit passive receivers. Permitted releases are conditionally exempt from cleanup as stated in OAR 340-122-0030(2). As such, the Cleanup Program generally defers to the DEQ permitting program for addressing permitted releases. Any testing, treatment, or discharge limit requirements for PFAS by the permitting programs would be independent of this rulemaking.

The DEQ Cleanup Program may become involved, in limited cases, at a permitted site as described in OAR 340-122-0030(2). The Cleanup Program may also become involved at unpermitted passive receiver sites. For example, historic solid waste landfills not subject to DEQ's permitting rules may be impacted by this rulemaking. To the extent passive receivers are affected by this rulemaking costs are anticipated to be like other impacted parties as described above.

This rulemaking may have some financial benefits for some PFAS passive receivers, as well as public water systems, particularly those that have found PFAS in the materials they are receiving. This rulemaking would support identifying sources and responsible parties and result in reduced PFAS impacts to passive receivers by allowing DEQ to require cleanup of upstream sources. Oregon law requires the Cleanup Program to follow a polluter-pays model, so the cost of identifying and cleaning up the PFAS remains with the polluter, as opposed to, for example, a water supply system that may need to test and treat to provide clean water.

Societal and community cost benefits

Societal- and community-level cost impacts are challenging to quantify and often unaccounted for when considering the effects of environmental contamination, despite the fact that these costs can be high. PFAS have been detected in Oregon's drinking water, fish, groundwater, surface water, soil, and sediment, in many cases at amounts exceeding health-based screening levels. A wide range of adverse health impacts have been linked to PFAS exposure, often even at low levels, such as cancer, high cholesterol, liver, immunological, endocrine, and cardiovascular damage, and low birth weight and developmental impacts to children.[58,59] Some studies have been done to estimate the health-related costs of PFAS. For example, one study estimated these costs to be approximately $37-59 billion annually in the United States, while another estimated $5.52-62.6 billion.[60,61] Other indirect social costs resulting from PFAS exposure also exist, though are difficult to quantify, such as lost wages, productivity, and years of life; reduced quality of life; and increased stress, anxiety, and depression, which may all have subsequent impacts on families and communities. As discussed in more detail in the Racial Equity Statement and Environmental Justice Considerations sections below, burdens resulting from exposure to contamination are likely to impact disadvantaged communities disproportionately. While quantifying the effect is challenging, reducing PFAS contamination in the environment and exposures to communities is expected to have a notable financial benefit to communities. The degree to which Oregon's communities will be financially impacted by exposure to PFAS contamination in the environment in the future depends largely on DEQ's ability to hold parties responsible for the contamination accountable. Additional costs to the public are discussed in the Public section below.

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[58] ATSDR, 2024. How PFAS Impacts Your Health. https://www.atsdr.cdc.gov/pfas/about/health-effects.html

[59] Zahm et al., 2024. Carcinogenicity of perfluorooctanoic acid and perfluorooctanesulfonic acid. The Lance Oncology. Volume 25, Issue 1. https://doi.org/10.1016/S1470-2045(23)00622-8.

[60] Cordner et al. 2021. The true cost of PFAS and the benefits of acting now. Environmental Science & Technology.

[61] Obsekov et al. 2022. Leveraging systematic reviews to explore disease burden and costs of per- and polyfluoroalkyl substance exposures in the United States. Exposure and Health.

Statement of cost of compliance

State agencies

DEQ

DEQ Cleanup Program
The Cleanup Program manages and oversees investigations, risk assessments, and cleanup actions; adding additional compounds, such as Oregon hazardous substances, is likely to increase the number of sites in the program. In many cases, responsible parties or limited grant funding cover these costs. In cases where the program has a waitlist for sites based on staffing limitations, prioritization is completed based on risks to people and the environment and impacts to parties requesting program participation; additional sites may influence the prioritization of the waitlist.

DEQ Emergency Response Program
The Emergency Response Program may respond to emergencies that may have resulted in potential PFAS release (e.g., firefighting foam used to extinguish a fire). If the proposed rules are adopted, in these cases, evaluations will be needed to determine whether sampling and cleanup action are needed.

DEQ permitting programs
Feedback from permitting programs (such as Solid Waste, Hazardous Waste, and Water Quality Programs) has indicated that any permitting requirements for testing or treatment of permitted facilities will be made independent of this rulemaking, except for the following. Oregon's underground injection rules (OAR 340-044-0018) include certain requirements for evaluations, sampling, plans, and approvals for injections of hazardous substances and facilities that have used, handled, or stored hazardous substances. Updating this rule may require additional work for the Underground Injection Control Program to consider PFAS in addition to the approximately 800 other hazardous substances already considered in program operations.

DEQ Drinking Water Protection Program
Public water systems test and monitor for contaminants to ensure drinking water does not exceed legally enforceable drinking water standards. In 2024, the EPA designated legally enforceable drinking water standards for six PFAS compounds. When public water systems identify contaminant levels greater than drinking water standards, the DEQ Drinking Water Protection Program, in conjunction with the Oregon Health Authority, evaluates potential sources of contamination in a source water assessment. When assessments identify sites that are in or could be in the Cleanup Program, the Drinking Water Protection Program coordinates with the Cleanup Program to evaluate next steps for potential investigations. However, without this rulemaking, DEQ is unable to require parties that may be contaminating drinking water to investigate possible releases and perform cleanup actions if warranted. No financial impact to the Drinking

Water Protection Program is anticipated; however, efforts by the Drinking Water Protection Program could be impeded based on Cleanup Program staffing availability.

Other DEQ programs
The rulemaking may indirectly impact other programs. Additionally, investigation and cleanup actions resulting from this rulemaking may lead to materials being removed from sites for disposal at landfills (e.g., from excavations). It is important to note that listing PFAS as hazardous substances does not list them as hazardous waste or hazardous constituents for regulation by DEQ's Hazardous Waste Program.

Oregon Health Authority

The Oregon Health Authority provides technical assistance and administers and manages grants and loans (e.g., Drinking Water State Revolving Fund grants and loans and Emerging Contaminants Bipartisan Infrastructure Law funding) to public water systems to address PFAS in drinking water. For example, technical assistance can be provided to water systems related to treatment options, operations and maintenance considerations, including spent media disposal. Without this rulemaking, DEQ cannot require responsible parties to address potential sources of PFAS in drinking water, leading to additional costs for OHA. These costs include staffing and funding for technical assistance and administering funding for treatment system design and installation. In addition, OHA supports DEQ in evaluating and communicating the risk to communities at cleanup sites in Oregon, and this proposed rulemaking may require additional resources to perform this work if PFAS investigations identify current exposures, and DEQ requests OHA's risk communication services from OHA may also be impacted by this rulemaking indirectly by the additional data collection the proposed rule would contribute to, as described in the Other DEQ programs section above.

Other Oregon agencies

Other state agencies (e.g., Departments of Transportation, State Lands, Fish and Wildlife, and Agriculture) may complete construction or improvement projects or otherwise encounter contamination that requires handling media that may be contaminated with hazardous substances, such as soil, groundwater, and sediment. Implementation of this rule may result in additional sampling, and if present at unacceptable levels, disposal requirements.

Local governments

In some cases, local governments may financially benefit from this rulemaking when they own facilities or systems, such as public water systems, publicly owned treatment works, and municipal solid waste landfills, where PFAS management may be needed but upstream sources cause contamination. Implementation of this rulemaking would help identify these sources and enable DEQ to require investigation and cleanup by the responsible parties, reducing the contamination load and costs to local government facilities and systems. Because the EPA has set legally enforceable drinking water standards, not completing this rulemaking would result in local governments and publicly owned water systems paying for the required treatment of PFAS in the drinking water system.

In some cases, local governments may be financially burdened by this rulemaking when they own or operate facilities that may have released PFAS contamination, such as municipal fire training facilities and some airports. Initial inventorying efforts have indicated Oregon has approximately eight Part 139 certified airports (required to maintain PFAS-containing firefighting foams on site) and 18 municipal fire training facilities serving the 20 most populated cities in Oregon.[62] These sites have a known or highly suspected history of use of firefighting foams that contain high levels of PFAS and may have been released to the environment during training or real fire emergencies.

Public

The public may be indirectly financially impacted by the implementation of this rulemaking. Many PFAS are known or suspected to have adverse health effects, such as cancer; high cholesterol; liver, immunological, endocrine, and cardiovascular damage; and low birth weight and developmental impacts to children.[58,59]

People or the environment may be harmed if exposed to PFAS by drinking, eating, or touching contaminated water, fish, groundwater, soil, or sediment. DEQ relies on the Oregon Hazardous Substance Remedial Action Rules to require parties who may be responsible for releases to investigate and, if needed, complete cleanup to protect people and the environment. An indirect economic benefit is expected for the people of Oregon, as this rulemaking would contribute to a cleaner and healthier environment. Reduced PFAS in the environment and reduced exposure to PFAS would reduce potential adverse health effects resulting from PFAS. Adverse health conditions negatively impact individual and family finances as well as the overall economy, due to increased health care costs, increased use of leave time, decreased pay if leave time is not available or is depleted, and increased missed work time and reduced productivity. Further, adverse health conditions impact quality of life. Communities and populations disproportionately affected by environmental contamination, such as minority groups or Tribal Nations, may be particularly affected by this rulemaking, as discussed in the Racial Equity Statement and Environmental Justice Considerations sections below.

Following implementation of this rulemaking, parties planning construction or ground-disturbing activities in areas with known or highly suspected PFAS contamination may be required to complete sampling or implement special handling and disposal practices.

Large businesses – businesses with more than 50 employees

[62] Note that other types of airports and municipal fire training facilities were not included in these numbers. Additionally, these numbers are approximate and have not been verified.

The Cleanup Program has begun inventorying sites with known or suspected use of PFAS and associated risk of release to the environment. Sites with the highest likelihood of large quantities of releases and exposures to people or the environment will be prioritized for investigation, assessment, and cleanup, if needed. Any business with a history of PFAS use and known or suspected PFAS release would be subject to this rulemaking, such as bulk fuel, metal plating, electronics manufacturing, and paper products manufacturing facilities. Initial inventorying efforts have indicated Oregon has 22 bulk fuel facilities with a capacity of 1 million gallons of fuel or more and 93 metal plating facilities.[63] Although many of these are expected to be large businesses, the sizes of these businesses are unknown, and more data and information about the presence and sources of PFAS in Oregon are needed to fully evaluate the number of large and small businesses that may be impacted by the implementation of this rulemaking.

Small businesses – businesses with 50 or fewer employees

Some small businesses that have used and possibly released PFAS compounds to the environment may be impacted by this rulemaking.

ORS 183.336 – Cost of Compliance for Small Businesses

a. Estimated number of small businesses and types of businesses and industries with small businesses subject to proposed rule.

As described in the large businesses section above, DEQ has begun inventorying potential PFAS use and release sites in Oregon, some of which may be small businesses. However, the complete number and type of businesses and industries that may be potential release sites is still being assessed. DEQ will use available database information to evaluate how many of the initially inventoried potential PFAS release sites in Oregon are small businesses.

b. Projected reporting, recordkeeping and other administrative activities, including costs of professional services, required for small businesses to comply with the proposed rule.

Reporting, recordkeeping, and administrative activities would only be needed for parties who are required or who voluntarily undertake investigation and remedial actions related to PFAS releases, such as maintaining sampling and field logs and reporting findings and recommended next steps. In most cases, environmental consultants are hired to manage and oversee these activities. The extent of these costs is related to the magnitude, importance and complexity of PFAS contamination at a site, if present.

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[63] Please note these numbers are approximate and have not been verified.

c. Projected equipment, supplies, labor and increased administration required for small businesses to comply with the proposed rule.

Equipment, supplies, labor, and increased administration costs would only be needed for parties who are required or who voluntarily undertake investigation and remedial actions related to PFAS, such as costs associated with field equipment and personnel, laboratory analytical testing, and evaluations and reporting by environmental professionals. In most cases, environmental consultants are hired to manage and oversee these activities. The extent of these costs is related to the magnitude, importance and complexity of PFAS contamination at a site, if present.

d. Describe how DEQ involved small businesses in developing this proposed rule.

The advisory committee for this rulemaking includes a representative for Oregon Business and Industry, with 83% of their 1,600+ members comprised of small businesses. DEQ also expects that public comments will include input from small and large businesses.

Documents relied on for fiscal and economic impact

Document title	Document location
ATSDR, 2024. How PFAS Impacts Your Health.	https://www.atsdr.cdc.gov/pfas/about/health-effects.html
Barbo et al., 2023. Locally caught freshwater fish across the United States are likely a significant source of exposure to PFOS and other perfluorinated compounds. Environmental Research, Volume 220.	https://www.sciencedirect.com/science/article/pii/S0013935122024926?via%3Dihub
Christensen et al., 2017. Perfluoroalkyl substances and fish consumption. Environmental Research. Volume 154.	https://www.sciencedirect.com/science/article/pii/S0013935116310726
Commission for Racial Justice, 1987. Toxic Waste and Race in the United States.	https://www.nrc.gov/docs/ml1310/ml13109a339.pdf
Cordner et al., 2021. Environmental Science & Technology, Volume 55.	https://pubs.acs.org/doi/full/10.1021/acs.est.1c03565
George et al., 2023. Nonlethal detection of PFAS bioaccumulation and biomagnification within fishes in an urban- and wastewater-dominant Great Lakes watershed. Environmental Pollution, doi: 10.1016/j.envpol.2023.121123.	https://www.sciencedirect.com/science/article/pii/S0269749123001252
Hamade, 2024. Fish consumption benefits and PFAS risks: Epidemiology and public	https://www.sciencedirect.com/science/article/pii/S2214750024001197

health recommendations. Toxicology Reports, Volume 13.	
Hoover et al., 2012. Indigenous peoples of North America: Environmental exposures and reproductive justice. Environmental Health Perspectives, Volume 120.	https://pubmed.ncbi.nlm.nih.gov/22899635/
Nilsen et al., 2024. Target and suspect per- and polyfluoroalkyl substances in fish from an AFFF-impacted waterway. Science of the Total Environment. Volume 906.	https://www.sciencedirect.com/science/article/pii/S0048969723064252
Obsekov et al., 2022. Leveraging systematic reviews to explore disease burden and costs of per- and polyfluoroalkyl substance exposures in the United States. Exposure and Health, Volume 15.	https://link.springer.com/content/pdf/10.1007/s12403-022-00496-y.pdf
Oregon Department of Environmental Quality, 2012. Off-Site Contaminant Migration Policy.	https://www.oregon.gov/deq/FilterDocs/OffSiteContaminantMigrationPolicy.pdf
Oregon Health Authority. Per- and polyfluoroalkyl substances (PFAS).	https://www.oregon.gov/oha/ph/healthyenvironments/drinkingwater/operations/pages/pfas.aspx
PM Environmental, 2023. Phase 1 vs. Phase 2 Environmental Site Assessments.	https://www.pmenv.com/articles/phase-1-vs-phase-2-environmental-site-assessments/
U.S. EPA About EPA's Work in the Columbia River Basin.	https://www.epa.gov/columbiariver/about-epas-work-columbia-river-basin#crbrp
U.S. EPA EJScreen: Environmental justice screening and mapping tool.	https://www.epa.gov/ejscreen
U.S. EPA Method 1633	https://www.epa.gov/cwa-methods/cwa-analytical-methods-and-polyfluorinated-alkyl-substances-pfas
U.S. EPA National Rivers and Streams Assessment.	https://www.epa.gov/national-aquatic-resource-surveys/nrsa
Zahm et al., 2024. Carcinogenicity of perfluorooctanoic acid and perfluorooctanesulfonic acid. The Lance Oncology. Volume 25, Issue 1.	https://doi.org/10.1016/S1470-2045(23)00622-8

Advisory committee fiscal review

DEQ appointed an advisory committee.

As ORS 183.333 requires, DEQ asked for the committee's recommendations on:

- Whether the proposed rules would have a fiscal impact,
- The extent of the impact, and
- Whether the proposed rules would have a significant adverse impact on small businesses; if so, then how DEQ can comply with ORS 183.540 to reduce that impact.

Most committee members preferred including the six PFAS compounds with enforceable drinking water standards in the proposed rule, rather than the initial proposal of only PFOA and PFOS. However, some committee members expressed concern with DEQ expanding the number of compounds included in the proposed rule, and one member thought DEQ was not transparent with the scope of the rulemaking. DEQ evaluated these concerns and has determined that adopting the six PFAS compounds with established drinking water standards provides better protection of people and the environment and will not require considerably more work or expense to investigate, assess, and cleanup contamination compared to the initial proposal of only PFOA and PFOS. These six compounds have the same analytical methods, treatment technologies, and disposal methods. As such, the change from two to six PFAS compounds proposed in this rulemaking will not result in additional analytical, treatment, or disposal costs.

Regarding the fiscal impact statement, some committee members suggested updates be made to estimates related to investigation and cleanup costs that more accurately reflect the upper end of potential costs. Additional cost information was added to the fiscal impact statement to describe potential investigation and cleanup costs. One committee member voiced concerns that some small businesses may not be able to afford investigation costs.

As ORS 183.333 and 183.540 require, the committee considered how DEQ could reduce the rules' fiscal impact on small business by:

- Establishing differing compliance or reporting requirements or timetables for small business,
- Clarifying, consolidating or simplifying the compliance and reporting requirements under the rule for small business,
- Utilizing objective criteria for standards,
- Exempting small businesses from any or all requirements of the rule, or
- Otherwise establishing less intrusive or less costly alternatives applicable to small business.

The DEQ Cleanup Program already engages with some small businesses to investigate releases of hazardous substances and complete cleanup actions when needed. When funds available to a business to meet investigation and cleanup actions are low, DEQ engages with several practices aimed at easing cost burdens, such as:

- Most parties engage with the Cleanup Program voluntarily. Low to medium priority sites in many to most cases will not be engaged by DEQ's Cleanup Program unless a party chooses or requests engagement. Before entering an agreement, Cleanup staff can meet with parties to discuss options for engaging with Cleanup and what actions and costs to expect.

- Barring a critical threat to people or the environment, DEQ can work with parties to phase work and create a schedule to distribute costs over time to alleviate cost burdens. For example, in most cases, simple reconnaissance-level records review and sampling are completed to establish an initial understanding and data at a site.
- DEQ's Off-Site Contaminant Migration Policy states that, generally, in cases where hazardous substances are located at a property solely due to the migration of sources outside the property, DEQ will not require the owner or operator of the impacted property to perform or pay for cleanup activities.[64] Cleanup staff can assist parties in interpreting and applying this policy.

Housing cost

As ORS 183.534 requires, DEQ evaluated whether the proposed rules would influence the development cost of a 6,000-square-foot parcel and construction of a 1,200-square-foot detached, single-family dwelling on that parcel. DEQ determined the proposed rules are unlikely to influence development and housing costs.

[64] Oregon DEQ, 2012. Off-Site Contaminant Migration Policy. https://www.oregon.gov/deq/FilterDocs/OffSiteContaminantMigrationPolicy.pdf

Racial equity

ORS 183.335(2)(b)(F) requires state agencies to provide a statement identifying how adoption of this rule will affect racial equity in this state.

The proposed rulemaking may have a positive impact on racial equity. The proposed rule expands the list of hazardous substances for which DEQ can require investigation and remediation in the event of a release or threat of a release. The rule is anticipated to improve environmental quality by supporting the identification of hazardous substances and cleanup to address unacceptable risk in environmental media such as drinking water, surface water, groundwater, and fish.

Minority communities, including racial minorities, face disproportionate burdens of environmental pollution; for example, race has been identified as a key factor for disparities in proximity to sites with hazardous materials. [65] This rulemaking is necessary to enable DEQ to collect data to evaluate the presence and sources of PFAS in Oregon, as well as which communities are most impacted. To protect people and ensure all Oregonians are protected, including those with the least resources, it is essential that DEQ can require investigations, and if an unacceptable risk exists, to implement cleanup measures. DEQ's Cleanup Program evaluates all potential exposure pathways and receptors during investigations and risk assessments. This allows DEQ to assess the communities that may be disproportionately impacted by contamination from a release and make requirements of responsible parties to address exposures.

It is expected that the following groups are most likely to benefit from the rulemaking in terms of racial equity: minority groups living near industrialized and urbanized areas, as well as minority, immigrant, and Tribal communities that consume fish from local waterways. Racial equity is one component of Environmental Justice, discussed in greater detail in the following section. Following issuance of this draft document, DEQ will continue to engage with representatives of organizations providing services to underserved communities to include input in the final document. Information in the Environmental Justice Considerations section below is also relevant to racial equity.

[65] Commission for Racial Justice, 1987. Toxic Waste and Race in the United States. https://www.nrc.gov/docs/ml1310/ml13109a339.pdf

Environmental justice considerations

ORS 182.545 requires natural resource agencies to consider the effects of their actions on environmental justice issues.

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, culture, education or income concerning the development, implementation and enforcement of environmental laws, regulations and policies. DEQ is committed to incorporating environmental justice best practices into its programs and decision-making to ensure all people in Oregon have equitable environmental and public health protections. DEQ considered these effects by evaluating how minority communities or communities disproportionately impacted by environmental contamination may be impacted by this rulemaking and by consulting with representatives of organizations providing services to underserved communities. Following the issuance of this draft document, DEQ will continue engagement with these representatives to include input in the final document. Further, DEQ will consider and work with disproportionately impacted communities in Oregon when prioritizing PFAS investigations.

This rulemaking may have a positive benefit to environmental justice by allowing DEQ to investigate and mitigate potential sources of contamination to reduce and prevent exposures to disadvantaged and environmental justice communities as well as collect additional data to better understand how certain communities may be disproportionately impacted by exposure to PFAS. This is important as wealthier communities may be able to afford to collect and analyze samples or complete treatment, while communities without these resources may not. Given data limitations on the sources and presence of PFAS in Oregon, DEQ is currently unable to fully evaluate environmental justice impacts of PFAS environmental contamination or this rulemaking. However, the Cleanup Program is undertaking efforts to inventory potential PFAS release sites and evaluate environmental justice considerations.

Industrial areas

PFAS use and releases to the environment have been associated with various industries present in Oregon (e.g., fire training, chrome plating, electronics manufacturing, and paper products manufacturing), and communities more likely to live and work near industrialized areas are already overburdened by environmental pollution and tend to have a higher proportion of low-income and minority families. This rulemaking would give DEQ the authority to require likely sources to investigate potential releases and, if needed, take action to address releases resulting in exposures to people or the environment.

Drinking water

Through initiatives by the EPA and the Oregon Health Authority, PFAS have been detected in some of Oregon's public water systems,[66] and additional data collection is planned, which may identify additional systems with contamination. When a public water system detects compounds, including PFAS, above drinking water standards, the OHA and DEQ's Drinking Water Protection Program conduct source water assessments to evaluate potential sources in the drinking water source areas. In cases where sites in DEQ's Cleanup Program, or potential candidates for the program, are identified, the Drinking Water Protection Program coordinates with the Cleanup Program to initiate investigations of possible sources. Without this rulemaking, DEQ cannot require investigation at facilities that may have released PFAS to the drinking water source area.

Generally, drinking water treatment for PFAS is extremely costly. Without the ability to require responsible parties to investigate and cleanup PFAS, the treatment cost burden falls on local municipalities and ratepayers. While grants and loans may be available for public water systems, smaller public water systems may have a more difficult time shouldering the costs of protecting the health of their customers by ensuring that PFAS are not in the drinking water. Costs might be passed on to the customers, which would be a higher burden for low-income communities that already pay a higher share of their income for basic food, shelter, water, and necessities. Further, PFAS information for private domestic wells is largely unavailable in Oregon, as the previous and ongoing drinking water studies do not include these wells, making potential drinking water exposures to rural communities a notable data gap. Wealthier communities and well owners may be able to afford testing and treatment of private wells, while those with less financial resources may be unable to do so. Oregon law requires the Cleanup Program to follow a polluter-pays model, ensuring that the public does not shoulder the cost of cleaning up the contamination that specific facilities or other parties released into the environment. By completing this rulemaking, DEQ could require that these responsible parties pay for the investigation and cleanup, alleviating the cost to the public and disproportionately impacted communities. The DEQ Cleanup Program will work with water suppliers, the Drinking Water Protection Program, and OHA to evaluate potential sources of PFAS in drinking water.

Fish exposure

PFAS are bioaccumulative and have been found in fish tissue in streams and rivers across the U.S. and have been linked to exposures to people who consume fish in their

[66] Oregon Health Authority. Per- and polyfluoroalkyl substances (PFAS). https://www.oregon.gov/oha/ph/healthyenvironments/drinkingwater/operations/pages/pfas.aspx

diet.[67,68,69] Fish contamination poses health risks for populations that fish in local waterways and consume fish at higher rates, such as Tribal, low-income, and subsistence fishers. Exposure via fish consumption is particularly notable for Tribal communities in Oregon as fish, especially salmon, have substantial cultural significance. Tribal communities often consume substantially more fish than non-Tribal communities, resulting in higher health risks associated with exposure to contaminants in fish. Environmental contamination may also impact other important first foods, or traditionally gathered foods, such as game, roots, and berries. Tribal populations are more likely to experience disease and chronic illness compared to other populations, and exposure to environmental contaminants can cause or compound health conditions.[70]

Initial limited data have shown that PFAS are present in fish tissue in multiple Oregon streams and rivers, with concentrations exceeding OHA's health screening level at six sites.[71,72] Currently, DEQ is unable to require likely sources of contamination to investigate or conduct cleanup to address fish contamination, because PFAS are not currently listed as a hazardous substance in Oregon. Implementation of this rulemaking will contribute to further data collection for fish in Oregon, as all exposure pathways, including fish consumption, are considered when evaluating exposure risk from release sites. Additional data may contribute to fish advisories in certain waterbodies when warranted. For example, fish samples collected in the Columbia Slough in Portland, Oregon, resulted in OHA issuing Oregon's first PFAS-based fish consumption advisory in 2022. This waterway is known to have minority communities that catch and consume fish. While fish consumption advisories are one tool available to reduce exposure to contaminants, they are limited in their usefulness; some people may continue to eat fish even with an advisory in place while those that do not may lose out on the many benefits fish provide, including an affordable or free food source, notable health benefits, and cultural significance for some groups.[73] Further, Oregon Tribes retain certain entitlements and protections for fish via treaty rights. Given these considerations, the Cleanup Program can require parties to take cleanup actions to

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[67] Christensen et al., 2017. Perfluoroalkyl substances and fish consumption. Environmental Research. Volume 154. https://www.sciencedirect.com/science/article/pii/S0013935116310726
[68] George et al., 2023. Nonlethal detection of PFAS bioaccumulation and biomagnification within fishes in an urban- and wastewater-dominant Great Lakes watershed. Environmental Pollution, doi: 10.1016/j.envpol.2023.121123. https://www.sciencedirect.com/science/article/pii/S0269749123001252
[69] Barbo et al., 2023. Locally caught freshwater fish across the United States are likely a significant source of exposure to PFOS and other perfluorinated compounds. Environmental Research, Volume 220. https://www.sciencedirect.com/science/article/pii/S0013935122024926?via%3Dihub
[70] Hoover et al., 2012. Indigenous peoples of North America: Environmental exposures and reproductive justice. Environmental Health Perspectives, Volume 120. https://pubmed.ncbi.nlm.nih.gov/22899635/
[71] U.S. EPA National Rivers and Streams Assessment: https://www.epa.gov/national-aquatic-resource-surveys/nrsa
[72] Nilsen et al., 2024. Target and suspect per- and polyfluoroalkyl substances in fish from an AFFF-impacted waterway. Science of the Total Environment. Volume 906. https://www.sciencedirect.com/science/article/pii/S0048969723064252
[73] Hamade, 2024. Fish consumption benefits and PFAS risks: Epidemiology and public health recommendations. Toxicology Reports. Volume 13. https://www.sciencedirect.com/science/article/pii/S2214750024001197

reduce fish or other animal and plant contamination to protect people and the environment from exposure.

An additional consideration includes waterbodies or watersheds shared with neighboring states who may be able to compel cleanup actions where Oregon cannot without this rulemaking. For example, the Columbia River Basin is one of the largest watersheds in North America, and given its significance, Congress amended the Clean Water Act in 2016 to establish a Columbia River Basin Restoration Program.[74] The basin covers a significant area of Oregon and over 90% of potential PFAS release sites in Oregon are located within the basin based on initial draft inventorying efforts. Approximately 300 miles of the Columbia River serves as the border between Oregon and Washington. Washington regulates all PFAS as hazardous substances and can require investigation and cleanup of PFAS contamination. Consistency in regulatory approaches with neighboring states is expected to have a variety of benefits, including reducing contamination in fish and improving environmental justice.

[74] U.S. EPA About EPA's Work in the Columbia River Basin. https://www.epa.gov/columbiariver/about-epas-work-columbia-river-basin#crbrp

Land use

Land-use considerations

In adopting new or amended rules, ORS 197.180 and OAR 340-018-0070 require DEQ to determine whether the proposed rules significantly affect land use. If so, DEQ must explain how the proposed rules comply with statewide land-use planning goals and locally acknowledged comprehensive plans.

Under OAR 660-030-0005 and OAR 340 Division 18, DEQ considers that rules affect land use if:

- The statewide land use planning goals specifically refer to the rule or program, or
- The rule or program is reasonably expected to have significant effects on:
- Resources, objects, or areas identified in the statewide planning goals, or
- Present or future land uses identified in acknowledged comprehensive plans

DEQ determined whether the proposed rules involve programs or actions that affect land use by reviewing its Statewide Agency Coordination plan. The plan describes the programs that DEQ determined significantly affect land use. DEQ considers that its programs specifically relate to the following statewide goals:

Goal	**Title**
5	Natural Resources, Scenic and Historic Areas, and Open Spaces
6	Air, Water and Land Resources Quality
11	Public Facilities and Services
16	Estuarine Resources
19	Ocean Resources

Statewide goals also specifically reference the following DEQ programs:

- Nonpoint source discharge water quality program – Goal 16
- Water quality and sewage disposal systems – Goal 16
- Water quality permits and oil spill regulations – Goal 19

Determination

DEQ determined that these proposed rules do not affect land use under OAR 340-018-0030 or DEQ's State Agency Coordination Program.

EQC prior involvement

DEQ presented this proposed rulemaking as an informational item to the EQC in July 2025.

Advisory committee

Background

DEQ convened the PFAS 2025 Rulemaking advisory committee, which met twice, once in November 2024 and once in January 2025. The committee included members representing wastewater, municipal water providers, landfills, environmental advocates, Tribal, environmental consulting, academic, business and industry, military, government, and aviation interests.

The committee members were:

Rulemaking Name Advisory Committee	
Name	**Representing**
Negonnekodoqua Blair	Confederated Tribes of the Umatilla Indian Reservation
Anzie St Clair	Port of Portland
Jim Denson	Waste Management
Jamie DeWitt	Oregon State University
Heather Gosack	Williams Sale Partnership Limited
Jeremy Haney	Oregon Military Department
Jeff Hunter	Perkins Coie, on behalf of Oregon Business and Industry
Michael Karnosh	Confederated Tribes of Grand Ronde
Johnny Leavy	City of Medford Public Works Water Reclamation Division and Association of Clean Water Agencies
Karen Lewotsky	Oregon Environmental Council
Jamie Porter	Rainbow Water District
Rose Poton	Verde
Teryn Yazdani	Columbia Riverkeeper

Meeting notifications

To notify people about the advisory committee's activities, DEQ:

- Sent GovDelivery bulletins, a free e-mail subscription service, to the following lists:
  - Rulemaking
  - DEQ Public Notices
  - PFAS
- Posted meeting information and materials on the web page for this rulemaking.

- Added advisory committee announcements to DEQ’s calendar of public meetings at DEQ Calendar.

Committee discussions

In addition to the recommendations described under the Statement of Fiscal and Economic Impact section above, the committee reviewed materials and gave feedback on the draft rule concepts. All agendas, meeting presentations, and meeting summaries can be found at PFAS 2025.

Public engagement

Public notice

DEQ provided notice of the proposed rulemaking and rulemaking hearing by:

- Filing notice on March 31, 2025, with the Oregon Secretary of State for publication in the April 2025 Oregon Bulletin
- Posting the notice, invitation to comment and draft rules on the web page for this rulemaking, located at PFAS 2025
- Emailing approximately 32,000 interested parties on the following DEQ lists through GovDelivery:
    - Rulemaking
    - DEQ Public Notices
    - PFAS
    - Cleanup Program, Sites and Spills
- Emailing the following legislators required under ORS 183.335:
    - Senator Rob Wagner, Senate President
    - Representative Julie Fahey, House Speaker
    - Senator Janeen Sollman, Chair, Senate Energy and Environment Committee
    - Senator David Brock-Smith Vice Chair, Senate Energy and Environment Committee
    - Representative John Lively, Chair, House Climate Energy and Environment Committee
    - Representative Bobby Levy, Vice-Chair House Climate Energy and Environment Committee
    - Representative Mark Gamba, Vice-Chair House Climate Energy and Environment Committee
- Emailing advisory committee members
- Posting on the DEQ event calendar

Public hearing

DEQ held two public hearings. DEQ received one comment at the first hearing and no comments at the second hearing. Later sections of this document include a summary of the 38 comments received during the open public comment period, DEQ's responses, and a list of the commenters. Original comments are on file with DEQ.

Presiding officers' record

Hearing 1

Date	April 22, 2025
Place	Zoom webinar
Start Time	11 a.m.
End Time	11:30 a.m.
Presiding Officer	Sarah Van Glubt

Hearing 2

Date	April 22, 2025
Place	Zoom webinar
Start Time	6 p.m.
End Time	6:34 p.m.
Presiding Officer	Sarah Van Glubt

Presiding officer:

The presiding officer convened the hearing, summarized procedures for the hearing, and explained that DEQ was recording the hearing. The presiding officer asked people who wanted to present verbal comments to sign the registration list, or if attending by phone, to indicate their intent to present comments. The presiding officer advised all attending parties interested in receiving future information about the rulemaking to sign up for GovDelivery email notices.

Per Oregon Administrative Rule 137-001-0030, the presiding officer summarized the content of the rulemaking notice.

Thirty-two people attended the first hearing and four people attended the second hearing. Both hearings were hosted on Zoom webinar. One person commented orally at the first meeting, no one commented orally at the second hearing, and no one submitted written comments at either hearing.

Summary of public comments and DEQ responses

Public comment period

DEQ accepted public comment on the proposed rulemaking from April 1, 2025, until 4 p.m. on May 9, 2025.

The following table provides a list of commenter ID #s, names and affiliation or organization for public comments received by the close of the public comment period. The description below the table organizes comments into 17 topics and corresponding DEQ responses with cross references to commenter(s). Public comments are included in Attachment C.

DEQ did not change the proposed rules in response to comments.

List of Commenters		
Commenter ID#	**Name**	**Affiliation or organization**
1	Robert Simon	American Chemistry Council
2	Jeffrey Hunter	Perkins Coie
3	Alexander Christy	
4	Ryan Jones	
5	Megan Beck	
6	Ben Criswell	
7	Dani Lightle and Katie Murray	Oregonians for Food & Shelter
8	Sharla Moffett	Oregon Business & Industry
9	Josh Graper	Rogue Valley International-Medford Airport (KMFR)
10	Drexell Barnes	City of Bend Water Services

List of Commenters		
Commenter ID#	**Name**	**Affiliation or organization**
11	Michael Martin	League of Oregon Cities
12	Alyssa MacDonald	Joint Water Commission
13	Chelsea Stewart-Fusek	
14	Mary Stites and Teryn Yazdani	Northwest Environmental Defense Center and Columbia Riverkeeper
15	Jerry Linder	Oregon Association of Clean Water Agencies
16	Tracy Rainey	Clean Water Services
17	Amy Wentworth	Pacific Seafood
18	Rebecca Jacobsen	
19	Eric Lintner	Consonus Pharmacy
20	Louise Tolzmann	
21	Lori Mason	
22	Joshua Shulman	
23	Thomas Fox	Center for Environmental Health
24	David Terrault	
25	Doris Cellarius	
26	Jane Stackhouse	
27	Kathy and Bruce Hanna	

List of Commenters		
Commenter ID#	Name	Affiliation or organization
28	Dick Hellberg	
29	Emily Belford	
30	Jewelara Burgeye	
31	Mat Merritt	
32	Leah Titus	
33	Tiffany Kallgren	
34	Melissa Ulrich	
35	Jenn Seim	
36	Connor Katchmark	
37	Christopher Lave-Massee	
38	Doris Cellarius	

Comment topic #1: General support for rulemaking.

Description: Some comments conveyed general support for the rulemaking. Some commenters cited adverse health effects associated with PFAS and the need for clarity and certainty given potential changes to federal regulations.

Response: DEQ acknowledges these comments and thanks the commentors for their input.

Comment IDs linked to this comment topic: 3, 4, 5, 6, 13, 14, 18, 20, 21, 22, 23, 24, 25, 26, 30, 31, 32, 33, 34, 35, 36, 37, 38

Comment topic #2: Out of scope topics.

Description: Some comments include suggestions or references to topics that are out of scope for this rulemaking, such as climate change, microplastics, biosolids, elimination of the use of PFAS, exemptions for certain parties or releases from Oregon Cleanup statutes and rules, changes to taxes, and designation of these compounds as hazardous waste.

Response: DEQ acknowledges these comments and notes that they include suggestions or references to topics that are out of scope for this rulemaking.

- While cleanup actions may involve the use of fossil fuel, this rulemaking does not have direct ties to climate change or climate protection
- This rulemaking does not impact the presence or regulation of microplastics
- This rulemaking is not expected to directly impact biosolids; the Cleanup Program defers to the biosolids program for addressing releases to the environment from biosolids
- This rulemaking does not impact the ability of parties to use, purchase, store, or transport PFAS products
- This rulemaking does not change Oregon statutes or Cleanup processes or policies related to exemptions
- This rulemaking does not change Oregon taxes
- This rulemaking does not impact other chemical definitions, such as hazardous waste

Comment IDs linked to this comment topic: 19, 20, 24, 27, 28, 29, 33, 34

Comment topic #3: Clarifying question: Would PFAS be incorporated into TMDLs?

Description: One commenter asked if PFAS would be incorporated into Total Maximum Daily Load.

Response: Whether or not a compound is listed as a hazardous substance does not impact listing impaired waters under the Clean Water Act section 303(d) and associated DEQ Total Maximum Daily Loads Program. The impaired waters list and the subsequent TMDLs are established based on the water quality standards to protect beneficial uses of surface waters in Oregon. The current Assessment Methodology for the impaired waters list for PFAS are based on Oregon Health Authority’s health advisories. For example, results from a sampling effort in the Columbia Slough in Portland OR resulted in Oregon Health Authority issuing Oregon's first fish consumption advisory for PFAS, specifically PFOS. As a result, DEQ's Water Quality Assessment Program listed the Columbia Slough as impaired for PFOS in the draft 2024 Integrated Report which was submitted to EPA in March 2025 and is awaiting approval.

Comment IDs linked to this comment topic: 37

Comment topic #4: DEQ should include additional PFAS compounds in the rulemaking.

Description: Some commenters noted concerns related to health effects related to PFAS exposure and recommended DEQ include additional PFAS compounds in this rulemaking and/or future rulemakings. Commenters suggested additional rulemakings to include additional PFAS compounds may be warranted as new science related to persistence, bioaccumulation, toxicity, and impacts to the environment develop. Commenters suggested DEQ take a proactive approach to PFAS and noted that DEQ could build on similar efforts taking place in neighboring states. One commenter suggested that sufficient scientific research is available to approach PFAS as a class and for DEQ to propose including all PFAS as hazardous substances.

Response: DEQ acknowledges there is research indicating additional PFAS compounds, and perhaps the entire class, have toxic characteristics. Currently there are not sufficient tools available to investigate and cleanup the entire class of compounds, such as analytical methods to quantify all compounds and screening levels based on toxicity data. We have more robust research available for specific individual compounds. For example, the U.S. Environmental Protection Agency has used toxicity data to set screening levels for soil and water for 15 PFAS compounds. The screening levels are not legally enforceable but set safe exposure levels based on toxicological studies. DEQ references these screening levels when evaluating contamination at sites. Six of those 15 compounds currently have enforceable federal rules related to cleaning up contamination and/or drinking water; these are the compounds proposed in this rulemaking. DEQ acknowledges that there is additional toxicity data of varying degrees available for other PFAS compounds, including some that have similarly well-established toxicity research. We are currently proposing these six given that they have completed federal rulemaking and have enforceable drinking water standards.

Comment IDs linked to this comment topic: 3, 6, 13, 23

Comment topic #5: DEQ should list fewer compounds to stay in alignment with EPA.

Description: Some commenters suggest DEQ only list two PFAS compounds (PFOA and PFOS) as Oregon hazardous substances to remain in alignment with EPA.

Response: Oregon's list of hazardous substances references and includes the federal list of hazardous substances. However, Oregon cleanup laws are separate from and independent of federal cleanup laws, and the Environmental Quality Commission can, and has, listed hazardous substances in Oregon beyond those listed federally. Some commenters indicated that discrepancies between state and federal hazardous substances would create confusion; DEQ notes that this is already the case in Oregon and many other states. Further, listing the six proposed PFAS compounds compared to the two listed by EPA would be more protective and is not anticipated to substantively increase cleanup costs.

Comment IDs linked to this comment topic: 2, 7, 8, 10, 11, 16, 17

Comment topic #6: It is not scientifically accurate or appropriate to group all PFAS together. DEQ should revisit its stated assumptions in the rulemaking to recognize the differences within this broad class of compounds.

Description: One commenter indicated that DEQ's assumptions regarding the risks of PFAS compounds was overly broad given the wide array of individual chemicals in the PFAS class.

Response: DEQ acknowledges and shares the view of the commenter that PFAS are a large chemical class comprising several thousand individual compounds and that compound physiochemical properties influence toxicity, persistence, and mobility in the environment. The six PFAS proposed in this rulemaking are of the same PFAS category: perfluoroalkyl acids, or PFAAs. Many PFAS have been found to be toxic, persistent, and mobile in the environment. However, research on the entire class of PFAS is less robust compared to some individual compounds. For that reason, DEQ is proposing six PFAS compounds in this rulemaking that are among the most researched and understood compounds and have well established characteristics that make their presence in the environment concerning. Particularly, these compounds have well established toxic effects, as described in the September staff report.

Comment IDs linked to this comment topic: 1

Comment topic #7: This rulemaking does not meet statutory requirements as not all compounds have been detected above health-based screening levels.

Description: One commenter indicated that this rulemaking does not meet statutory requirements to list these PFAS compounds as hazardous substances.This commenter said DEQ should focus on listing compounds that have been detected and exceed health-based screening levels and noted that several of the proposed compounds had limited or no detections from some of EPA's drinking water monitoring.

Response: The regulatory authority for this rulemaking is included in ORS 465.400 and 465.315. ORS 465.400 states that "Before designating a substance or class of substances as a hazardous substance, the commission must find that the substance, because of its quantity, concentration, or physical, chemical or toxic characteristics, may pose a present or future hazard to human health, safety, welfare or the environment should a release occur." Oregon statute does not, however, include the detection of compounds in the environment at levels exceeding health-based screening levels as a requirement for designation as hazardous substances. DEQ considers the toxicity research available for the proposed compounds sufficiently demonstrates the statutory requirements are met to list these compounds as Oregon hazardous substances. More information about these compounds' toxicity is available in the September Staff Report. Further, all six PFAS compounds proposed for this rulemaking have been detected in Oregon's environment and/or drinking water at levels exceeding health-based levels. For example, PFOA, PFOS, PFHxS, and PFNA have all been detected in Oregon groundwater at levels exceeding health-based screening levels set by the EPA. PFOA, Additionally, PFOS, PFOA, PFHxS, GenX, and PFBS have all been detected in Oregon drinking water exceeding drinking water standards set by the EPA. The Oregon Health Authority website has more information on PFAS detections in drinking water.

Comment IDs linked to this comment topic: 1

Comment topic #8: DEQ should wait to complete rulemaking until federal litigation is resolved.

Description: One commenter noted that the 2024 PFAS federal rulemakings are undergoing litigation. One of the rulemakings established two PFAS compounds as hazardous substances and the other rulemaking established drinking water regulations, including drinking water standards, for six PFAS compounds. The commenter recommended that DEQ postpone this rulemaking effort until the litigations for the federal rulemakings are resolved.

Response: Oregon's environmental cleanup laws are separate from and independent of federal law. The EQC can, and has, listed additional Oregon hazardous substances than the federal list, such as oil and methane. Further, DEQ acknowledges the federal regulatory landscape is uncertain. Listing these PFAS as hazardous substances in Oregon rule provides clarity and certainty for people in Oregon and ensures that DEQ is protecting communities around our state.

Comment IDs linked to this comment topic: 1

Comment topic #9: DEQ should list fewer compounds, as DEQ is deviating from the advisory committee charter and additional input and analysis is needed for this rulemaking.

Description: Some commenters noted concern that DEQ's current rulemaking proposal to list six PFAS as Oregon hazardous substances is expanded from the initial proposal brought to the rulemaking advisory committee of listing two PFAS compounds (PFOA and PFOS), and indicated this change is significant and beyond the stated purpose of the rulemaking.

Some commenters also suggested that additional engagement, input, and analysis is needed to expand the rulemaking to include six PFAS compounds, particularly in the context of passive receivers. These commenters suggested that the process for this proposed rulemaking was condensed and recommend deferring listing additional compounds beyond PFOA and PFOS until more information is available and opportunities for input are provided.

Response: The topic of how many PFAS compounds to include in this rulemaking was a priority for DEQ to get feedback on from outside parties. For example, the second advisory committee meeting included a robust discussion on the topic of how many compounds to include and all committee members had the opportunity to provide input. Initially, DEQ proposed readopting the current list of federal hazardous substances, which would result in adding PFOA and PFOS to Oregon's list of hazardous substances. We heard from the advisory committee and public comments that some people preferred DEQ list the same two PFAS compounds as EPA while others preferred DEQ regulate additional compounds or the entire class. DEQ has determined that listing the six compounds would be more protective of people and the environment. Further, the six PFAS currently proposed present a middle of the road approach taking into consideration feedback received. It is common for proposed rules to be updated based on input received during advisory committee meetings and the public comment period.

One commenter indicated that during the first rulemaking advisory committee meeting, DEQ stated that adding additional compounds beyond PFOA and PFOS would be outside of the scope of this rulemaking. However, it has never been DEQ's stance that suggestions for changes to the list of PFAS compounds proposed for this rulemaking would be out of scope.

Comment IDs linked to this comment topic: 11, 15, 16

Comment topic #10: DEQ should list fewer compounds, as remediation methods for short-chain compounds are not well developed and may be more expensive.

Description: Some commenters noted concerns related to listing compounds in addition to PFOA and PFOS due to challenges in remediating short-chain PFAS compounds, including less well developed remediation technologies and higher costs.

Response: DEQ notes that PFNA was erroneously listed as a shorter-chain compound by the commenters; PFNA is a longer-chained compound than PFOA, having one additional fluorinated carbon atom. PFHxS, GenX and PFBS are, however, shorter-chain compounds than PFOA and PFOS and DEQ acknowledges these compounds have higher water solubility. DEQ also acknowledges that shorter-chained compounds with higher solubilities can be more challenging to treat from water than longer-chained compounds. However, DEQ notes that all six PFAS compounds proposed in this rulemaking can be analyzed and treated using the same methods and technologies, and notable cost differences to test for and cleanup all six PFAS compounds versus two compounds is not anticipated. For example, EPA Method 1633 analyzes for 40 PFAS analytes, including the proposed six compounds and common water treatment technologies such as granular activated carbon and ion exchange resins are effective in treating all six proposed compounds.

Comment IDs linked to this comment topic: 2, 8, 17

Comment topic #11: Cost concern: Estimated costs are uncertain, case studies focused on investigation rather than cleanup costs, and estimated costs may be underestimated.

Description: Some commenters noted concerns that costs presented in the Statement of Fiscal and Economic Impact are estimates and that DEQ indicated costs are challenging to estimate.

Response: There are cost uncertainties associated with this proposed rulemaking, as described in the Cost Uncertainties section of the Statement of Fiscal and Economic Impact. For example, costs to investigate and cleanup contamination at a given site is highly variable, depending on several factors, such as:

- Site location and use
- Local geology and depth to groundwater
- Type of PFAS use and likelihood of release
- The magnitude and extent of PFAS release, if one has occurred
- Whether people or the environment are impacted by releases, and to what extent
- Cleanup and treatment options

It is important to note that costs for PFAS investigations are anticipated to be similar to other types of contaminants already regulated and commonly encountered, such as chlorinated solvents, dioxins, and petroleum products.

Some commenters also noted that the case studies provided in the Statement of Fiscal and Economic Impact primarily described investigation costs rather than cleanup costs and that only one case study included an estimate of cleanup costs. DEQ notes that the Statement of Fiscal and Economic Impact also includes Table 1 with general scenarios necessitating possible PFAS investigation or cleanup actions and general associated cost ranges.

One commenter also suggested that DEQ underestimated costs associated with the proposed rulemaking. Some rulemaking advisory committee members provided feedback to DEQ that initial cost estimates in the Statement of Fiscal and Economic Impact were too low, particularly for cleanup costs. As a result, DEQ updated the statement to reflect more realistic high-end costs.

Comment IDs linked to this comment topic: 2, 7, 8, 17

Comment topic #12: Cost concerns: Businesses, including small businesses, and airports could be adversely affected by the rulemaking.

Description: Some commenters noted that costs for investigation and cleanup of PFAS contamination may be high and could have notable impacts to small businesses or public airports.

Response: DEQ acknowledges that investigation and cleanup costs can be expensive for some sites. However, DEQ expects these costs to be similar to those for contaminants already commonly encountered and managed at sites. Further, DEQ thinks these actions and associated costs in some cases will be needed in order to protect people and the environment from exposure to these chemicals with known toxicity. The Cleanup Program commonly works with small businesses and respects the financial limitations some parties may have. The Cleanup Program can use flexible schedules and project phasing to ease financial burdens, conduct Ability to Pay analyses where cleanup work may produce a hardship, and help coordinate some limited funding opportunities, such as through Business Oregon or Brownfields.

One commenter noted that any location where firefighting foam was applied could have resulted in a PFAS release. While this is true, the Cleanup Program's approach to potential firefighting foam sites is on a worst first basis, where releases are most likely to have occurred and people and the environment may be impacted. That means sites with repeated use of firefighting foams, such as airports, military installations, or fire training facilities are of highest concern regarding firefighting foams. This commenter further expressed concern that residential properties may need cleanup action for PFAS as a result of firefighting activities. However, the Cleanup Program generally only works with residential property owners in cases where they may be impacted by contamination from offsite industrial or commercial sources.

One commenter noted concerns for potential impacts to routine airport construction projects, such as project delays, high testing costs and cleanup obligations. DEQ commonly works with parties, including airports, completing construction projects in contaminated areas and can provide technical assistance in creating Contaminated Media Management Plans.

Comment IDs linked to this comment topic: 2, 7, 8, 9, 17

Comment topic #13: DEQ should provide guidance, a phased implementation approach, and cost sharing opportunities.

Description: One commenter requested that DEQ provide guidance, technical assistance, phased implementation and cost-sharing pathways for investigations, particularly in the context of airports.

Response: Addressing contamination at sites can be costly, and airports may have particular concerns related to PFAS contamination. DEQ provides guidance and technical assistance to all parties working with the Cleanup Program. DEQ commonly utilizes phased implementation with parties that may experience cost burdens as a result of investigation and cleanup work and will do the same with PFAS sites. Oregon statute requires DEQ recover costs from responsible parties. However, DEQ can complete Ability to Pay analyses and assist parties with some limited funding opportunities, such as through Business Oregon and Brownfields.

Comment IDs linked to this comment topic: 9

Comment topic #14: Oregon's hazardous substances rules should automatically incorporate and adopt updates to the federal list of hazardous substances.

Description: Some commenters noted that Oregon's definition of hazardous substances references and includes the federal list of hazardous substances and suggested that updates to the federal list be automatically incorporated on an ongoing basis to avoid the need to complete state rulemaking.

Response: Rulemaking is legally required to incorporate any federal changes to Oregon's rules. Relevant legal precedent establishes that changes in state legal requirments cannot be outsourced to the federal government. As a result, the list of federal hazardous substances included in Oregon's definition of hazardous substances is the list as of the date the rule was last updated in 2006, and readopting the federal list to include updates made since that time must be completed with rulemaking.

Comment IDs linked to this comment topic: 11, 16

Comment topic #15: This rulemaking would support the protection of drinking water.

Description: One commenter noted that the proposed rulemaking would benefit public water systems by investigating and cleaning up contaminant sources to drinking water, using a polluter-pays approach and prioritizing high-risk sites. This commenter strongly supported rule adoption and expressed the proposed rule appropriately considers the role of drinking water treatment plants by focusing on the sources of PFAS releases.

Response: DEQ acknowledges this comment and agrees that this rulemaking would support the protection of drinking water source water and drinking water systems. Addressing releases resulting in contamination of drinking water is a high priority for DEQ.

Comment IDs linked to this comment topic: 12

Comment topic #16: DEQ should conduct additional monitoring for PFAS.

Description: Some comments suggested DEQ monitor PFAS in food and/or fish to fully understand the impacts of PFAS in the environment.

Response: DEQ acknowledges the comment and agrees that more monitoring data is needed to fully evaluate where and to what extent PFAS are present in Oregon's environment. One benefit of this proposed rulemaking is that it would support data collection to aid in understanding the presence of PFAS in the environment and potential impacts to people and the environment.

Comment IDs linked to this comment topic: 6, 13

Comment topic #17: DEQ should provide exemptions for certain types of facilities, parties, and/or past releases.

Description: Some commenters expressed concern about liability that would be posed to certain types of facilities and releases by the proposed rulemaking and suggested DEQ include exemptions. Concerns were voiced for past releases, airports and facilities required to use and train with firefighting foams, permitted facilities such as wastewater treatment plants, and public water systems.

Response: DEQ understands concerns related to potential liability posed by the proposed rulemaking. However, exemptions for certain facilities or parties or past releases are beyond the scope of this rulemaking for two major reasons.

1. Oregon statute defines which parties are and are not liable for cleanup (ORS 465.255), meaning the legislature chose the parties that are responsible for remediation of hazardous substances in statute. In practice, this means that parties that would be responsible for the cleanup of PFAS are the same as those parties responsible for the cleanup of all current hazardous substances.

2. Exemptions would pose a major shift in the way the Cleanup Program works and would be inconsistent with program policies and procedures. Additional exemptions for certain facilities or parties or past releases have not been provided for any of the current hazardous substances. This rulemaking proposes to update Oregon's list of hazardous substances, but does not propose any changes to the Cleanup Program's operations.

Past releases: Oregon cleanup law, as well as federal cleanup law, applies to both current and past releases of hazardous substances and are applicable whether or not the release was legal at the time, with limited exceptions. One commenter noted concerns related to investigation or cleanup requirements for closed sites. The Cleanup Program's general practice is not to reopen closed sites, unless there is a compelling reason to do so; this would also be the case for PFAS. Closed sites would only be reopened if there is known or significantly suspected risk to people or the environment from a release from a closed site.

Airports: DEQ acknowledges that some facilities, such as certain airports, were required by federal law to use and train with firefighting foam containing PFAS. DEQ understands concerns airports may have related to this rulemaking; however, DEQ believes in some cases investigation and cleanup actions will be needed in order to protect people and the environment.

Permitted facilities: Permitted releases are conditionally exempt from cleanup as stated in OAR 340-122-0030(2). As such the Cleanup Program generally defers to the DEQ permitting program for addressing permitted releases. Any testing, treatment or discharge limit requirements for PFAS by the permitting programs would be independent of this rulemaking. The DEQ Cleanup Program may become involved, in limited cases, at a permitted site as described in OAR 340-122-0030(2).

Water systems: This rulemaking would support identifying sources and responsible parties and result in reduced PFAS impacts to passive receivers by allowing DEQ to require cleanup of upstream sources. Oregon law requires the Cleanup Program to follow a polluter-pays model, so the cost of identifying and cleaning up the PFAS remains with the polluter, as opposed to, for example, a water supply system that may need to test and treat to provide clean water. Further, the Oregon Health Authority, not DEQ, regulates water systems and drinking water quality.

Comment IDs linked to this comment topic: 2, 8, 9, 10, 11, 12, 15, 16, 17

Implementation

Notification

The proposed rules would become effective upon filing on approximately September 13, 2025. DEQ would notify affected parties by:

- Updating the PFAS 2025 webpage
- Sending a GovDelivery notice to the following DEQ lists:
  - Rulemaking
  - DEQ Public Notices
  - PFAS
  - Cleanup Program, Sites and Spills
- Email all DEQ Cleanup Program staff
- Emailing or sending letters to all participants in the Cleanup Program

Compliance and enforcement

Affected parties – Parties that have used, stored, or manufactured products containing PFAS that have resulted in releases or possible releases to the environment may be required to investigate and cleanup PFAS contamination. Most parties participating in the Cleanup Program do so voluntarily. Use of enforceable agreements will be considered, as needed, where parties are unresponsive and there is a known or suspected risk to people or the environment.

DEQ staff – Cleanup Program staff will be expected to consider PFAS contamination at sites participating in the program and ensure site work meets program policy and regulatory requirements. A limited number of staff will participate in efforts to identify, inventory, and prioritize outreach to new sites not already participating in the Cleanup Program.

Measuring, sampling, monitoring and reporting

Affected parties – Parties required to investigate and cleanup PFAS contamination will need to complete sampling, monitoring, and reporting. As with current hazardous substances, objectives are expected to include characterizing the extent of contamination, evaluating risk to people and the environment, and evaluating and implementing cleanup strategies.

DEQ staff – Staff will provide technical assistance to parties participating in the program to determine how to best investigate and cleanup PFAS contamination at sites.

Systems

Website

The Cleanup Program PFAS website will be updated to reflect this proposed rulemaking.

Database
The proposed rule amendments do not require changes to DEQ systems. Your DEQ Online already has a way to indicate that PFAS contaminants are detected at a cleanup site or are otherwise a site concern.

Invoicing
The proposed rule amendments do not require changes to DEQ's invoicing system.

Training

Affected parties – DEQ has created a PFAS Fact Sheet describing the Cleanup Program's approach to addressing PFAS at sites. This factsheet was created for potentially responsible parties and environmental consultants and is available online. DEQ will provide additional guidance and training as needed.

DEQ staff – Guidance and training on PFAS-specific considerations at sites will be provided to staff. An existing Cleanup PFAS workgroup will support staff on project work and training.

Five-year review

Requirement

Oregon law requires DEQ to review new rules within five years after EQC adopts them. The law also exempts some rules from review. DEQ determined whether the rules described in this report are subject to the five-year review. DEQ based its analysis on the law in effect when EQC adopted these rules.

Exemption from five-year rule review

The Administrative Procedures Act exempts all the proposed rules from the five-year review because the proposed rules would:

- Amend or repeal an existing rule. ORS 183.405(4).

EPA grant disclaimer

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