From: Field, Jennifer A
To: Benton Public Comment
Cc: PAYNE Bailey
Subject: Written testimony regarding Coffin Butte landfill expansion LU-24-027
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Attachments: Written Testimonial on Landfill Expansion May 2025.pdf

Good afternoon, I wish to submit the attached written testimony.

Sincerely,

Jennifer Field

May 19, 2025

Dear Benton County Planning Commission,

My name is Jennifer Field and I live at 5340 NW Shasta Avenue in Corvallis Oregon where I have lived since 1993. I have a Ph.D. in Geochemistry from the Colorado School of Mines and I am currently a Professor in the Department of Environmental and Molecular Toxicology at Oregon State University. My Google Scholar profile, which lists my peer-reviewed publications (https://scholar.google.com/citations?user=2lI93vAAAAAJ&hl=en&oi=ao) shows that I have published 10 peer-reviewed papers on or related to per- and polyfluoroalkyl substances (PFAS) and landfills. These studies were all supported by funding from the US National Science Foundation and Environmental Protection Agency. My laboratory website can be found at: https://emt.oregonstate.edu/jenniferfieldlab/jennifer-field-lab. Recently, I gave a short talk on PFAS in landfill leachate and gas, PFAS in the Corvallis wastewater treatment system, and how PFAS move between these types of engineered systems. The talk can be viewed on YouTube at https://www.youtube.com/watch?v=uUs8v_FP2Vw. Some of the main points of this talk are captured below with citations to peer-reviewed literature. While I am not a toxicologist, I do recommend an excellent review that documents the health effects of PFAS.[1] Most of the toxicity data is for just two PFAS, namely perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). The review by Fenton et al. indicates certainty adverse outcomes with high certainty related to PFAS exposure that include delayed mammary gland development, reduced response to vaccines, lower birth weight, thyroid disease, increased cholesterol levels, liver and kidney damage, and testicular cancer.[1]

Over the last 32 years as a researcher, I have conducted a number of collaborative studies with Dr. Mort Barlaz of North Carolina State University. The objective of the studies was to document the occurrence and behavior of per- and polyfluoroalkyl substances (PFAS) in landfill leachate and gas. While I have not conducted research on Coffin Butte landfill leachate or gas, my research has involved hundreds of samples from dozens of landfills across the United States. My work began in 2011, when we documented 24 different types of PFAS in US municipal landfill leachates.[2] We were the first to discover that US landfill leachates have PFAS concentrations up to 2,400 ng/L. Our group then expanded the PFAS list in 2014 to include 70 different types of PFAS,[3] well exceeding the current list of PFAS currently listed in US EPA Method 1633.[4] As part of that study, we found that a certain class of PFAS (n:3 FTCA) had higher concentrations in landfill leachate than the PFAS listed in US EPA Method 1633. The n:3 FTCA class is now considered a characteristic of landfill leachates.[5, 6]

Key Point #1: Many more PFAS are present in landfill leachate than are measured by US EPA Method 1633 and, thus, total PFAS concentrations in landfills are higher than currently reported by US EPA Method 1633.

We also demonstrated that the PFAS composition of leachates from landfills is dominated by short-chain PFAS that are very water soluble and therefore more challenging to remove from water.[3, 7]

Key Point #2: The PFAS found in landfill leachate are the most water-soluble forms and are the ones that transport farther if they reach groundwater and that are more difficult to remove by sorption-based technology (e.g. activated carbon).

These two findings on landfill leachate have been replicated by other studies around the world[8] and in the US,[5, 9-11] which indicates that PFAS occur in landfill leachate, irrespective of location. Others studies demonstrate PFAS are also in gas condensate from landfills.[12] While one research group found the effects of landfill liners in retaining PFAS inconclusive,[11] others report that PFAS will permeate through punctured landfill liners.[13]

My research collaboration with North Carolina State produced the first US national inventory of PFAS in municipal landfill leachates. Out of the 95 samples of leachate taken for this study, all samples had PFAS. The annual total estimate of PFAS released to the environment in the United States was estimated to be 563 - 638 kilograms (kg) per year. Using this data, a recent report concluded that 11% of the PFAS mass entering landfills, exits as leachate.[14] We found that 79% of the leachate in the US emanates from landfills located in wet climates.[15] The lower volume of leachate generated by landfills in drier locations can potentially be treated more cost effectively than higher volumes produced over shorter time periods by landfills in wetter locations.

Key Point #3: Landfills located in wet areas, like Corvallis, generate more leachate than those located in drier areas.

My laboratory at OSU was the first to create an analytical method for detecting volatile PFAS in landfill gas.[16] Landfill gas collected from gas wells in landfills has volatile PFAS concentrations that range from 830-4,900 ng/m,^{3} a result that has been confirmed by others.[17] We have just completed a project that estimates the emissions of volatile PFAS from landfills in the US and our findings indicate that the mass of PFAS leaving landfills in landfill gas is equal to that leaving in leachate (unpublished results). Landfill gas is diluted by air as it travels downwind. Air immediately above landfills has measurable PFAS concentration (19 ng/m^3), while locations 5 km (3 miles) downwind of landfills still have detectable levels (0.2 – 2 ng/m^3 PFAS).

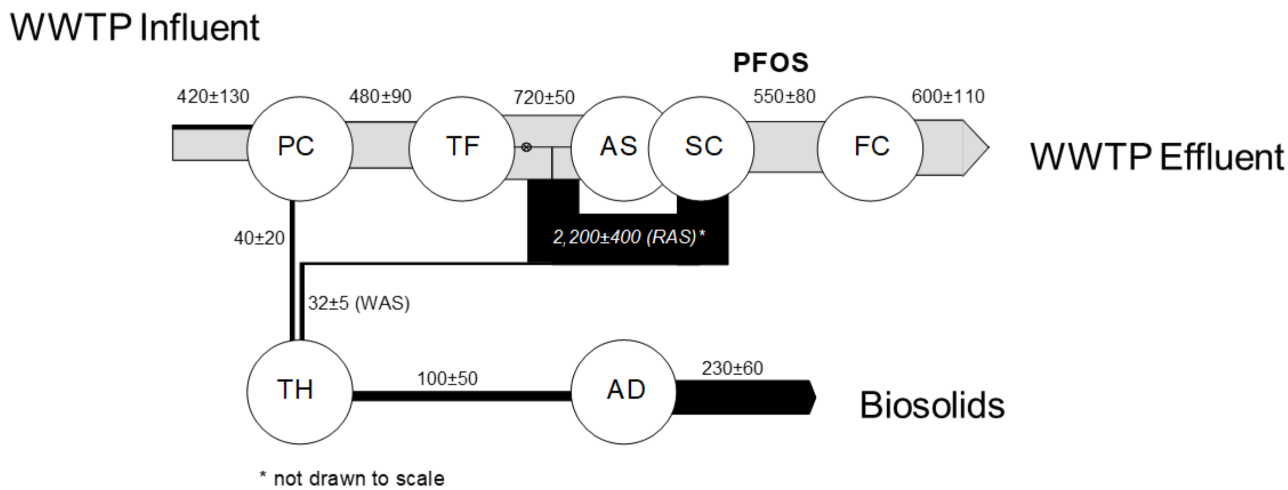
Key Point #4: Landfills release volatile PFAS via gas emissions that double the uncontrolled total PFAS mass emission of landfills.

My research group participated in laboratory studies in which small-scale 'model' landfill reactors were filled with a mixture of municipal solid waste and then monitored the evolution of PFAS in leachate[7] and gas.[18] We and other research groups have demonstrated that municipal solid waste components including carpet,[19] clothing,[20] and food packaging[18] all generate PFAS that end up landfill leachate or gas.

Key Point #5: Materials including food packaging, clothing, carpets all release PFAS into leachate and gas.

Lastly, one of the original studies on the mass flow (mass per day) of PFAS through a municipal wastewater treatment plant was actually conducted in Corvallis back in 2005.[21] We sampled raw influent, primary effluent, trickling filter effluent, secondary effluent, final effluent, as well as sludge biosolids over the course of 10 days. We determined that PFAS are not significantly removed during wastewater treatment plant processes (note the units in the diagram below are in units of milligrams/day). While the Corvallis wastewater treatment plant has likely undergone renovations and modifications since the time of our study, the results of our study have been replicated at many wastewater treatment plants around the world. Thus, shipping landfill leachate to any municipal wastewater treatment plant does not result in actual mineralization (complete biodegradation), rather PFAS exit wastewater treatment plants as effluent to the Willamette River and associated with biosolids. Unfortunately, wastewater treatment plants are simply not currently designed for the removal of PFAS. Other research groups report that PFAS removal technologies are more cost effective if applied *prior* to entering wastewater treatment plants, when the volume of leachate requiring treatment is lower.[10, 22]

Key Point #6: Municipal wastewater treatment plants are not designed to remove PFAS and thus pass PFAS onto surface waters receiving effluent and to soil during the application of biosolids.



In conclusion, there is documented evidence that landfill leachates are a source of PFAS that is sent to municipal wastewater treatment plants, such as the one in Corvallis. The mass of PFAS that passes through to the Willamette River is not reduced by passage through the Corvallis wastewater treatment plant, since the treatment plant is not designed to remove PFAS. There is ample evidence that municipal biosolids from the wastewater treatment plant are another source of PFAS that are land applied in surrounding regions. Further, there is strong evidence that landfills like Coffin Butte are putting PFAS into the surrounding air and that PFAS are potentially impacting groundwater through uncontrolled emissions. Expansion of Coffin Butte landfill will only increase the PFAS burden on the region and further diminish our air and water quality, forcing downgradient water users to bear the costs of removing PFAS from impacted water. Thus, as a Corvallis resident and researcher with expertise on PFAS in landfills, I urge the members of the Benton County Planning Commission to deny the proposed expansion.

Sincerely,

Jennifer Field, Ph.D.

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