State of Oregon Department of Environmental Quality

Notice of Proposed Rulemaking

March 28, 2025

PFAS 2025

This package contains the following documents:

- Notice of Rulemaking
- Draft rules – edits highlighted
- Draft rules – edits included (final clean version)

Note for readers:

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Introduction

The Oregon Department of Environmental Quality invites public input on proposed permanent rule amendments to chapter 340 of the Oregon Administrative Rules.

Request for other options

During the public comment period, DEQ asks for public comment on whether there are other options for achieving the rules' substantive goals while reducing the rules' negative economic impact on business.

Overview

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. These proposed rules would also incorporate changes to the federal list of hazardous substances, which includes adding PFOA, PFOS, and 1-Bromopropane and removing some waste definitions. These proposed rules would allow DEQ to conduct or require the investigation and cleanup of these substances that pose an unacceptable risk to human health 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 and animals. 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, to date PFAS have been detected in 32 Oregon public water systems, with 23 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 human health or the environment.

Oregon statutes and rule provide DEQ the authority to require investigation and remedial actions where hazardous substances have been or may have been released

to protect human health, safety, and welfare and the environment. Oregon's hazardous substance definition was last updated in 2006, when methane was added. Since that time, federal regulations have changed and studies have identified toxic impacts of chemicals 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) and 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.

Procedural summary

More information

Information about this rulemaking is on the PFAS 2025 web page.

Virtual public hearings

DEQ plans to hold two public hearings. Anyone can attend these hearings by Zoom webinar or call in.

Date: April 22, 2025
Start time: 11:00 AM
Register via Zoom

Date: April 22, 2025
Start time: 6:00 PM
Register via Zoom

After registering, you will receive a confirmation email with instructions how to join the meeting.

How to comment on this rulemaking proposal

DEQ is asking for public comment on the proposed rules. Anyone can submit comments and questions about this rulemaking. A person can submit comments by email, mail or at the public hearing.

- Email: Send comments by email to PFAS.2025@deq.oregon.gov
- Postal mail:

Oregon DEQ
Attn: Sarah Van Glubt
700 NE Multnomah Street, Suite 600
Portland, OR 97232-4100

- At the public hearings:
  - April 22, 2025 11:00 AM
  - April 22, 2025 6:00 PM

Comment deadline

DEQ will only consider comments on the proposed rules that DEQ receives by **4 p.m., on April 25, 2025.**

Note for public university students:

ORS 192.345(29) allows Oregon public university and OHSU students to protect their university email addresses from disclosure under Oregon's public records law. If you are an Oregon public university or OHSU student, notify DEQ that you wish to keep your email address confidential.

Sign up for rulemaking notices

Get email or text updates about this rulemaking by either:

- Signing up through GovDelivery.
- Signing up on the rulemaking website.

What will happen next?

DEQ will include a written response to comments in a staff report that DEQ will submit to the Environmental Quality Commission. DEQ may modify the rule proposal based on the comments.

Proposed rules only become effective if the Environmental Quality Commission adopts them. DEQ intends to submit the proposed rule changes for consideration to the Commission on or after May 21, 2025.

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, in order to protect human health 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 human health 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 human health 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 human health 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 and why are you not pursuing them?

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 human health 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, the majority of 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				
465.4000	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.	https://www.sciencedirect.com/science/article/pii/S0013935122024926?via%3Dihub

Environmental Research, Volume 220.	
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

Rules summary

As OAR 166-500-0030(1)(e) requires, the following are included to provide a brief summary of the proposed new rules and existing rules affected by this rulemaking.

OAR chapter 340, division 122

Rule Number	Rule Title	Explanation
-0115	Definitions	Updates the definition of hazardous substance

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 financially benefit the most are communities, particularly communities disproportionately impacted by environmental contamination, and society at large. The statement of cost compliance section below discusses additional parties that may be financially impacted by this rulemaking.

The financial impacts to responsible parties is difficult to fully quantify because the costs to investigate, assess, and cleanup contamination is dependent on site-specific factors and the variable past uses of PFAS compounds that resulted in the release to the environment. However, for the purposes of 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 are found which pose unacceptable risk to people or the environment.

Fiscal and economic impact

Releases from facilities using PFAS

Impacted parties

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 to parties for simply 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 on a voluntary basis 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 processes 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, 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 additional financial impact.

Cleanup work would only be required if it is determined 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). 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 necessary; 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 for and treated using the same methods and technologies. In many cases additional costs will not be incurred from addressing all six compounds versus a smaller subset.

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.

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. [1] 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,

[1] 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:[2] **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 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

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

that some initial site assessment, sampling, analysis, and reporting costs included other contaminants as well). Additional work will include upgradient investigation and quarterly sampling and reporting.

Example Project #2:[2] **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 cleanup 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:[2] **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.

Example Project #4:[3] **Large commercial airport**
The Portland International Airport, or PDX, is Oregon's largest commercial airport with several decades of PFAS-containing firefighting foam training and use, as required by the Federal Aviation Administration. The facility is located near important groundwater and surface water resources, such as the Columbia River, Columbia Slough, and the City of Portland drinking water wellfield. Given the site's unique location, since 2017, the Port of Portland has completed several investigations of PFAS releases from PDX's fire training facility and former fire stations. Activities have included reviewing historical records, installing groundwater wells, multiple years of groundwater, soil, and stormwater sampling and analysis for PFAS, preparing associated plans and reports, and paying DEQ oversight costs. To date, costs have totaled approximately $1,290,000, with additional work ongoing. This cost estimate does not include Port staff time and other impacts associated with the presence of PFAS including material management. Work has been performed with significant support from insurers.

Releases from permitted facilities

[3] Information provided by the Port of Portland.

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. Many passive receivers are permitted by other DEQ programs. Facilities that have a DEQ permit, for example wastewater treatment plants or landfills, are not expected to be directly impacted by this rulemaking. The Cleanup Program defers to the DEQ program issuing the permit for addressing releases to the environment from these facilities. Any testing, treatment, or discharge limit requirements for PFAS would be made by the permitting programs and would be independent of this rulemaking.

The Cleanup Program may, however, become involved at unpermitted passive receiver sites, or in limited cases when the permitting programs request Cleanup Program assistance. For example, historic solid waste landfills not subject to DEQ's permitting rules may be impacted by this rulemaking.

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 impacts of environmental contamination, despite 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.[4,5] 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.[6,7] 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 to families and communities. As discussed in more detail in

[4] ATSDR, 2024. How PFAS Impacts Your Health. https://www.atsdr.cdc.gov/pfas/about/health-effects.html
[5] 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.
[6] Cordner et al. 2021. The true cost of PFAS and the benefits of acting now. Environmental Science & Technology.
[7] 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.

the Racial Equity Statement and Environmental Justice Considerations sections below, burdens resulting from exposure to contamination are likely to disproportionately impact disadvantaged communities. While quantifying the effect is challenging, reducing PFAS contamination in the environment and exposures to communities is likely 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.

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 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 which 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
Other programs may be indirectly impacted by the rulemaking due to the data collection the rulemaking would support. 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 and operations and maintenance considerations, including spent media disposal. Without this rulemaking, DEQ is unable to require responsible parties to address potential sources of PFAS to drinking water, resulting in additional costs to the Oregon Health Authority to provide staffing and funding to support technical assistance and administer funding for treatment system design and installation. In addition, the Oregon Health Authority 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 risk communication services from the Oregon Health Authority. The Oregon Health Authority 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., the 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 contamination is caused by upstream sources. 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 required treatment of PFAS from 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 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.[8] 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. One of these airports has completed PFAS sampling confirming high levels of contamination to groundwater.

Public

The public is expected to 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.[4,5]

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 impacted by environmental contamination, such as minority groups or

[8] 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.

Tribal Nations, may be particularly impacted 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

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.[9] 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 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 initial 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

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

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, extent, and complexity of PFAS contamination at a site, if present.

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 related to 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, extent, 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 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

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.

The majority of 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 felt 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. 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 time tables 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 a number of 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. Prior to 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 is completed to establish 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.[10] 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 have an effect on 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 have an effect on development and housing costs.

[10] 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 is expected to 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. [11] Not completing this rulemaking would mean those communities continue to face exposure to a higher level of hazardous substances. 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. In order to protect human health and ensure all Oregonians are protected, including those with the least resources, it is essential DEQ have the ability to require investigations, and if unacceptable risk exists, cleanup. DEQ's Cleanup Program evaluates all potential exposure pathways and receptors during investigations and risk assessments. This allows DEQ to assess the communities who 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 have a racial equity benefit from the rulemaking: minority groups more likely to live near industrialized and urbanized areas and minority, immigrant, and Tribal communities eating fish collected 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.

[11] 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 with respect to 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 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 is expected to 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. For example, the EPA's EJScreen tool is an environmental justice mapping and screening tool developed by the EPA that includes considerations of environmental and socioeconomic factors. [12] EJScreen, or other data or tools to evaluate environmental justice, will be used to consider equity and disproportionate burdens of environmental contamination at sites.

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.

[12] U.S. EPA EJScreen: Environmental justice screening and mapping tool. https://www.epa.gov/ejscreen

Drinking water

Through initiatives by the EPA and the Oregon Health Authority, PFAS have been detected in some of Oregon's public water systems,[13] 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 Oregon Health Authority and DEQ's Drinking Water Protection Program conduct source water assessments to evaluate potential sources to 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 lacks the ability to require investigation at facilities that may have released PFAS to the drinking water source area.

Generally, drinking water treatment for PFAS is extremely costly, and 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 the Oregon Health Authority to evaluate potential sources of PFAS to 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

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

diet.[14,15,16] Fish contamination has particular 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.[17]

Initial limited data has shown that PFAS are present in fish tissue in multiple Oregon streams and rivers, with concentrations exceeding the Oregon Health Authority's health screening level at 6 sites.[18,19] 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 additional 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 towards fish advisories in certain waterbodies, when warranted. For example, fish samples collected in the Columbia Slough in Portland resulted in the Oregon Health Authority issuing Oregon's first PFAS-based fish consumption advisory in 2022. This waterway is known to have minority communities 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.[20] 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 reduce fish or other animal and plant contamination to protect people and the environment from exposure.

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[14] Christensen et al., 2017. Perfluoroalkyl substances and fish consumption. Environmental Research. Volume 154. https://www.sciencedirect.com/science/article/pii/S0013935116310726

[15] 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

[16] 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

[17] 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/

[18] U.S. EPA National Rivers and Streams Assessment: https://www.epa.gov/national-aquatic-resource-surveys/nrsa

[19] 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

[20] 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

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.[21] 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 has the ability to 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.

[21] 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 local 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 acknowledge 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 did not present additional information specific to this proposed rule revision.

DEQ plans to share information related to this rulemaking with the EQC at its July 2025 meeting.

Advisory committee

Background

DEQ convened the PFAS 2025 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 advocate, Tribal, environmental consulting, academic, business and industry, military, government, and aviation interests. The committee's web page is located at: PFAS 2025 Rulemaking.

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	WSP
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 on this rulemaking's page at PFAS 2025.

Public engagement

Public notice

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

- On March 31, 2025, filing notice 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 key 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 Bobbie 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

How to comment on this rulemaking proposal

DEQ is asking for public comment on the proposed rules. Anyone can submit comments and questions about this rulemaking. A person can submit comments through an online web page, by regular mail, or at the public hearings.

- Email: Send comments by email to PFAS.2025@deq.oregon.gov
- Postal mail:
  Oregon DEQ
  Attn: Sarah Van Glubt
  700 NE Multnomah Street, Suite 600
  Portland, OR 97232-4100
- At the public hearings:
    - April 22, 2025 11:00 AM
    - April 22, 2025 6:00 PM

Comment deadline

DEQ will only consider comments on the proposed rules that DEQ receives by 4 p.m., on **April 25, 2025.**

Note for public university students:

ORS 192.345(29) allows Oregon public university and OHSU students to protect their university email addresses from disclosure under Oregon's public records law. If you are an Oregon public university or OHSU student, notify DEQ that you wish to keep your email address confidential.

Public hearing

DEQ plans to hold two public hearings. Anyone can attend these hearings by Zoom webinar or call in.

Date: April 22, 2025
Start time: 11:00 AM
Register via Zoom

Date: April 22, 2025
Start time: 6:00 PM
Register via Zoom

After registering, you will receive a confirmation email with instructions how to join the meeting.

Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age or sex in administration of its programs or activities.

Visit DEQ's Civil Rights and Environmental Justice page.

Supporting documents

Three fact sheets are posted to accompany this Notice of Proposed Rulemaking:

- PFAS 2025 Rulemaking Public Comment Fact Sheet
- DEQ Environmental Cleanup Program – General Process Fact Sheet
- DEQ Cleanup Program – Update on PFAS Regulations Fact Sheet

The fact sheets are available on the rulemaking website at:
https://www.oregon.gov/deq/rulemaking/Pages/PFAS-2025.aspx.

Draft Rules – Edits Highlighted

Key to identifying changed text:
~~Deleted text~~
New/inserted text

Division 122
HAZARDOUS SUBSTANCE REMEDIAL ACTION RULES

340-122-0115
Definitions

Terms not defined in this rule have the meanings set forth in ORS 465.200. Additional terms are defined as follows unless the context requires otherwise:

(1) "Acceptable risk level" with respect to the toxicity of hazardous substances has the meaning set forth in ORS 465.315 (1)(b)(A) and (B) and is comprised of the acceptable risk level definitions provided for carcinogenic exposures, noncarcinogenic exposures, and ecological receptors in sections (2) through (6) of this rule.

(2) "Acceptable risk level for human exposure to individual carcinogens" means:

(a) For deterministic risk assessments, a lifetime excess cancer risk of less than or equal to one per one million for an individual at an upper-bound exposure; or

(b) For probabilistic risk assessments, a lifetime excess cancer risk for each carcinogen of less than or equal to one per one million at the 90th percentile, and less than or equal to one per one hundred thousand at the 95th percentile, each based upon the same distribution of lifetime excess cancer risks for an exposed individual.

(3) "Acceptable risk level for human exposure to multiple carcinogens" means the acceptable risk level for human exposure to individual carcinogens and:

(a) For deterministic risk assessments, a cumulative lifetime excess cancer risk for multiple carcinogens and multiple exposure pathways of less than or equal to one per one hundred thousand at an upper-bound exposure; or

(b) For probabilistic risk assessments, a cumulative lifetime excess cancer risk for multiple carcinogens and multiple exposure pathways of less than or equal to one per one hundred thousand at the 90th percentile and less than or equal to one per ten thousand at the 95th percentile, each based upon the same distribution of cumulative lifetime excess cancer risks for an exposed individual.

(4) "Acceptable risk level for human exposure to noncarcinogens" means:

(a) For deterministic risk assessments, a hazard index less than or equal to one for an individual at an upper-bound exposure; or

(b) For probabilistic risk assessments, a hazard index less than or equal to one at the 90th percentile, and less than or equal to ten at the 95th percentile, each based upon the same distribution of hazard index numbers for an exposed individual.

(5) "Acceptable risk level for individual ecological receptors" applies only to species listed as threatened or endangered pursuant to 16 USC 1531 et seq. or ORS 465.172, and means:

(a) For deterministic risk assessments, a toxicity index less than or equal to one for an individual ecological receptor at an upper-bound exposure, where the toxicity index is the sum of the

toxicity quotients attributable to systemic toxicants with similar endpoints for similarly-responding species and the toxicity quotient is the ratio of the exposure point value to the ecological benchmark value; or

(b) For probabilistic risk assessments, a toxicity index less than or equal to one at the 90th percentile and less than or equal to 10 at the 95th percentile, each based on the same distribution of toxicity index numbers for an exposed individual ecological receptor; or

(c) The probability of important changes in such factors as growth, survival, fecundity, or reproduction related to the health and viability of an individual ecological receptor that are reasonably likely to occur as a consequence of exposure to hazardous substances is de minimis.

(6) "Acceptable risk level for populations of ecological receptors" means a 10 percent chance, or less, that more than 20 percent of the total local population will be exposed to an exposure point value greater than the ecological benchmark value for each contaminant of concern and no other observed significant adverse effects on the health or viability of the local population.

(7) "Assessment endpoint" means an explicit expression of a specific ecological receptor and an associated function or quality that is to be maintained or protected. Assessment endpoints represent ecological receptors directly or as their surrogates for the purposes of an ecological risk assessment.

(8) "Background level" means the concentration of hazardous substance, if any, existing in the environment in the location of the facility before the occurrence of any past or present release or releases.

(9) "Beneficial uses of water" means any current or reasonably likely future beneficial uses of groundwater or surface water by humans or ecological receptors.

(10) "Carcinogen" means any substance or agent that produces or tends to produce cancer in humans.

(11) "Cleanup level", means the residual concentration of a hazardous substance in a medium that is determined to be protective of public health, safety and welfare, and the environment under specified exposure conditions.

(12) "Commission" means the Environmental Quality Commission.

(13) "Confirmed release" means a release of a hazardous substance into the environment that has been confirmed by the Department in accordance with OAR 340-122-0073.

(14) "Confirmed release list" means a list of facilities for which the Director has confirmed a release of a hazardous substance.

(15) "Contaminant of concern" means a hazardous substance that is present in such concentrations that the contaminant poses a threat or a potentially unacceptable risk to public health, safety or welfare, or the environment considering:

(a) The toxicological characteristics of the hazardous substance that influence its ability to affect adversely human health, ecological receptors or the environment relative to the concentration of the hazardous substance at the facility;

(b) The chemical and physical characteristics of the hazardous substance that govern its tendency to persist in the environment, move through environmental media, or accumulate through food webs;

(c) The background level of the hazardous substances;

(d) The thoroughness of the testing for the hazardous substance at the facility;

(e) The frequency that the hazardous substance has been detected at the facility; and

(f) Degradation by-products of the hazardous substances.

(16) "Critical endpoint" or "Critical effect" means the adverse health effect used as the basis for the derivation of the reference dose (RfD). Exposure to a given chemical may result in a variety of toxic effects (e.g., liver defects, kidney defects, or blood defects). The critical endpoint is selected from the different adverse health effects produced by a given chemical, and is the adverse health effect with the lowest dose level that produced toxicity.

(17) "Department" means the Oregon Department of Environmental Quality.

(18) "Deterministic risk assessment" means a risk assessment that produces a point value estimate of risk for a specific set of exposure assumptions.

(19) "De minimis release" means a release of a hazardous substance that, because of the quantity or characteristics of the hazardous substance released and the potential for migration and exposure of human or environmental receptors, can reasonably be considered to pose no significant threat to public health, safety or welfare, or the environment.

(20) "Director" means the Director of the Department of Environmental Quality or the Director's authorized representative.

(21) "Ecological benchmark value" means the highest no-observed-adverse-effect-level (NOAEL) for individual ecological receptors considering effects on reproductive success or the median lethal dose or concentration (LD50 or LC50) for populations of ecological receptors. If a NOAEL, LD50 or LC50, as applicable, is not available for ecological receptors considered in the risk assessment, the ecological benchmark value may be derived from other toxicological endpoints for those receptors or appropriate surrogates for those receptors, adjusted with uncertainty factors to equate to a NOAEL, LD50 or LC50. The ecological benchmark value shall be based, to the extent practicable, on studies whose routes of exposure and duration of exposure were commensurate with the expected routes and duration of exposure for ecological receptors considered in the risk assessment, or appropriate surrogates for those receptors.

(22) "Ecological receptor" means a population of plants or animals (excluding domestic animals and cultivated plants) or an individual member of any species listed as threatened or endangered pursuant to 16 U.S.C. 1532 et seq. or ORS 496.172.

(23) "Engineering control" means a remedial method used to prevent or minimize exposure to hazardous substances, including technologies that reduce the mobility or migration of hazardous substances. Engineering controls may include, but are not limited to, capping, horizontal or vertical barriers, hydraulic controls, and alternative water supplies.

(24) "Environment" includes ecological receptors, the waters of the state, any drinking water supply, any land surface and subsurface strata, sediments, saturated soils, subsurface gas, or ambient air or atmosphere.

(25) "Exposure point value" means the concentration or dose of a hazardous substance occurring at a location of potential contact between a human receptor and the hazardous substance, or between an ecological receptor and the hazardous substance.

(26) "Facility" or "Site" means any building, structure, installation, equipment, pipe or pipeline including any pipe into a sewer or publicly owned treatment works, well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, above ground tank, underground storage tank, motor vehicle, rolling stock, aircraft, or any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located and where a release has occurred or where there is a threat of a release, but does not include any consumer product in consumer use or any vessel.

(27) "Groundwater" means any water, except capillary moisture, beneath the land surface or beneath the bed of any stream, lake, reservoir or other body of surface water within the boundaries of the state, whatever may be the geological formation or structure in which such water stands, flows, percolates or otherwise moves.

(28) "Hazard index" means a number equal to the sum of the hazard quotients attributable to systemic toxicants with similar toxic endpoints.

(29) "Hazard quotient" means the ratio of the exposure point value to the reference dose, where the reference dose is typically the highest dose causing no adverse effects on survival, growth or reproduction in human populations.

(30) "Hazardous substance" means:

(a) Hazardous waste as defined in ORS 466.005;

(b) 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;

(c) Oil as defined in ORS 465.200(18); and

(d) Methane generated at a historic solid waste landfill; and

(e) Any substance designated by the commission under ORS 465.400;

(f) “Perfluorooctanoic acid” or “PFOA”, including its salts and structural isomers;

(g) “Perfluorooctane sulfonic acid” or “PFOS”, including its salts and structural isomers;

(h) “Perfluorohexane sulfonic acid” or “PFHxS”, including its salts and structural isomers;

(i) “Perfluorononanoic acid” or “PFNA”, including its salts and structural isomers;

(j) “Hexafluoropropylene oxide dimer acid”, commonly known as GenX Chemicals or “HFPO-DA”, including its salts and structural isomers; and

(k) “Perfluorobutane sulfonic acid” or “PFBS”, including its salts and structural isomers.

(31) "Historic solid waste landfill" means:

(a) A solid waste landfill that was never permitted for disposal of solid waste, including landfills that received solid waste prior to adoption of permit requirements under ORS 459.205;

(b) A solid waste landfill that was previously permitted for disposal of solid waste pursuant to ORS 459.205, if operational and post-closure permits for management of the facility have expired, or have been terminated or revoked by the Department; and

(c) A permitted solid waste landfill, if the Department determines that permit requirements for management of methane will not be implemented by the permittee including determinations by the Department that the permittee is financially unable to implement applicable permit requirements.

(32) "Hot spots of contamination" means:

(a) For groundwater or surface water, hazardous substances having a significant adverse effect on beneficial uses of water or waters to which the hazardous substances would be reasonably likely to migrate and for which treatment is reasonably likely to restore or protect such beneficial uses within a reasonable time, as determined in the feasibility study; and

(b) For media other than groundwater or surface water, (e.g., contaminated soil, debris, sediments, and sludges; drummed wastes; "pools" of dense, non-aqueous phase liquids submerged beneath groundwater or in fractured bedrock; and non-aqueous phase liquids

floating on groundwater), if hazardous substances present a risk to human health or the environment exceeding the acceptable risk level, the extent to which the hazardous substances:

(A) Are present in concentrations exceeding risk-based concentrations corresponding to:

(i) 100 times the acceptable risk level for human exposure to each individual carcinogen;

(ii) 10 times the acceptable risk level for human exposure to each individual noncarcinogen; or

(iii) 10 times the acceptable risk level for exposure of individual ecological receptors or populations of ecological receptors to each individual hazardous substance.

(B) Are reasonably likely to migrate to such an extent that the conditions specified in subsection (a) or paragraphs (b)(A) or (b)(C) would be created; or

(C) Are not reliably containable, as determined in the feasibility study.

(33) "Institutional control" means a legal or administrative tool or action taken to reduce the potential for exposure to hazardous substances. Institutional controls may include, but are not limited to, use restrictions, environmental monitoring requirements, and site access and security measures.

(34) "Inventory" means a list of facilities for which the Director has confirmed a release of a hazardous substance and, based on a preliminary assessment or equivalent information, has determined that additional investigation, removal, remedial action, or long term engineering or institutional controls related to removal or remedial action are required to assure protection of the present and future public health, safety and welfare, and the environment.

(35) "Locality of the facility" means any point where a human or an ecological receptor contacts, or is reasonably likely to come into contact with, facility-related hazardous substances, considering:

(a) The chemical and physical characteristics of the hazardous substances;

(b) Physical, meteorological, hydrogeological, and ecological characteristics that govern the tendency for hazardous substances to migrate through environmental media or to move and accumulate through food webs;

(c) Any human activities and biological processes that govern the tendency for hazardous substances to move into and through environmental media or to move and accumulate through food webs; and

(d) The time required for contaminant migration to occur based on the factors described in subsections (35)(34)(a) through (c) of this rule.

(36) "Measurement endpoints for ecological receptors" are quantitative expressions of an observed or measured response in ecological receptors exposed to hazardous substances.

(37) "Noncarcinogen" means hazardous substances with adverse health effects on humans other than cancer.

(38) "Onsite", for purposes of ORS 465.315(3), means the areal extent of contamination and all suitable areas in close proximity to the contamination necessary for implementation of a removal or remedial action.

(39) "Permitted or authorized release" means a release that is from an active facility and that is subject to and in substantial compliance with a current and legally enforceable permit issued by an authorized public agency.

(40) "Population" and "Local population", for purposes of evaluating ecological receptors, means a group of individual plants, animals, or other organisms of the same species that live together

and interbreed within a given habitat, including any portion of a population of a transient or migratory species that uses habitat in the locality of the facility for only a portion of the year or for a portion of their lifecycle.

(41) "Practical quantification limit" or "PQL" means the lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability when testing field samples under routine laboratory operating conditions using Department-approved methods.

(42) "Preliminary assessment" means an investigation conducted in accordance with OAR 340-122-0072 for the purpose of determining whether additional investigation, removal, remedial action, or related engineering or institutional controls are needed to assure protection of public health, safety and welfare, and the environment.

(43) "Probabilistic risk assessment" means a risk assessment that produces a credible range or distribution of possible risk estimates by taking into consideration the variability and uncertainty in the exposure and toxicity data used to make the assessment.

(44) "Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment including the abandonment or discarding of barrels, containers and other closed receptacles containing any hazardous substance, or any threat thereof, but excludes:

(a) Any release which results in exposure to a person solely within a workplace, with respect to a claim that the person may assert against the person's employer under ORS chapter 656;

(b) Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine;

(c) Any release of source, by product or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, as amended, if such release is subject to the requirements with respect to financial protection established by the Nuclear Regulatory Commission under Section 170 of the Atomic Energy Act of 1954, as amended, or, for the purposes of ORS 465.260 or any other removal or remedial action, any release of source by product special nuclear material from any processing site designated under Section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978; and

(d) The normal application of fertilizer.

(45) "Remedial action" and "Removal" have the meanings set forth in ORS 465.200(22) and (24), respectively, and, for purposes of these rules, may include investigations, treatment, excavation and offsite disposal, engineering controls, institutional controls, any combination thereof.

(46) "Remediated" means implementation of a removal or remedial action.

(47) "Residual risk assessment" means both:

(a) A quantitative assessment of the risk resulting from concentrations of untreated waste or treatment residuals remaining at the conclusion of any treatment and offsite disposal taking into consideration current and reasonably likely future land and water use scenarios and the exposure assumptions used in the baseline risk assessment; and

(b) A qualitative or quantitative assessment of the adequacy and reliability of any institutional or engineering controls to be used for management of treatment residuals and untreated hazardous substances.

(48) "Risk" means the probability that a hazardous substance, when released into the environment, will cause adverse effects in exposed humans or ecological receptors.

(49) "Risk assessment" means the process used to determine the probability of an adverse effect due to the presence of hazardous substances. A risk assessment includes identification of the hazardous substances present in the environmental media; assessment of exposure and exposure pathways; assessment of the toxicity of the hazardous substances; characterization of human health risks; and characterization of the impacts or risks to the environment.

(50) "Sensitive environment", for purposes of OAR 340-122-0045, means an area of particular environmental value where a hazardous substance could pose a greater threat than in other non-sensitive areas. Sensitive environments include but are not limited to: Critical habitat for federally endangered or threatened species; National Park, Monument, National Marine Sanctuary, National Recreational Area, National Wildlife Refuge, National Forest Campgrounds, recreational areas, game management areas, wildlife management areas; designated federal Wilderness Areas; wetlands (freshwater, estuarine, or coastal); wild and scenic rivers; state parks; state wildlife refuges; habitat designated for state endangered species; fishery resources; state designated natural areas; county or municipal parks; and other significant open spaces and natural resources protected under Goal 5 of Oregon's Statewide Planning Goals.

(51) "Significant adverse effect on beneficial uses of water" means current or reasonably likely future exceedance of:

(a) Applicable or relevant federal, state or local water quality standards, criteria, or guidance;

(b) In the absence of applicable or relevant water quality standards, criteria, or guidance, the acceptable risk level; or

(c) If subsections (a) and (b) of this section do not apply, the concentration of a hazardous substance indicated by available published peer-reviewed scientific information to have a significant adverse effect on a current or reasonably likely future beneficial use of water.

(52) "Soil" means a mixture of organic and inorganic solids, air, water, and biota which exists on the earth surface above bedrock, including materials of anthropogenic sources such as slag and sludge.

(53) "Solid waste" means all useless or discarded putrescible and nonputrescible materials, including but not limited to garbage, rubbish, refuse, ashes, paper and cardboard, sewage sludge, septic tank and cesspool pumpings or other sludge, useless or discarded commercial, industrial, demolition and construction materials, discarded or abandoned vehicles or parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semisolid materials, dead animals and infectious waste as defined in ORS 459.386. "Solid waste" does not include:

(a) Hazardous waste as defined in ORS 466.005.

(b) Materials used for fertilizer or for other productive purposes or which are salvageable as such materials are used on land in agricultural operations and the growing or harvesting of crops and the raising of animals.

(54) "Solid waste landfill" means a facility for the disposal of solid waste involving the placement of solid waste on or beneath the land surface.

(55) "Surface water" means lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, wetlands, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface waters), which are wholly or partially within or bordering the state or within its jurisdiction.

(56) "Total excess cancer risk" means the upper bound on the estimated excess cancer risk associated with exposure to multiple hazardous substances and multiple exposure pathways.

(57) "Treatment" means to permanently and substantially eliminate or reduce the toxicity, mobility or volume of hazardous substances with the use of either in-situ or ex-situ remedial technologies.

Draft Rules – Edits Included

Division 122
HAZARDOUS SUBSTANCE REMEDIAL ACTION RULES

340-122-0115
Definitions

Terms not defined in this rule have the meanings set forth in ORS 465.200. Additional terms are defined as follows unless the context requires otherwise:

(1) "Acceptable risk level" with respect to the toxicity of hazardous substances has the meaning set forth in ORS 465.315 (1)(b)(A) and (B) and is comprised of the acceptable risk level definitions provided for carcinogenic exposures, noncarcinogenic exposures, and ecological receptors in sections (2) through (6) of this rule.

(2) "Acceptable risk level for human exposure to individual carcinogens" means:

(a) For deterministic risk assessments, a lifetime excess cancer risk of less than or equal to one per one million for an individual at an upper-bound exposure; or

(b) For probabilistic risk assessments, a lifetime excess cancer risk for each carcinogen of less than or equal to one per one million at the 90th percentile, and less than or equal to one per one hundred thousand at the 95th percentile, each based upon the same distribution of lifetime excess cancer risks for an exposed individual.

(3) "Acceptable risk level for human exposure to multiple carcinogens" means the acceptable risk level for human exposure to individual carcinogens and:

(a) For deterministic risk assessments, a cumulative lifetime excess cancer risk for multiple carcinogens and multiple exposure pathways of less than or equal to one per one hundred thousand at an upper-bound exposure; or

(b) For probabilistic risk assessments, a cumulative lifetime excess cancer risk for multiple carcinogens and multiple exposure pathways of less than or equal to one per one hundred thousand at the 90th percentile and less than or equal to one per ten thousand at the 95th percentile, each based upon the same distribution of cumulative lifetime excess cancer risks for an exposed individual.

(4) "Acceptable risk level for human exposure to noncarcinogens" means:

(a) For deterministic risk assessments, a hazard index less than or equal to one for an individual at an upper-bound exposure; or

(b) For probabilistic risk assessments, a hazard index less than or equal to one at the 90th percentile, and less than or equal to ten at the 95th percentile, each based upon the same distribution of hazard index numbers for an exposed individual.

(5) "Acceptable risk level for individual ecological receptors" applies only to species listed as threatened or endangered pursuant to 16 USC 1531 et seq. or ORS 465.172, and means:

(a) For deterministic risk assessments, a toxicity index less than or equal to one for an individual ecological receptor at an upper-bound exposure, where the toxicity index is the sum of the toxicity quotients attributable to systemic toxicants with similar endpoints for similarly-responding species and the toxicity quotient is the ratio of the exposure point value to the ecological benchmark value; or

(b) For probabilistic risk assessments, a toxicity index less than or equal to one at the 90th percentile and less than or equal to 10 at the 95th percentile, each based on the same distribution of toxicity index numbers for an exposed individual ecological receptor; or

(c) The probability of important changes in such factors as growth, survival, fecundity, or reproduction related to the health and viability of an individual ecological receptor that are reasonably likely to occur as a consequence of exposure to hazardous substances is de minimis.

(6) "Acceptable risk level for populations of ecological receptors" means a 10 percent chance, or less, that more than 20 percent of the total local population will be exposed to an exposure point value greater than the ecological benchmark value for each contaminant of concern and no other observed significant adverse effects on the health or viability of the local population.

(7) "Assessment endpoint" means an explicit expression of a specific ecological receptor and an associated function or quality that is to be maintained or protected. Assessment endpoints represent ecological receptors directly or as their surrogates for the purposes of an ecological risk assessment.

(8) "Background level" means the concentration of hazardous substance, if any, existing in the environment in the location of the facility before the occurrence of any past or present release or releases.

(9) "Beneficial uses of water" means any current or reasonably likely future beneficial uses of groundwater or surface water by humans or ecological receptors.

(10) "Carcinogen" means any substance or agent that produces or tends to produce cancer in humans.

(11) "Cleanup level", means the residual concentration of a hazardous substance in a medium that is determined to be protective of public health, safety and welfare, and the environment under specified exposure conditions.

(12) "Commission" means the Environmental Quality Commission.

(13) "Confirmed release" means a release of a hazardous substance into the environment that has been confirmed by the Department in accordance with OAR 340-122-0073.

(14) "Confirmed release list" means a list of facilities for which the Director has confirmed a release of a hazardous substance.

(15) "Contaminant of concern" means a hazardous substance that is present in such concentrations that the contaminant poses a threat or a potentially unacceptable risk to public health, safety or welfare, or the environment considering:

(a) The toxicological characteristics of the hazardous substance that influence its ability to affect adversely human health, ecological receptors or the environment relative to the concentration of the hazardous substance at the facility;

(b) The chemical and physical characteristics of the hazardous substance that govern its tendency to persist in the environment, move through environmental media, or accumulate through food webs;

(c) The background level of the hazardous substances;

(d) The thoroughness of the testing for the hazardous substance at the facility;

(e) The frequency that the hazardous substance has been detected at the facility; and

(f) Degradation by-products of the hazardous substances.

(16) "Critical endpoint" or "Critical effect" means the adverse health effect used as the basis for the derivation of the reference dose (RfD). Exposure to a given chemical may result in a variety of toxic effects (e.g., liver defects, kidney defects, or blood defects). The critical endpoint is selected from the different adverse health effects produced by a given chemical, and is the adverse health effect with the lowest dose level that produced toxicity.

(17) "Department" means the Oregon Department of Environmental Quality.

(18) "Deterministic risk assessment" means a risk assessment that produces a point value estimate of risk for a specific set of exposure assumptions.

(19) "De minimis release" means a release of a hazardous substance that, because of the quantity or characteristics of the hazardous substance released and the potential for migration and exposure of human or environmental receptors, can reasonably be considered to pose no significant threat to public health, safety or welfare, or the environment.

(20) "Director" means the Director of the Department of Environmental Quality or the Director's authorized representative.

(21) "Ecological benchmark value" means the highest no-observed-adverse-effect-level (NOAEL) for individual ecological receptors considering effects on reproductive success or the median lethal dose or concentration (LD50 or LC50) for populations of ecological receptors. If a NOAEL, LD50 or LC50, as applicable, is not available for ecological receptors considered in the risk assessment, the ecological benchmark value may be derived from other toxicological endpoints for those receptors or appropriate surrogates for those receptors, adjusted with uncertainty factors to equate to a NOAEL, LD50 or LC50. The ecological benchmark value shall be based, to the extent practicable, on studies whose routes of exposure and duration of exposure were commensurate with the expected routes and duration of exposure for ecological receptors considered in the risk assessment, or appropriate surrogates for those receptors.

(22) "Ecological receptor" means a population of plants or animals (excluding domestic animals and cultivated plants) or an individual member of any species listed as threatened or endangered pursuant to 16 U.S.C. 1532 et seq. or ORS 496.172.

(23) "Engineering control" means a remedial method used to prevent or minimize exposure to hazardous substances, including technologies that reduce the mobility or migration of hazardous substances. Engineering controls may include, but are not limited to, capping, horizontal or vertical barriers, hydraulic controls, and alternative water supplies.

(24) "Environment" includes ecological receptors, the waters of the state, any drinking water supply, any land surface and subsurface strata, sediments, saturated soils, subsurface gas, or ambient air or atmosphere.

(25) "Exposure point value" means the concentration or dose of a hazardous substance occurring at a location of potential contact between a human receptor and the hazardous substance, or between an ecological receptor and the hazardous substance.

(26) "Facility" or "Site" means any building, structure, installation, equipment, pipe or pipeline including any pipe into a sewer or publicly owned treatment works, well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, above ground tank, underground storage tank, motor vehicle, rolling stock, aircraft, or any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located and where a release has occurred or where there is a threat of a release, but does not include any consumer product in consumer use or any vessel.

(27) "Groundwater" means any water, except capillary moisture, beneath the land surface or beneath the bed of any stream, lake, reservoir or other body of surface water within the

boundaries of the state, whatever may be the geological formation or structure in which such water stands, flows, percolates or otherwise moves.

(28) "Hazard index" means a number equal to the sum of the hazard quotients attributable to systemic toxicants with similar toxic endpoints.

(29) "Hazard quotient" means the ratio of the exposure point value to the reference dose, where the reference dose is typically the highest dose causing no adverse effects on survival, growth or reproduction in human populations.

(30) "Hazardous substance" means:

(a) Hazardous waste as defined in ORS 466.005;

(b) 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;

(c) Oil as defined in ORS 465.200(18); and

(d) Methane generated at a historic solid waste landfill; and

(e) Any substance designated by the commission under ORS 465.400;

(f) “Perfluorooctanoic acid” or “PFOA”, including its salts and structural isomers;

(g) “Perfluorooctane sulfonic acid” or “PFOS”, including its salts and structural isomers;

(h) “Perfluorohexane sulfonic acid” or “PFHxS”, including its salts and structural isomers;

(i) “Perfluorononanoic acid” or “PFNA”, including its salts and structural isomers;

(j) “Hexafluoropropylene oxide dimer acid”, commonly known as GenX Chemicals or “HFPO-DA”, including its salts and structural isomers; and

(k) “Perfluorobutane sulfonic acid” or “PFBS”, including its salts and structural isomers.

(31) "Historic solid waste landfill" means:

(a) A solid waste landfill that was never permitted for disposal of solid waste, including landfills that received solid waste prior to adoption of permit requirements under ORS 459.205;

(b) A solid waste landfill that was previously permitted for disposal of solid waste pursuant to ORS 459.205, if operational and post-closure permits for management of the facility have expired, or have been terminated or revoked by the Department; and

(c) A permitted solid waste landfill, if the Department determines that permit requirements for management of methane will not be implemented by the permittee including determinations by the Department that the permittee is financially unable to implement applicable permit requirements.

(32) "Hot spots of contamination" means:

(a) For groundwater or surface water, hazardous substances having a significant adverse effect on beneficial uses of water or waters to which the hazardous substances would be reasonably likely to migrate and for which treatment is reasonably likely to restore or protect such beneficial uses within a reasonable time, as determined in the feasibility study; and

(b) For media other than groundwater or surface water, (e.g., contaminated soil, debris, sediments, and sludges; drummed wastes; "pools" of dense, non-aqueous phase liquids submerged beneath groundwater or in fractured bedrock; and non-aqueous phase liquids floating on groundwater), if hazardous substances present a risk to human health or the environment exceeding the acceptable risk level, the extent to which the hazardous substances:

(A) Are present in concentrations exceeding risk-based concentrations corresponding to:

(i) 100 times the acceptable risk level for human exposure to each individual carcinogen;

(ii) 10 times the acceptable risk level for human exposure to each individual noncarcinogen; or

(iii) 10 times the acceptable risk level for exposure of individual ecological receptors or populations of ecological receptors to each individual hazardous substance.

(B) Are reasonably likely to migrate to such an extent that the conditions specified in subsection (a) or paragraphs (b)(A) or (b)(C) would be created; or

(C) Are not reliably containable, as determined in the feasibility study.

(33) "Institutional control" means a legal or administrative tool or action taken to reduce the potential for exposure to hazardous substances. Institutional controls may include, but are not limited to, use restrictions, environmental monitoring requirements, and site access and security measures.

(34) "Inventory" means a list of facilities for which the Director has confirmed a release of a hazardous substance and, based on a preliminary assessment or equivalent information, has determined that additional investigation, removal, remedial action, or long term engineering or institutional controls related to removal or remedial action are required to assure protection of the present and future public health, safety and welfare, and the environment.

(35) "Locality of the facility" means any point where a human or an ecological receptor contacts, or is reasonably likely to come into contact with, facility-related hazardous substances, considering:

(a) The chemical and physical characteristics of the hazardous substances;

(b) Physical, meteorological, hydrogeological, and ecological characteristics that govern the tendency for hazardous substances to migrate through environmental media or to move and accumulate through food webs;

(c) Any human activities and biological processes that govern the tendency for hazardous substances to move into and through environmental media or to move and accumulate through food webs; and

(d) The time required for contaminant migration to occur based on the factors described in subsections (35)(34)(a) through (c) of this rule.

(36) "Measurement endpoints for ecological receptors" are quantitative expressions of an observed or measured response in ecological receptors exposed to hazardous substances.

(37) "Noncarcinogen" means hazardous substances with adverse health effects on humans other than cancer.

(38) "Onsite", for purposes of ORS 465.315(3), means the areal extent of contamination and all suitable areas in close proximity to the contamination necessary for implementation of a removal or remedial action.

(39) "Permitted or authorized release" means a release that is from an active facility and that is subject to and in substantial compliance with a current and legally enforceable permit issued by an authorized public agency.

(40) "Population" and "Local population", for purposes of evaluating ecological receptors, means a group of individual plants, animals, or other organisms of the same species that live together and interbreed within a given habitat, including any portion of a population of a transient or migratory species that uses habitat in the locality of the facility for only a portion of the year or for a portion of their lifecycle.

(41) "Practical quantification limit" or "PQL" means the lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability when testing field samples under routine laboratory operating conditions using Department-approved methods.

(42) "Preliminary assessment" means an investigation conducted in accordance with OAR 340-122-0072 for the purpose of determining whether additional investigation, removal, remedial action, or related engineering or institutional controls are needed to assure protection of public health, safety and welfare, and the environment.

(43) "Probabilistic risk assessment" means a risk assessment that produces a credible range or distribution of possible risk estimates by taking into consideration the variability and uncertainty in the exposure and toxicity data used to make the assessment.

(44) "Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment including the abandonment or discarding of barrels, containers and other closed receptacles containing any hazardous substance, or any threat thereof, but excludes:

(a) Any release which results in exposure to a person solely within a workplace, with respect to a claim that the person may assert against the person's employer under ORS chapter 656;

(b) Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine;

(c) Any release of source, by product or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, as amended, if such release is subject to the requirements with respect to financial protection established by the Nuclear Regulatory Commission under Section 170 of the Atomic Energy Act of 1954, as amended, or, for the purposes of ORS 465.260 or any other removal or remedial action, any release of source by product special nuclear material from any processing site designated under Section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978; and

(d) The normal application of fertilizer.

(45) "Remedial action" and "Removal" have the meanings set forth in ORS 465.200(22) and (24), respectively, and, for purposes of these rules, may include investigations, treatment, excavation and offsite disposal, engineering controls, institutional controls, any combination thereof.

(46) "Remediated" means implementation of a removal or remedial action.

(47) "Residual risk assessment" means both:

(a) A quantitative assessment of the risk resulting from concentrations of untreated waste or treatment residuals remaining at the conclusion of any treatment and offsite disposal taking into consideration current and reasonably likely future land and water use scenarios and the exposure assumptions used in the baseline risk assessment; and

(b) A qualitative or quantitative assessment of the adequacy and reliability of any institutional or engineering controls to be used for management of treatment residuals and untreated hazardous substances.

(48) "Risk" means the probability that a hazardous substance, when released into the environment, will cause adverse effects in exposed humans or ecological receptors.

(49) "Risk assessment" means the process used to determine the probability of an adverse effect due to the presence of hazardous substances. A risk assessment includes identification of the hazardous substances present in the environmental media; assessment of exposure and

exposure pathways; assessment of the toxicity of the hazardous substances; characterization of human health risks; and characterization of the impacts or risks to the environment.

(50) "Sensitive environment", for purposes of OAR 340-122-0045, means an area of particular environmental value where a hazardous substance could pose a greater threat than in other non-sensitive areas. Sensitive environments include but are not limited to: Critical habitat for federally endangered or threatened species; National Park, Monument, National Marine Sanctuary, National Recreational Area, National Wildlife Refuge, National Forest Campgrounds, recreational areas, game management areas, wildlife management areas; designated federal Wilderness Areas; wetlands (freshwater, estuarine, or coastal); wild and scenic rivers; state parks; state wildlife refuges; habitat designated for state endangered species; fishery resources; state designated natural areas; county or municipal parks; and other significant open spaces and natural resources protected under Goal 5 of Oregon's Statewide Planning Goals.

(51) "Significant adverse effect on beneficial uses of water" means current or reasonably likely future exceedance of:

(a) Applicable or relevant federal, state or local water quality standards, criteria, or guidance;

(b) In the absence of applicable or relevant water quality standards, criteria, or guidance, the acceptable risk level; or

(c) If subsections (a) and (b) of this section do not apply, the concentration of a hazardous substance indicated by available published peer-reviewed scientific information to have a significant adverse effect on a current or reasonably likely future beneficial use of water.

(52) "Soil" means a mixture of organic and inorganic solids, air, water, and biota which exists on the earth surface above bedrock, including materials of anthropogenic sources such as slag and sludge.

(53) "Solid waste" means all useless or discarded putrescible and nonputrescible materials, including but not limited to garbage, rubbish, refuse, ashes, paper and cardboard, sewage sludge, septic tank and cesspool pumpings or other sludge, useless or discarded commercial, industrial, demolition and construction materials, discarded or abandoned vehicles or parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semisolid materials, dead animals and infectious waste as defined in ORS 459.386. "Solid waste" does not include:

(a) Hazardous waste as defined in ORS 466.005.

(b) Materials used for fertilizer or for other productive purposes or which are salvageable as such materials are used on land in agricultural operations and the growing or harvesting of crops and the raising of animals.

(54) "Solid waste landfill" means a facility for the disposal of solid waste involving the placement of solid waste on or beneath the land surface.

(55) "Surface water" means lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, wetlands, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface waters), which are wholly or partially within or bordering the state or within its jurisdiction.

(56) "Total excess cancer risk" means the upper bound on the estimated excess cancer risk associated with exposure to multiple hazardous substances and multiple exposure pathways.

(57) "Treatment" means to permanently and substantially eliminate or reduce the toxicity, mobility or volume of hazardous substances with the use of either in-situ or ex-situ remedial technologies.