POLLUTION PREVENTION resource center

pprc

RAPID RESPONSE

Inquiry: What could be contributing to PFAS contamination in commercial car wash wastewater (and nearby groundwater), and how can it be minimized?

July 2023

This report was developed under Assistance Agreement No. NP-02J20301 awarded by the U.S. Environmental Protection Agency (EPA), administered by Washington State Department of Ecology (Ecology). This research also received support from Clackamas Water Environment Services (CWES).

Contents

Introduction 2

Findings of PFAS in Commercial Car Wash Wastewater/Sludge and Groundwater 2

Potential PFAS Sources in Car Wash Water 3

Alternatives for Consumers 6

Alternatives for Car Wash Facilities, Dealerships, and Detailers 6

Alternatives for Auto Repair and Auto Body Shops 7

Conclusion 7

Additional References and Resources 8

Appendix A – List of Car Wax and Polish Products Containing or Potentially Containing PFAS 9

Appendix B - List of Vehicle Lubricants Containing or Potentially Containing PFAS 10

Introduction

A wastewater treatment plant asked the rapid response question: what could be contributing to Per- and polyfluoroalkyl substances (or PFAS) contamination in car wash water? There are at least three cases of municipalities around the country detecting PFAS contamination in groundwater wells on or near a car wash facility.

There are over 9,000 PFAS compounds (aka "forever chemicals"), and some have been found to be extremely persistent, bioaccumulative and toxic to humans and wildlife.

PFAS have been used in various industrial and consumer products since the 1940s. These substances are known for their resistance to heat, water, and oil, making them useful in applications such as non-stick cookware, stain-resistant fabrics, fume suppressants in plating operations, paper coatings, protective coatings on furniture, carpets, and vehicles, and in firefighting.

It is a challenge to identify PFAS in products for various reasons, including but not limited to:

- Non-disclosure by manufacturers, claiming confidential business information (e.g., trade secrets);
- Lack of PFAS ingredient listings on the product SDS (Section 3, Composition) possibly because the concentration falls under the threshold required for inclusion or the manufacturer may assume that the compound is not hazardous and therefore does not need to be listed; or,
- Limited individual product testing.

This rapid response research intends to find potential sources of PFAS that could be contributing to car wash water contamination and identify possible alternatives that are safer for human health and the environment.

Findings of PFAS in Commercial Car Wash Wastewater/Sludge and Groundwater

Car wash wastewater is the water that drains off the vehicles while washing at commercial car wash facilities. Washing carries a variety of pollutants from the vehicle into the wash water including dirt, grease, oil, heavy metals. This water may also include residual pollutants from waxes and polishes, water repellents, and the soaps used while cleaning.

Additional chemicals that can be washed off during engine cleaning, such as lubricants, engine oil and grime, and engine degreasers, if used in cleaning.

Car wash facilities are required to have wastewater treatment systems on site to remove these pollutants and ensure that the wastewater is in compliance with discharge permits and limits before entering waters of the state. Some systems actually recycle the water for reuse.

Car wash sludge is the solids and debris washed off cars, along with dissolved chemicals, that settles at the bottom of the wastewater holding tank, or the reclaim tank in the case of water recycling systems. This sludge must be pumped out periodically, usually by a professional pumping company. There are automated sludge removal systems as well. Some pumpers may test the sludge for certain pollutants, prior to disposal.

In the literature search, we found three instances of PFAS detected in car wash water samples or in groundwater wells on or near the car wash property, and/or in water samples taken from the oil-water separator.

360 South Street Car Wash As a part of a statewide sampling effort in Michigan, Environment, Great Lakes, and Energy (EGLE) sampled the onsite well water (i.e., influent), the wash water in the final settling tank (i.e., effluent), and two groundwater monitoring wells for PFAS at the car wash in Fall 2021 as part of a statewide sampling effort. Two groundwater monitoring wells exceeded groundwater cleanup criteria for PFOA, and one also exceeded groundwater cleanup criteria for PFOS. The highest result was 22.3 ppt PFOA and 50.9 ppt PFOS.

North Hampton Car Wash Cited for PFAS Contamination. Field samples taken in 2017 and 2018 in wells on the car wash property show readings for regulated PFAS compounds. State officials found readings of up to 158.8 ppt combined for the compounds perfluorooctanoic acid (PFOA) and perfluoro-octanesulfonate (PFOS).

Undisclosed location (Fuss & O'Neill). At a former car wash, PFAS were detected in each of six samples collected from a large wash-water oil water separator and in groundwater. Total PFAS were detected in two monitoring wells at elevated concentration ranging up to 1,287 ng/L. PFOS was the primary PFAS detected.

PFOA was detected in all three car wash pits mentioned above – and is used in the manufacturing process of PTFE (Teflon). PTFE and/or Teflon seems to be a common ingredient in numerous car wash and polish products.

Potential PFAS Sources in Car Wash Water

Listed below in Table 1 are some potential PFAS sources that could conceivably contribute to PFAS in car wash water and sludge. However, some of this information is inferred, as it is hard to prove that a product contains PFAS.

Table 1: Potential PFAS Sources and Supporting Information

Potential Source	References/Supporting Information
Legacy contamination to wash pits and sewer pipes from past car maintenance products containing PFAS	Communication with Michigan/EGLE. 2023.
Car wax / polish (See a list of product names in Appendix A)	Two car wax products tested in a 2017 study (Borg, et al, 2017) were found to contain PFAS (specifically PFOA). Although the formulation may have changed since 2017, these companies still produce car wax.   One company submitted a disclosure statement under the California Ingredient Disclosure "Cleaning Products Right to Know Act of 2017". Their product, called Banana Wax, was disclosed as containing PTFE. This product is currently available on the market. PPRC found 14 car wax or polish products with "Teflon" or "PTFE" on the packaging or in the name of the product. It is assumed these products contain PTFE because of the name, but when SDS are available, none listed any PFAS ingredients. Three of these products claimed trade secrets. *Note: This was not an exhaustive search.* In a literature search, numerous articles, PFAS purchasing guides, and an EPA presentation, claiming that car wax and polish contain PFAS, but the documents do not cite a study or information source.
"Teflon" car paint coating	This creates a protective layer on the surface of a car's paintwork, designed to repel water, dirt, and provides a non-stick surface that is easy to maintain and clean. The protective coating can last up to about one year.
Durable water repellents (DWR)	DWRs may be applied to exterior car windows to repel rain. No PFAS is not listed on any SDS for water repellant products found online. Most now seem to be silicone-based per the SDS, but this does not necessarily prove there is no PFAS content.

Table 1 (Continued)

Potential Source	References/Supporting Information
Lubricants (could be released with engine washing) (See a list of product names in Appendix B)	A pilot study in 2020, analyzed automotive lubricants and found concentrations and profiles of 13 perfluoroalkyl acids (PFAAs), in 18 automotive lubricants available for purchase in the United States. Similar to car waxes, numerous lubricants were identified with "Teflon" or "PTFE" in the product name or product literature. This was not an exhaustive search, but out of 14 products identified, only two listed PTFE in the SDS, at 1.3% and "<1%". See Appendix B.
Engine oil additives (could be released during engine washing if oil leaks are present)	Engine oil additives with PTFE (e.g., Cerflon®, a PTFE and boron nitride compound)
Engine compartment wiring and gauges (could be released during engine washing)	PFAS Helps Power America's Transportation (American Chemical Council).
Automotive chemical- and heat-resistant gaskets and O-rings (could be released during engine washing)	
Cylinder head coatings and hoses made with Fluorotechnology (could be released during engine washing)	
Engine degreasers (could be released during engine washing)	Conjecture that degreasers may contain PFAS is based on communication with Michigan/EGLE (June 2023).

Other PFAS-containing products may be used in or on vehicles but would be less likely to contribute contaminants in car wash water. These include:

- Stain treatments on upholstery and carpet
- Anti-fogging
- Certain cleaners/polishes for interior hard surfaces (e.g., plastic dashboard).

Alternatives for Consumers

Here are suggestions for consumers to minimize the possibility of releasing PFAS during car washing:

Car wax / polish	• Ask your retailer to offer PFAS-free car waxes and polishes, putting the onus on them to contact suppliers to disclose whether their product contains any PFAS.
"Teflon" car paint coating	• Avoid protective coatings. • Ceramic coating (which can last several years, compared to about one year for the Teflon coating)
Durable water repellents (DWR)	• Instead of applying water repellent, replace wipers when they no longer work effectively
Lubricants (could be released with engine washing)	• Ask your auto mechanic to use PFAS-free lubricants. • Avoid products that say Teflon or PTFE on the product name or label, and/or list a fluorinated ingredient on the SDS. • DIY auto mechanics, purchase non-PFAS lubricants
Engine degreasers (could be released during engine washing)	• Ask your detailer to use PFAS-free lubricants. • Avoid products that say Teflon or PTFE in the product name or on the label, and/or list a fluorinated ingredient on the SDS.

Alternatives for Car Wash Facilities, Dealerships, and Detailers

A best practice would be to periodically test residual wash water for PFOA and PTFE content, and report to local water jurisdiction of any findings. Currently, small-scale PFAS removal technologies such as activated carbon removal or reverse osmosis, are unable to remove PFAS from collected car wash water due to the presence of soaps, detergents, waxes, and other chemicals that will allow PFAS to bypass the filtration mechanisms.

Other alternatives include:

Legacy	Decontaminate legacy PFAS in tanks and pipes. This is an expensive option, however.
Car waxes or polishes	If wax service is offered, work with the vendor of the wax to ensure no PTFE, or other PFAS in their wax products. For DIY customers, educate them about avoiding waxes or polishes with PTFE or Teflon in the product name.
Durable water repellents (DWR)	If this treatment is offered, work with the supplier to ensure no PTFE, or other PFAS in their product.
"Teflon" car paint coating	If this service (applying the Teflon coating) is offered, switch to offering a ceramic coating, which lasts longer and does not contain PFAS.
Lubricants (could be released with engine washing)	For DIY customers, educate customers about avoiding lubricants with PTFE or Teflon in the product name.
Engine degreasers (could be released during engine washing)	If this treatment is offered, work with the supplier to ensure no PTFE, or other PFAS in their products.

Alternatives for Auto Repair and Auto Body Shops

Legacy	Decontaminate legacy PFAS in tanks and pipes. This is an expensive option, however.
Durable water repellents (DWR)	If this treatment is offered, work with this product vendor to ensure no PTFE, or other PFAS in their product.
"Teflon" car paint coating	If this service (applying the Teflon coating) is offered, switch to offering a ceramic coating, which lasts longer and does not contain PFAS.
Lubricants (could be released with engine washing)	Purchase lubricants that do not have PTFE or "Teflon" in the product name or on packaging.
Engine degreasers	Ask the vendor to ensure there is no PTFE, or other PFAS in their product.
Car waxes or polishes	Work with the vendor of the wax to ensure no PTFE, or other PFAS in their wax products.

Conclusion

There is evidence that certain PFASs are found in car wash water (and therefore, may likely also be in the sludge), as determined by three instances of PFAS contamination from car washes. There are several possible sources of PFAS in different types of exterior car care products. Unfortunately, it is not obvious whether most products contain PFAS or not, as they are often not disclosed, and not listed on the product SDS.

Without full disclosure by suppliers, or individual product testing, it can be difficult to determine whether products contain PFAS.

There are preemptive actions that may ensure reduced PFAS contamination of car wash water, both for consumers and for car wash facilities. These include:

- Asking automotive retailers, auto detailers, auto repair shops, and suppliers to car wash facilities to ensure the products they offer are PFAS-free, by working with all their respective suppliers, especially engine lubricants, car wash/polishes, engine degreasers, and any other exterior treatments like car paint coatings or water repellents.
- Avoid Teflon car paint coating, exterior water repellent treatment. .
- Avoid products that say Teflon or PTFE on the product name or label, and/or list a fluorinated ingredient on the SDS.

Additional References and Resources

American Chemistry Council. PFAS Helps Power America's Transportation (American Chemical

Environmental Protection Agency. Undated. U.S. State Resources About PFAS

Gluge, et. al. 2020. An overview of the uses of per- and polyfluoroalkyl substances (PFAS)

CarWash.com. 2012. When sediment and sludge is the pits

Hongkai Zhu, Kurunthachalam Kannan. 2020. A Pilot Study of Per- and Polyfluoroalkyl Substances in Automotive Lubricant Oils from the United States

Borg and Iversson. 2017. Analysis of PFASs and TOF in Products

Responsible Purchasing Network (for state of MA). 2023. A Slick New Guide to Avoiding PFAS (Forever Chemicals) in Products Using Massachusetts Statewide Contracts

Cars 24.com. (undated). Teflon Coating Vs Ceramic Coating : Advantages and Disadvantages Explained.

Communication. 2023. Michigan Department of Environmental Quality

Appendix A – List of Car Wax and Polish Products Containing or Potentially Containing PFAS

Product Name	PFAS Disclosed?	Claimed Trade Secret?	SDS
LEVEL Velocity Gloss Car Wax - Liquid Auto Polish and PTFE Speed Wax	No	Yes	SDS Link
Turtle Wax - Metallic Car Wax + PTFE	No	No	SDS Link
Banana Wax	Yes (California Disclosure)	No	SDS Link
Star Brite Premium Cleaner Wax with PTEF	No	No	SDS Link
HS Ultra Gloss 29.916 Car Wax Carnuba Long Lasting with PTFE Resins	No	No	SDS Link
Street Legal Kryptonite Premium Wax with Carnauba Teflon and Silicone	n/a	n/a	No SDS
Infinity Teflon Wax	No	Yes	SDS Link
SHIELD, Carnauba Wax with PTFE*	n/a	n/a	No SDS
Sahara Pure Natural Car Wax PTFE	n/a	n/a	No SDS
CARAT (81% Vol.) Carnauba wax with PTFE	n/a	n/a	No SDS
Sudbury Miracle Coat Spray-On Wax W-carnauba & PTFE	No	No	SDS link
Lanco™ TF 1780 EFC Micronized Wax (Micronized PTFE-Modified Polyethylene Wax – Low PFOA)	Yes	No	Product Data Sheet LInk
Diablo PTFE Wax	n/a	n/a	No SDS
Dupont Teflon Car Wax	n/a	n/a	No SDS
*Turtle Car Wax Original	n/a	n/a	No SDS
*Autoglym/Sonax	n/a	n/a	No SDS

*PFAS detected in product testing in 2017 (Borg, et al 2017)

Appendix B- List of Vehicle Lubricants Containing or Potentially Containing PFAS

Product Name	PFAS Disclosed?	Claimed Trade Secret?	SDS
Hi-Tech PTFE Gel Lube	No	Yes	SDS Link
3-IN-ONE® Multi-Purpose PTFE Lubricant	No	Yes	SDS Link
Sprayway Penetrating Lubricant with PTFE	No	Yes	SDS Link
Madler PTFE Spray	No	No	SDS Link (in German)
CRC General Purpose Dry Lubricant	No	Yes	SDS Link
CRC Power Lube High Prf w PTFE	No	No	SDS LInk
CRC Syntha-Tech Lubricant	Yes (PTFE at <1%)	No	SDS LInk
Dupont Teflon® Silicon Lubricant	No	No	SDS Link
DuPont™ Teflon® Product Use: Lubricant	No	No	SDS Link
Sonax PTFE Spray-On Grease	n/a	n/a	No SDS
WD-40® Specialist® Anti-Friction Dry PTFE	No	No	SDS Link
Zep Lubricant 45, with PTFE	No	No	SDS Link
Blaster Multi-Purpose Lubricant	Yes (PTFE at 1.3%)	No	SDS LInk
Tri-Flow Industrial Lubricant ("Primary additive PTFE")	No	No	SDS Link