Safer Products for Washington: Apparel and Gear Manufacturer Data

Overview

The 2021 PFAS Chemical Action Plan[1] (CAP) identified coatings applied to protective clothing, footwear, and outdoor gear (like tents and umbrellas) as sources of PFAS in Washington. PFAS are mainly used in these products to repel water, oils, and stains. In 2022, the Legislature amended Chapter 70A.350 RCW,[2] directing Ecology to prioritize PFAS sources and uses listed in the CAP as priority products without additional steps. It also required Ecology to decide on regulatory determinations by June 2024. Based on this recommendation, the Safer Products for Washington program considered apparel, footwear, and gear as priority products in cycle 1.5.

To help make a regulatory determination, we ordered apparel, footwear, and gear manufacturers to share information about the chemicals they use for stain and water resistance in products sold in Washington. You can find more details about the information we requested and received below.

If you have questions about this order for information, contact us at SaferProductsWA@ecy.wa.gov.

Key highlights

- Manufacturers use PFAS in apparel, footwear, and gear to provide stain resistance, water repellency, and waterproofing.
- Ten of twelve manufacturers reported that they still use PFAS in their products.
- Two of those ten manufacturers reported using PFAS only on their footwear products.
- Seven of the ten manufacturers currently using PFAS stated that they had plans to phase out PFAS in their products.
- Eight of twelve manufacturers reported using alternatives to PFAS in their products.
- Seven out of the eight manufacturers that reported using alternatives to PFAS have not completely phased out PFAS from their products.
- One of the two manufacturers that do not use PFAS reported relying entirely on alternatives for stain and water resistance.

[1] apps.ecology.wa.gov/publications/summarypages/2104048.html
[2] app.leg.wa.gov/rcw/default.aspx?cite=70A.350

PFAS manufacturer order

To understand how PFAS are used in apparel, footwear, and gear, we used our authority under RCW 70A.350.030[3] and 70A.350.040[4] to order information from manufacturers.

We created a series of questions and a template for manufacturers to use when responding. We asked them to confirm whether PFAS were used in any apparel or gear they sold or offered for sale in Washington over the past five years.

If no PFAS were used in their products during that time, manufacturers could simply state this, and no further details were required.

If PFAS were used, manufacturers were asked to provide additional information.

Specifically, manufacturers were asked to provide a list of all of apparel, footwear, and gear sold or offered for sale in Washington within the past 12 months. For each product, we asked the manufacturer to:

- Answer "Yes" or "No" if PFAS were used in the product.
- Provide a description of the product and its components, including the type of fabric or material where PFAS was applied.
- Include the name and CAS registry number of the PFAS used.
- Explain the function of PFAS used in the product.

Regardless of whether PFAS were used in the past 12 months, we also asked manufacturers if any products used alternative chemicals for water and stain resistance. For these products, we asked the manufacturers to:

- Provide the name and CAS registry number of the alternative chemicals used.
- Give a description of the product and its components, including the type of fabric or material where the alternative was applied.

Additionally, if manufacturers used PFAS in their products in the past 12 months, we asked them to provide sales or volume data for PFAS-containing products sold in Washington.

Results manufacturer reported

We identified twelve apparel and gear manufacturers based on the types of products they offer. Manufacturers with items labeled as stain-, dirt-, or water-resistant, or waterproof were more likely to use PFAS. Similarly, manufacturers of gear featuring Gore-Tex, Teflon tags, or

[3] app.leg.wa.gov/RCW/default.aspx?cite=70A.350.030
[4] app.leg.wa.gov/RCW/default.aspx?cite=70A.350.040

products using "C6" technologies were also likely to use PFAS. This sampling of manufacturers, however, may not represent the entire market.

In February 2023, we sent orders to twelve apparel, footwear, and gear manufacturers, asking for information about PFAS use in their products. All twelve manufacturers responded to our order.

- One manufacturer reported no PFAS use in their products in the past five years.
- A second manufacturer responded no PFAS used in the past 12 months.
- Ten out of twelve manufacturers reported still using some PFAS in their apparel, footwear, and gear products.
- Seven of those ten manufacturers stated they are phasing out PFAS from their products.
- Two of those ten manufacturers reported using PFAS only in footwear products.

The main functions of PFAS reported by manufacturers were to provide stain resistance, water repellency, and waterproofing in apparel, footwear, and gear. We identified four basic categories for products reported by the manufacturers. These are similar to the product categories identified in the PFAS CAP as likely to have PFAS coatings: 1) apparel (outerwear), 2) apparel for extended and extreme use, 3) footwear, and 4) gear for recreation and travel.

From the information provided, it is clear that most products are made from multiple layers of different materials or a combination of various material types. This means a single product could contain both PFAS-treated materials and alternative materials, or even multiple PFAS-treated materials to achieve different properties. For example, a jacket might have one layer coated with polymers of side chain PFAS for water repellency, along with an additional Polytetrafluoroethylene (PTFE) membrane layer for waterproofing. Similarly, another jacket might use the same coating polymer with side chain PFAS and a polyurethane film in place of a PTFE membrane for waterproofing.

The PFAS chemicals reported by manufacturers are listed in Table 1.

Table 1. PFAS chemicals reported by manufacturer and product category where used.

PFAS	Product category
Durable Water Repellants (DWR) - C6	Apparel (outerwear), Apparel for extreme and extended use, and gear for recreational and outdoor use

PFAS	Product category
Polytetrafluoroethylene (PTFE)	Apparel (outerwear), Apparel for extreme and extended use, gear for recreational and outdoor use, and footwear
^Polymer of perfluoroalkylethylacrylate, alkylaminomethacrylate, hydroxyalkylmethacrylate, organic acid salt (generic)	Apparel (outerwear)
^Polymer of perfluoroalkylethylmethacrylate, alkylacrylate, chloroethene, and urethane methacrylate (generic),	Apparel (outerwear)
^Perfluoroalkylethyl methacrylate copolymer (generic),	Apparel (outerwear)

Table note: Side chain fluorinated copolymer coatings are noted with a caret symbol (**^**). These coatings are often used in combination with PTFE membranes to provide a durable repellent finish and waterproofing on a piece of apparel.

In addition to PFAS use, manufacturers also reported products that combine PFAS-treated materials with non-PFAS materials to achieve water and stain resistance. These combinations are listed in the Table 2.

Table 2. Chemical-material combinations of PFAS and PFAS-free material by product category.

Combination	Product category
C16-C22 Aliphatic alkyl acrylate copolymer/ NEOGUARD WR-800NF (C6 DWR) /dipropylene glycol	Unable to identify using product numbers
PU Solvent coating, DWR-C6/PTFE	Apparel, Apparel for extreme and extended use, gear for recreational and outdoor use
PU laminate film, DWR-C6	Apparel, Apparel for extreme and extended use, gear for recreational and outdoor use

Eight of twelve manufacturers reported using alternatives to PFAS in their products. Of those, seven manufacturers reported using a combination of PFAS-treated materials and alternatives in their products.

While four manufacturers did not report any alternatives, one of them noted they are using alternatives but were not able to report on them. The other three manufacturers did not mention whether alternatives were required or used in their products.

- One manufacturer reported phasing out PFAS from apparel and gear in 2018, but still reported using it in their footwear.
- Another manufacturer did not report on their alternatives because the supplier did not provide the information. However, they indicated that some alternatives were being used in their products. They also mentioned that their apparel and gear products have phased out PFAS since 2020.
- One manufacturer stated they did not use PFAS in their products in the past five years, so they were not required to provide additional information.
- Another manufacturer provided a list of products with and without PFAS but did not clarify whether alternatives were used in products with water or stain resistance properties. However, they did mention an ongoing phase out of PFAS from their products.

For alternatives, we asked manufacturers to provide information on the names and CAS registry numbers of the alternative chemicals or products, the name of the products they were used on, and the types of materials where they were applied. While some manufacturers provided detailed information, some requested their alternatives to be considered confidential business information. We agreed to treat the alternative chemicals used by some manufacturers as confidential.

The trade names provided by companies that did not request confidentiality are discussed below:

- One manufacturer only reported final product names readily available in the market, such as: Chemours Zelan R3, HeiQ Eco Dry, and Archroma Smartrepel Hydro. These alternatives were applied to their entry level performance products.
- One manufacturer reported Futurelight™ technology as an alternative in which a nano-spun polyurethane membrane laminated onto the backer and face fabric surfaces creates a breathable waterproof fabric.
- Some manufacturers reported “C0” as the alternative, which is a generic term for non-fluorinated carbon based DWR.

Other manufacturers provided some generic information on their alternatives (see Table 3).

Table 3. PFAS alternatives used across product categories, chemicals, and materials.

Alternate process, chemical or method*	Product category	CAS registry number and chemicals in the formulation provided	Material on which the alternative was applied
Fluorine free water repellent/ treatment	Footwear	Phthalide (87-41-2), DMPA (4767-03-7)/ not provided	Webbing on footwear/ woven and non-woven materials on footwear
Fluorine free water repellent GSJ-2639	Footwear	Propylene glycol (57-55-6), Tergitol (60828-78-6), D2O (7732-18-5)	Knit on footwear
Fluorine free now-wicking	Footwear	Not provided	Webbing on footwear
PFC-FREE CHEMICAL - DOW Chemical	Apparel (outerwear)	PDMS (106214-84-1), Silicone oil (63148-62-9), 106875-66-1	Recycled Nylon, Polyethylene
Polyacrylic ester polymer	Footwear	Not provided	Thread
Daikin PFAS free DWR agent – XF 5010	Gear for outdoor recreation and travel (backpacks and pack accessories)	Acrylate copolymer	Nylon
Daikin -XF 5005	Unable to identify with product number	Acrylate copolymer (non-fluorinated cationic water emulsion)	Not provided
Unidyne XF-5015	Gear for outdoor recreation and travel (tents and tent accessories)	Not provided	Recycled nylon

Table note: The reported alternatives were used only on specific components of each product type, meaning the products as a whole may not be entirely PFAS-free.

Challenges with the reports received

- Some manufacturers provided detailed information about their products and components as requested, while others reported broad categories or product numbers.

This inconsistency made it challenging to identify and categorize product types uniformly across all manufacturer data. Requesting products with their brick codes in the future could help improve consistency.

- Some manufacturers did not have or could not obtain information about PFAS or their alternatives from suppliers, making it difficult for them to provide clear responses.
- The information provided by manufacturers on alternatives wasn't detailed enough to determine whether alternatives were safer than PFAS.
- Some manufacturers took more than six months to respond to the order, which made it difficult to incorporate information into the regulatory determinations report.[5] Some delays were due to requests from manufacturers to protect the information provided as "confidential business information," protecting it from being released to the public.

Contact

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ADA Accessibility

To request an ADA accommodation, contact us by phone at 360-407-6700, by email at hwtrpubs@ecy.wa.gov, or visit ecology.wa.gov/accessibility.
For Relay Service or TTY call 711 or 877-833-6341.

[5] apps.ecology.wa.gov/publications/summarypages/2404023.html