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RE: Draft Rule for Chapter 90: Products Containing Perfluoroalkyl and Polyfluoroalkyl Substances, Currently Unavoidable Use (CUU) Designation for Cookware

Dear Ms. Malinowski Farris,

We would like to provide our company's recommendations regarding the Maine Department of Environmental Protection (DEP) draft rule establishing the currently unavoidable use (CUU) designation for specific categories of regulated products subject to sales prohibition for intentionally added PFAS beginning January 1, 2026. The Chapter 90 DEP Staff Memo to the Board of Environmental Protection (BEP) on July 17, 2025 based its recommendation to deny the CUU proposals for the use of PFAS in cookware and kitchen electric appliances (including coffee makers) based on a lack of evidence that these products meet the statutory definition of "essential for health, safety and the functioning of society" and that "reasonably available alternatives" are readily obtainable by consumers.

We strongly encourage DEP to recommend BEP approve the CUU proposals for the use of high-performance materials in cookware/bakeware and electric kitchen appliances, including coffee makers, as these applications meet the statutory definition of being essential for health, safety and the functioning of society. In particular, substances such as PTFE (covered by a broad PFAS definition) provide unique properties that are critical for durability, safety and performance. Comparable and reasonably available alternatives that deliver the same level of functionality and reliability are not readily accessible to consumers. These comments provide justification for making this recommendation in addition to the following change to the draft rule before it is finalized.

Recommended Changes to Draft Rule

9. Currently Unavoidable Use.

B. Department Designations of Currently Unavoidable Use.

The Department has determined that the following uses of PFAS are currently unavoidable uses. Each determination will remain in effect until the date listed below.

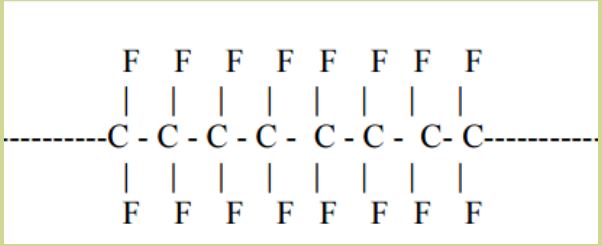
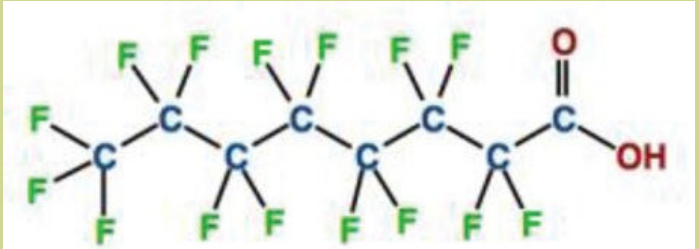
1) *The use of PFAS in a cleaning product container internal cartridge valve within the HTS classification 3926.90.4510, which are used in the industrial sector with the NAICS codes 561210 and 561720 is a currently unavoidable use until January 1, 2031.*
2) *The use of PFAS in a cleaning product container vented cap liner within the HTS classification 3921.19.0000, 7607.20.5000, and 3923.50.0000, which are used in the industrial sector with the NAICS code 322299 is a currently unavoidable use until January 1, 2031.*
3) *The use of PFAS in a cookware/bakeware products and kitchen electric appliances within the HTS classification 7615, 7323, 8516 and 9902, which are used in the industrial sector with the NAICS code 332215 and 335210 are a currently unavoidable use until January 1, 2031.*

PTFE vs PFOA

The definition of PFAS includes an estimated 14,000 molecules and compounds that significantly vary in their physiochemical properties and should not be regulated in the same manner. For example, PTFE and PFOA have different chemical structures and properties (see chart below). PTFE is a stable, inert, non-polar polymer mainly used for its chemical resistance and non-stick properties, while PFOA is a bioaccumulative, amphiphilic surfactant with environmental mobility concerns and has been phased-out due to its potential health risks. (See attachment for an overview of global studies and findings.)

Below are a few examples of the broad agreement on this scientific fact:

- Department of Defense report states "A variety of broad molecular structure descriptors, without regard to the individual substance's toxicity profile and hazard characterization, are used to define the chemical class "PFAS." These structural definitions do not inform whether a substance is harmful but only communicate that the substances share common structural traits to varying degrees."
- EPA's National PFAS Testing Strategy states "Most of the hundreds of PFAS currently in commerce have limited or no toxicity data."
- Organisation for Economic Co-operation and Development (OECD) issued a report stating, "As PFASs are a chemical class with diverse molecular structures and physical, chemical and biological properties, it is highly recommended that such diversity be properly recognized and communicated in a clear, specific and descriptive manner. The term "PFASs" is a broad, general, non-specific term, which does not inform whether a compound is harmful or not, but only communicates that the compounds under this term share the same trait for having a fully fluorinated methyl or methylene carbon moiety."
- Canada PFAS risk management approach excludes fluoropolymers.

Property	PTFE	PFOA
Chemical Structure	Linear polymer composed of repeating (can be thousands) tetrafluoroethylene monomers - $(CF_2\text{-}CF_2)n$ 	8-carbon chain fully fluorinated except for the last carbon which is attached to a carboxylic acid group - $C_8HF_{15}O_2$ 
Water Solubility	Insoluble	Soluble
Mobility in Environment	Stable and does not dissolve or migrate easily in the environment due to its solid form and chemical inertness	Can move through soil and water due to its solubility and persistence in the environment
Bioaccumulation	Not bioaccumulative; it is inert and does not absorb into living tissues	Highly bioaccumulative; it tends to persist in biological systems, accumulating over time and potentially causing health issues
Polarity	Non-polar	PFOA is considered amphiphilic because it has both hydrophobic (non-polar) and hydrophilic (polar) parts
Toxicity	Inert and non-toxic; does not react with other chemicals easily and poses minimal risk under normal conditions	Toxic

Other States
Several states have stopped including cookware in state legislation or further narrowed and refined its regulatory guidance to minimize banning safe products that are needed in homes and restaurants. Also, bills have been introduced to repeal existing bans on cookware.

Below are some activities in other states.

- Only **Minnesota** has a current ban of non-stick cookware that is effective, and this year, they already enacted changes to that law to exclude internal components.
- This year, the **Vermont** legislature delayed its effective date by 2.5 years to July 2028 so they could study the cookware prohibition.
- **Connecticut Governor Lamont** was quoted in the press raising concerns about the "unintended consequences" and "expressed misgivings about banning popular household products such as Teflon." And stated in the press – "Teflon non-stick pans could be unavailable in Connecticut . . . there may be challenges in the wide-spread manufacture and distribution of affordable cookware. . ." In his signing statement on June 5, 2024, the Governor wrote "I ask that the Legislature continue to discuss this issue in the next regular session and carefully consider whether there is a need to exempt PTFE." As a result, a bill was introduced to roll back the cookware exemption, but it was not enacted before the legislature adjourned.
- In **New York,** a bill to ban cookware in PFAS was not enacted. Last year, cookware was removed from a larger PFAS prohibition bill during the legislative process.
- **New Mexico Governor Lujan Grisham** signed a PFAS product ban bill, championed by her Secretary of the Environment, James Kenney, that specifically excludes all fluoropolymers from the PFAS ban bill.
- **Illinois Governor Pritzker** approved a bill on August 15 that is a PFAS product ban and specifically removed the cookware prohibition during the legislative process.
- **Delaware (and West Virginia**) - In PFAS laws concerning drinking water that are already in place in both Delaware and West Virginia, the definition of PFAS in statute specifically excludes fluoropolymers like PTFE.
    - Delaware:§ 8092. Definitions.
      (4) "PFAS" means **non-polymeric** perfluoroalkyl and polyfluoroalkyl substances that are a group of man-made chemicals that contain at least 2 fully fluorinated carbon atoms, excluding gases and volatile liquids....
    - West Virginia: §22-11C-2. Definitions.
      "Perfluoroalkyl and polyfluoroalkyl substances" or "PFAS" means **non-polymeric** perfluoroalkyl and polyfluoroalkyl substances that contain at least two fully fluorinated carbon atoms, excluding gases and volatile liquids. . .

Canada
In March 2025, **Health Canada** excluded fluoropolymers -- Risk Management Approach for Per- and polyfluoroalkyl substances (PFAS), excluding fluoropolymers
Environment and Climate Change Canada

I. Reasonably Available Alternatives

The recommendation to deny the CUU proposal for cookware/bakeware and kitchen appliances (including coffee makers) because "reasonable alternatives" are readily obtainable by consumers is incorrect, arbitrary and capricious. Chapter 90 defines the term "reasonably available" to mean the following:

> *"Reasonably available" means a PFAS alternative which is readily available in sufficient quantity and at a comparable cost to the PFAS, to include changes to the manufacturing process, it is intended to replace and performs as well as or better than PFAS in a specific application of PFAS in a product or product component.*

Of note, the alternative product must be (1) at a comparable cost and (2) perform as well as or better. Neither of these criteria are met for non-stick cookware/ bakeware or electric kitchen appliances, including coffee maker alternatives.

Chapter 90 also defines the term "functionally equivalent" to mean the following:

> *"Functionally Equivalent" means a product or product component that functions in the same basic manner as the product it is being compared against to perform the same purpose to the same standard as the original PFAS containing product or product component it is being compared against.*

Of note, for an alternative product to be functionally equivalent it must perform the same purpose to the same standard. In response to comments, DEP stated, "If the standard that the existing product is meeting includes a lifespan or duration component, such a function will be included in the Department's Currently Unavoidable Use assessment."

Further, the DEP Staff Memo to the Board of Environmental Protection on July 17, 2025 stated the following:

> *The objective of Maine law Products Containing PFAS, 38 M.R.S. §1614, is to reduce the potential for environmental contamination by and human exposure to perfluoroalkyl and polyfluoroalkyl substances (PFAS) by eliminating their non-essential use in products through sales prohibitions.*

Of note, the objective is to (1) reduce potential for environmental contamination by and (2) human exposure to PFAS. Neither of these criteria are met if non-stick cookware/ bakeware or electric kitchen appliances, including coffee maker alternatives, are banned.

The alternative to the traditional non-stick cookware material is known as "ceramic," which is not fired clay material or traditional pottery. The term ceramics for non-stick cookware is used to describe a silica-based sol-gel coating that cures into a hard, glass-like layer. Modifiers (resins or oils) are embedded in the silica matrix during curing to provide the "slipperiness."

Other traditional cookware materials such as cast iron, stainless steel, or uncoated aluminum, lack inherent non-stick properties. While these materials may offer advantages in heat

retention or durability, they typically require regular seasoning or the addition of oil to prevent food from sticking. As such, they do not meet the expectations of consumers seeking convenience and low-maintenance cooking. They are not alternatives to fluoropolymer-based non-stick surfaces.

Accordingly, information and supporting evidence to justify DEP adding cookware/ bakeware and electric kitchen appliances, including coffee makers, to the Department's CUU designations are detailed below.

1. Alternative products are not at a comparable cost

Ceramic alternatives cost more than traditional non-stick cookware. The cost difference on average, based on publicly available retail information, is that an average set of mid-range ceramic cookware would cost $200-350 more than the current, traditional non-stick cookware.

In addition to the retail price increase, the alternative (ceramics) has a shorter estimated average useful life (see more details on this aspect below), which would require consumers to purchase cookware more frequently.

2. Alternative products do not perform as well as or better

A "functionally equivalent" product must function in the same basic manner as the product it is being compared against to perform the same purpose as the original PFAS containing product. DEP has stated that lifespan will be included in its CUU assessment. The alternative to PTFE-coated cookware is ceramic-coated cookware, which has a shorter lifespan.

The alternative to the traditional non-stick cookware material is known as "ceramic," but it is not fired clay material or traditional pottery. The term ceramic for non-stick cookware is used to describe a silica-based sol-gel coating that cures into a hard, glass-like layer. Modifiers (resins or sacrificial oils) are embedded in the silica matrix during curing to provide the "slipperiness." Overtime with heat and washing, these additives degrade, leaving mostly a hard silica network.

Consumer studies comparing ceramic and fluoropolymer non-stick cookware reveal that ceramic-coated cookware wear out more quickly, requiring more frequent replacement. This reduced durability increases costs for consumers and leads to a greater overall negative environmental impact (Palermo, A., 2020).

In 2012, the National Advertising Division (NAD) issued a decision on advertising claims (DuPont v Greenpan Thermolon™ Ceramic). The conclusion of that advertising decision stated:

> *Non-stick performance claims*: NAD recommended that GreenPan discontinue its broad unqualified claim that Thermolon has "*superior release properties,*" and that GreenPan discontinue its use of the claims "*The Thermolon™ surface provides great non-stick,*" and that Thermolon™ is a "*high quality nonstick coating*" as they appear in the comparative advertising at issue.

In that decision, the results from the challenger's testing showed that the ceramic pan failed the egg release test, a standardized performance test used to evaluate the non-stick properties and durability of cookware coatings, on only its 10th cycle, with an average release score of only 2.45 out of 5 (averaging ratings of the first and second egg cycle). In contrast the Teflon® Platinum non-stick coated pan had an average release rating of 4.7 after 10 cycles and did not fail the release test until its 67th cycle. Even after 67 cycles, the Teflon® non-stick coated pan had an average release score of 4.08 – demonstrating comparatively longer-term durability and slower degradation of its non-stick performance.

According to a study by Rossi et al, the C–F bond in fluoropolymers provides superior self-lubrication and non-stick properties, and chemical and thermal resistance compared to sol-gel ceramic coatings. This study demonstrated also that the main concern with sol–gel non-stick coatings is their reliability over long periods of usage and when subjected to wear. Unlike fluoropolymer non-stick coatings, ceramic coatings are not "intrinsically non-stick, relying only on the action of the functionalized groups of the topcoat, which can be easily removed by everyday usage." This makes ceramic coatings more susceptible to abrasion, degradation, and loss of performance, contributing to their inferior quality in terms of non-stick durability. "Sol–gel coatings, despite being proposed as valid alternatives to fluoropolymer ones, do not achieve the same quality standards in terms of releasing properties, being in addition much more sensible to degradation and loss in performances." (Rossi et al., 2022)

A recent study published earlier this year in April 2025 found that the non-stick performance of ceramic coatings was inferior to that of (fluoropolymer) PTFE-based coatings.[1] The researchers measured the peeling force required to release a pancake from the pan surface. After 90 cooking cycles, the lowest performing ceramic cookware required nearly 9 times more force than a PTFE-coated pan. The study concluded that "while ceramic coatings may offer initial non-stick performance comparable to PTFE, their long-term durability varies significantly." It also noted that **"**PTFE offers the best protection against impact abrasive wear action" (measured by the stripping time against brown corundum particles and walnut shell particles).

3. Alternative products do not reduce potential for environmental contamination

Using the term PFAS as a single regulatory category is overly broad and does not reflect the vast differences between the thousands of substances it encompasses. While certain substances of this group are rightly considered as harmful, others are fundamentally different in their properties and are recognized as safe and approved for use by regulatory authorities. A clear example of the latter is PTFE, which has been widely used in non-stick cookware since the 1970s. Global public health authorities consistently regard PTFE as inert, non-bioaccumulative, insoluble in water, and therefore safe for consumers. Further, PTFE is considered immobile in the environment. The Interstate Technology Regulatory Council (ITRC) reinforces this distinction, noting that "[…] a stable, insoluble fluoropolymer such as PTFE may pose little environmental/ecological or health risk once it is in a product."[2]

[1] https://www.sciencedirect.com/science/article/pii/S2590123025011491
[2] https://pfas-1.itrcweb.org/wp-content/uploads/2023/12/Full-PFAS-Guidance-12.11.2023.pdf

Both Delaware and West Virginia have recognized the fact that fluoropolymers are not a concern for drinking water. In their PFAS laws concerning drinking water, the definition of PFAS in statute specifically excludes fluoropolymers like PTFE (see below).

- **Delaware (and West Virginia**) -
  - Delaware:§ 8092. Definitions.
    (4) "PFAS" means **non-polymeric** perfluoroalkyl and polyfluoroalkyl substances that are a group of man-made chemicals that contain at least 2 fully fluorinated carbon atoms, excluding gases and volatile liquids....
  - West Virginia: §22-11C-2. Definitions.
    "Perfluoroalkyl and polyfluoroalkyl substances" or "PFAS" means **non-polymeric** perfluoroalkyl and polyfluoroalkyl substances that contain at least two fully fluorinated carbon atoms, excluding gases and volatile liquids. . .

4. Alternative products do not reduce potential for human exposure

As recently as early January 2025 under the Biden Administration, the FDA reaffirmed that the use of PTFE and similar fluoropolymers in non-stick (cookware) coatings remains approved:

> "*Some PFAS are approved for use in the manufacture of non-stick cookware coatings. These coatings are made of molecules that are polymerized (i.e., joined together to form large molecules) and applied to the cookware through a heating process that tightly binds the polymer coating to the cookware. . . Similarly, the PFAS used in manufacturing of gaskets that come into contact with food do not pose a safety risk because they are also made of molecules that are polymerized.*"

It is noteworthy that the FDA partnered with ECRI to conduct an independent safety review. ECRI, designated as a Patient Safety Organization by the U.S. Department of Health and Human Services, collected data from over 1,800 healthcare provider organizations across the country. The review, delivered in 2021, used over 1,750 published, peer-reviewed scientific articles, as well as ECRI's real-world surveillance network of clinics and healthcare providers through its Patient Safety Organization. The findings concluded that there is no conclusive evidence of patient health risks associated with PTFE as a material.[3]

Other recognized and trusted authorities in this field have likewise confirmed that PTFE is suitable and approved for use in food-contact applications:

- American Cancer Society: "While some PFAS can be used in making some non-stick cookware coatings, they are joined together in large molecules (polymerized) and are tightly bound to the cookware, so very little is capable of getting into food, according to the FDA."
- Interstate Technology Regulatory Council (ITRC): "[…] a stable, insoluble fluoropolymer such as PTFE may pose little environmental/ecological or health risk once it is in a product."

[3] https://www.fda.gov/medical-devices/products-and-medical-procedures/pfas-medical-devices?utm_medium=email&utm_source=govdelivery

- EFSA: "These studies concluded that fluoropolymer food contact materials were not likely to be a major source of PFASs" and further clarified that a high molecular weight fluoropolymer poses no risk if ingested.
- BFR (Germany): "The BfR has no data which would indicate that, under normal usage conditions (no overheating), any PTFE-coated cookware, ovenware or frying pans currently available on the market transfer fluorinated chemicals to food in quantities suitable for endangering human health."
- International Agency for Research on Cancer (IARC), created by the World Health Organization: IARC concluded that after ingestion of 25% PTFE for 90 days, PTFE had no toxicological impact. IARC also specified that the material did not produce skin irritation and did not act as an allergen.

II. Essential for health, safety and the functioning of society

We respectfully disagree with DEP's recommendation to deny the CUU proposal for cookware/ bakeware and electric kitchen appliances, including coffeemakers, on the grounds that these products allegedly do not meet the statutory definition of "essential for health, safety and the functioning of society." Under Maine law [38 M.R.S. § 1614(1)(B-1)] "Essential for health, safety, or the functioning of society" is defined as follows:

> *B-1. "Essential for health, safety or the functioning of society" means a use of a PFAS in a product when the function provided by the PFAS is necessary for the product to perform as intended, such that the unavailability of the PFAS for use in the product would cause the product to be unavailable, which would result in:*
> *(1) A significant increase in negative health outcomes;*
> *(2) An inability to mitigate significant risks to human health or the environment; or*
> *(3) A significant disruption of the daily functions on which society relies.*

For the reasons outlined in detail below, DEP should recommend that cookware/ bakeware and electric kitchen appliances, including coffee makers, receive a CUU determination.

1. A significant increase in negative health outcomes

Alternative ceramic non-stick coatings have not been studied for the same length of time or with the same rigor as PTFE-based materials. By contrast, PTFE and related fluoropolymers used in cookware have been the subject of robust scientific evaluation for more than six decades. Since the 1960s, the FDA has authorized PTFE and other fluoropolymers for use in food-contact applications and cookware.[4] Accordingly, DEP cannot reasonably determine that eliminating access to PTFE-coated cookware would not increase the risk of negative health outcomes.

FDA

To ensure food contact substances are safe for their intended use, the FDA conducts a rigorous review of scientific data prior to their authorization for market entry. The FDA's authorization of a food contact substance requires that available data and information

[4] https://www.fda.gov/food/environmental-contaminants-food/and-polyfluoroalkyl-substances-pfas

demonstrate that there is a reasonable certainty of no harm under the intended conditions of use.

Authorized Uses of Food Contact Substances that Contain PFAS and Potential for Migration

Authorized & Intended Use	**Molecular Structure of Substance & Product Manufacturing Process**	**Migration Potential Description**
Non-stick applications on pots & pans	PFAS molecules are polymerized* (i.e., joined together to form large molecules) and are then applied to the surface of the cookware at very high temperatures, which tightly binds the polymer coating to the cookware.	The manufacturing process vaporizes off virtually all the smaller (i.e., migratable) PFAS molecules. The result is a highly polymerized coating bound to the surface of the cookware. Studies show negligible amounts of PFAS in this coating can migrate to food.

The same fluoropolymer (PFAS) materials used in non-stick cookware are critical components in life-saving medical devices, such as pacemakers. According to the FDA, fluoropolymers, including PTFE, have a long history of safe use, with PTFE first applied in medical devices as early as the 1950s.[5]

Importantly, the FDA underscores that not all substances grouped under the broad label "PFAS" are the same. According to FDA, PFAS encompasses more than 1,000 different chemicals with widely varying properties. Within this group, fluoropolymers stand apart: they are uniquely irreplaceable in medical applications, as no other materials can perform and fulfill their critical roles. Moreover, due to their very large molecular size, fluoropolymers cannot cross cell membranes and are, therefore, considered highly unlikely to pose toxicity risks to patients.

Laws of Chemistry

Alternative ceramic coatings have not been studied to the same extent as PTFE. Moreover, fundamental principles of chemistry demonstrate that no alternative can deliver superior health outcomes, as PTFE is composed solely of carbon and fluorine, and the carbon-fluorine bond is the strongest in organic chemistry, making PTFE uniquely stable and inert.

National Advertising Division

In August 2025, the NAD issued a decision on advertising claims (CSA v Caraway). The decision concluded that the advertiser did not meet its burden of providing a reasonable basis for claims that competing [PTFE] nonstick cookware is toxic. Further, NAD found that the advertiser did not substantiate the claim that competitor nonstick [PTFE] cookware is unsafe or is less safe than [ceramic] cookware. Therefore, NAD concluded that the advertiser did not provide a reasonable basis for the claim that its cookware is comparatively safer than competitor cookware.

[5] https://www.fda.gov/medical-devices/products-and-medical-procedures/pfas-medical-devices?utm_medium=email&utm_source=govdelivery

In a 2012 NAD decision on advertising claims (DuPont v Greenpan), it states that US Consumer Product Safety Commission noted that the petitioner, the Environmental Working Group, had "not established whether humans will experience adverse health effects when Teflon or other coated cookware is used at normal cooking temperatures" or that toxic chemicals "are released in amounts during a consumer's use of a product that would cause human illness or injury." NAD recommended that the advertiser discontinue its PTFE-free claims or modify them to avoid conveying the unsupported message that its Thermolon (ceramic) coated products are healthier and safer than all PTFE type non-stick products. The NAD recommended that the advertiser discontinue its "eco-friendly" claims, its implied comparative health and safety claims, and its "natural," "mineral," and "mineral based" claims as the product in its final form has been chemically altered. NAD determined that the message reasonably conveyed "that the product is natural, in whole or in substantial part" was not supported. Similar to the Olean and Arm & Hammer cases, while the sol-gel process which forms the Thermolon (ceramic) coating may start off with compounds that are found in nature, these materials undergo a chemical process which ultimately creates a synthetic compound.

Oils Used in Cooking

Oil can be a very useful and tasty part of cooking foods. However, the American Heart Association (AHA) has a web page devoted to "healthy cooking oils" and a web page on "cooking to lower cholesterol." On these web pages it states the following:

- *Replacing "bad" fats (saturated and trans) with "good" fats (monounsaturated and polyunsaturated) is smart for your heart.*
- *Try cooking vegetables in a tiny bit of vegetable oil and add a little water during cooking, if needed.*

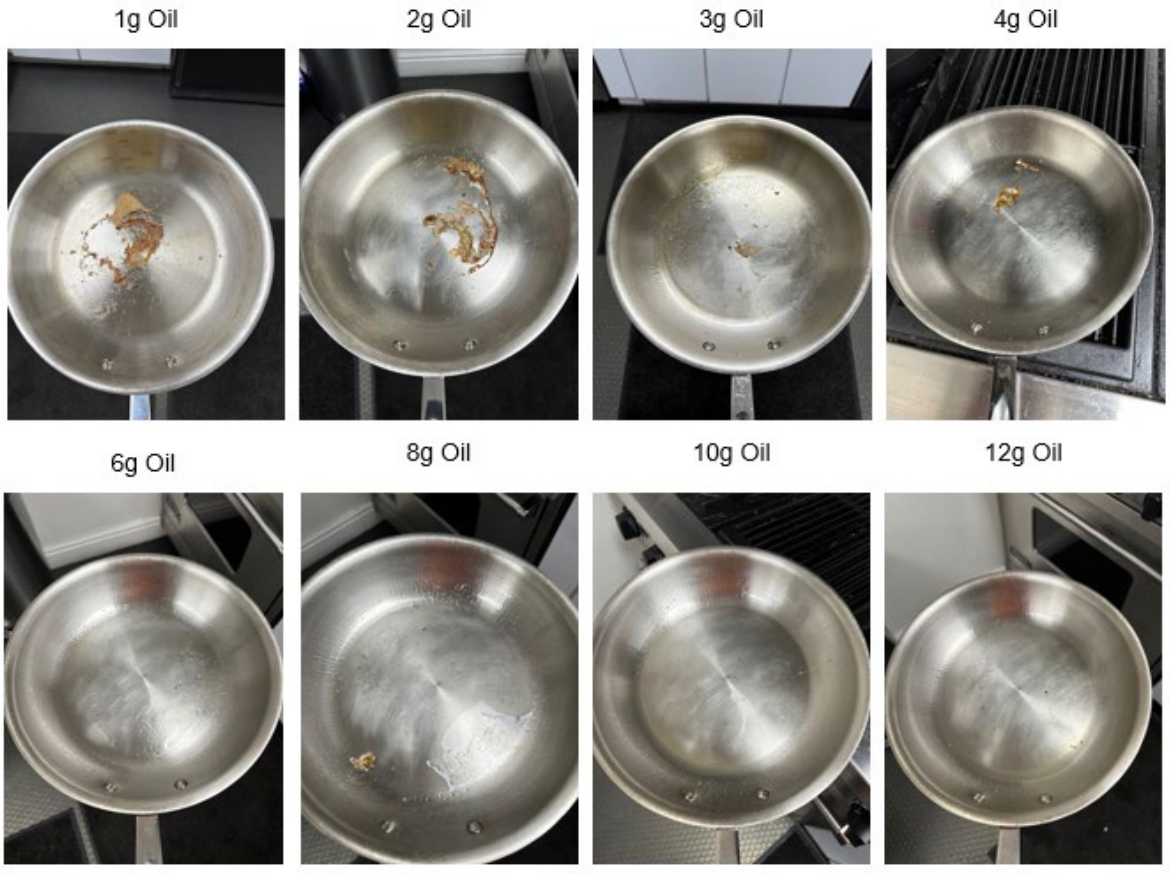
The AHA also has a Quality of Care analysis for Maine, which shows that the 2nd leading cause of death in Maine in 2017 was due to heart disease. The usage of fat in cooking is prevalent in the US -- 60% of all recipes prepared by US cooks use fat. Olive oil is the most used (51%) and butter is the second highest use (32%) followed by Canola oil (15%). And most US cooks do home-made cooking for health reasons (63%) and half (52%) cook at home because it is healthier than eating out.

Groupe SEB's consumer research has investigated the issues of cooking on non-stick and the use of oils. One test was to determine the amount of oil needed to cook an egg. The test found that no oil was needed for a PTFE coated pan and 1.5 teaspoons or more was needed for a stainless steel or cast iron pan in order to have an easy release of an egg.

Below are photos of a stainless-steel pan after cooking an egg and using 1.5 teaspoons and a cast iron pan after cooking an egg using 2 tablespoons of oil. The pans with stainless steel and cast iron require more intensive cleaning even with the addition of oil.

Stainless Steel w/1.5 tsp Oil **Cast Iron w/ 2 tsp Oil** **PTFE w/no Oil**

Below is a series of photographs of a stainless-steel pan after cooking an egg (sunny side up) with increasing levels of oil. As oil increases, the non-stick qualities improve.



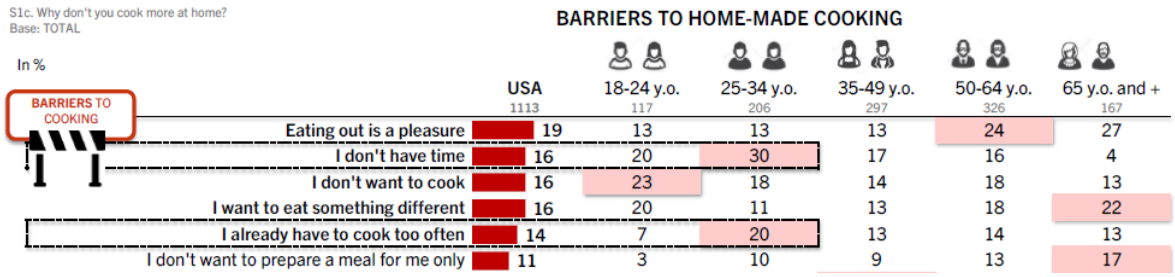
Below is a series of photographs of a cast iron pan after cooking an egg (sunny side up) with increasing levels of oil. As oil increases, the non-stick qualities improve but do not reach the same level as PTFE pans even with 12g (or 3 tsp) of oil.

Below is a series of photographs of a PTFE coated pan after cooking an egg (sunny side up) with increasing levels of oil. There is no change.

Consumer research shows that people prefer cooking with non-stick -- 70% of respondents use some non-stick and some stainless steel. Consumers prefer non-stick because of the easy release (37%) and easy cleanup (31%). Of note, if non-stick was not available, 75% of people would either season the pan or use oil (33% use more oil and 45% season the pan).

Time is a major barrier to eating at home, even more so for 25 to 34-year-old cooks. Since COVID, people still cook more at home. Our research shows that US cooks spend more time

cooking at home, in comparison with preceding waves (2020, 2017). They feel more knowledgeable and are more willing to be more creative in cooking, but most meals are prepared rather quickly and are not complex. However, Gen Z is eating out more because they see cooking as taking too much time.



American cooks closely look to price when purchasing products – more particularly the youngest ones, and more than 2020. People aged 35-49 years old are the best equipped with cookware, so changes in costs and availability will hit younger and older people more.

Space is also a concern. Not everyone has a large kitchen to store large, heavy cookware of different types.

Misleading Claims During August Public Hearing

We want to address the misleading claims expressed on the record during the public hearing regarding health issues on PTFE cookware. Similar arguments were made to NAD. In a 2025 NAD decision, they found the following:

> *Although [the advertiser] submitted multiple studies and articles in support of its argument that PTFE is toxic and causes harm to the human body, including the digestive system and kidneys, most of the studies offered are a poor fit for the challenged claims. Specifically, these studies either fail to distinguish PTFE from PFAS generally, relate to a different type of PFAS, involve testing on birds rather than on humans, or involve exposure in conditions wholly unrelated to cookware.*
>
> *Additionally, the Advertiser did not show that consumers would be exposed to PTFE fumes during ordinary use of traditional nonstick cookware. The record shows that other than broiling (which nonstick manufacturers advise against), most forms of cooking occur at temperatures of 232°C (450°F) or below. The Advertiser's evidence provides that ultrafine particles are released around 290°C (554°F) and that toxic fumes are released only at around 360°C (680°F). In addition, the Challenger explained that even if cookware temporarily exceeds manufacturers' recommended temperatures, such as during preheating, while searing, or while overheating, the formation of toxic gas is not an instantaneous process but rather takes 4-5 hours to develop. There is no evidence in the record that consumers would be exposed to such high temperatures for sufficiently long enough to create a health hazard or how frequently such exposure occurs. Moreover, the Challenger submitted evidence that the temperature of smoke points of common cooking oils is lower than the*

temperature at which PTFE degrades, at which point consumers would likely stop cooking to stop the oil from smoking.

Further, avian respiratory consequences do not equate to human health effects. Birds have unidirectional air flow through their lungs, unlike humans. Also, a simple example in which avian and human health effects differ is that avocados are toxic to most birds due to the presence of the chemical compound persin, but persin (and avocados) are non-toxic to humans. In fact, the authors of one study, specifically on pyrolysis and fry pans coated with Teflon and exposure to birds, states that "[n]either should [this] paper be cited as evidence that the proper use of cookware coated with Teflon finish presents undue hazards" and concludes that their results "support the FDA conclusion concerning the safety of cookware coated with Teflon finish in normal use."[6]

2. An inability to mitigate significant risks to human health or the environment

Fluoropolymers, unlike non-polymeric PFAS, are indispensable in non-stick cookware because of their unique balance of safety, functionality, and durability. PTFE is distinguished by its highly stable molecular structure: it is immobile, non-bioaccumulative, and unable to cross the gastrointestinal barrier or enter human cells. When ingested, PTFE passes through the body unchanged. These properties underpin its long-standing recognition as safe for use in food-contact applications, with no identified risks to human health. By contrast, DEP has presented no evidence demonstrating that ceramic alternatives provide superior health or environmental outcomes.

Siloxane monomers are essential precursors in the production of silicone polymers, which are widely used across numerous industries, including in so-called ceramic coatings for food-contact applications. While the manufacturing of these monomers and the formulation of silicone-based polymers are global in scale, they have not been subjected to the same level of scrutiny or regulatory assessment as PTFE to determine whether they meet equivalent safety and performance requirements.

<u>End-of-Life</u>

Ceramic non-stick cookware does not last as long as PTFE-coated cookware. Consumer studies comparing ceramic and fluoropolymer non-stick products show that ceramic coatings wear out more quickly, leading to more frequent replacements. This shorter lifespan not only increases long-term costs for consumers but also contributes to a higher environmental burden (Palermo, A., 2020). In fact, the resulting waste is estimated to be 3 to 8 times greater than that of PTFE-coated cookware. Such outcomes run counter to DEP's stated goals of "reduce, reuse, recycle," where waste reduction is recognized as the top priority in the waste management hierarchy:

[6] Griffith, F. D., Stephens, S. S., & Tayfun, F. O. (1973). Exposure of Japanese quail and parakeets to the pyrolysis products of fry pans coated with Teflon® and common cooking oils. *American Industrial Hygiene Association Journal 34*(4), 176-178.

Global public authorities and studies show that the end-of-life of kitchen utensils with a PTFE coating do not represent a major challenge for the environment or human health. (See attachment for an overview of global studies and findings.)

In April 2024, EPA's Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances and Materials Containing Perfluoroalkyl and Polyfluoroalkyl Substances states the following:

> ***Landfill disposal in all landfill types: Landfill disposal of stable polymeric PFAS.*** *Stable polymeric PFAS, such as polytetrafluoroethylene (Teflon™) and fluorinated ethylene propylene (FEP), are large molecules that are not susceptible to hydrolysis or oxidation. They are neither volatile nor water soluble and, as a result, they are expected to remain within the waste mass for long periods of time. This PFAS category tends not to migrate with the leachate and is unlikely to volatilize with the LFG; therefore, permitted hazardous and municipal solid waste (MSW) landfills (MSWLFs) may provide a good disposal option.*

A 2012 ColePlamer study found the following:

> *[…] fluoropolymers are highly unlikely to degrade in landfill conditions. They have high UV resistance, are not subject to degradation by microbiological activity, and fluoropolymer decomposition temperatures are not reached in landfills. Their inertness to chemicals and insolubility in water and other solvents adds to their stability in landfills.*

A very recent study, dated September 2025, Environmental fate and behavior studies of a polymeric PFAS, polytetrafluoroethylene (PTFE) – results and application to risk assessment, found the following:

- No degradation was observed in air, sunlight, seawater, soil, sediment, or sludge.
- No transformation or subsequent release of (polymeric/non-polymeric) PFAS was observed.

- PTFE shows a low likelihood of adsorption to soil/sediment or movement with them.
- PTFE does not partition to air/water (as gas/vapor).

3. A significant disruption of the daily functions on which society relies

Banning PTFE-coated non-stick cookware without first conducting a thorough study of potential substitutes and the impacts on consumers' daily lives would be a misguided approach. Non-stick cookware accounts for more than half of the total cookware market, reflecting the extent to which households and professionals rely on it. Families, for example, depend on durable, easy-to-clean cookware to prepare meals quickly before school or work, while short-order chefs rely on it to keep up with fast-paced kitchen demands. Forcing consumers to switch to higher-cost alternatives that wear out more quickly would mean more expenses, more frequent replacements, and greater waste. Introducing such a regrettable substitute into the market would represent a step backwards, both for consumers and for society.

Thank you for considering our views and recommendations. We would welcome meeting with you to discuss this important matter in more detail.

Sincerely,

Kevin Messner
SVP, Public Affairs USA & Canada

END OF LIFE

NON-STICK COATING

The term PFAS is a generic name that encompasses thousands of very different substances. While some are unquestionably recognized as harmful, it is sometimes broadly defined to unnecessarily include some targeted chemicals approved for use by regulatory authorities. This is particularly the case with non-stick coatings (PTFE).

Since the 1970s, public health authorities around the world have taken a unanimous position on PTFE: it is inert, non-bioaccumulative, not water soluble, and therefore safe for consumers. As recently as January 2025, FDA stated the use of non-stick coatings is approved for food contact applications.

In the same time, public authorities and studies show that the end-of-life of kitchen utensils with a PTFE coating do not represent a major challenge for the environment or human health.

DESTINATION OF END-OF-LIFE PANS

2024 - 66% of consumers say they dispose of their used cookware in recycling channels, and 19% says they dispose them incorrectly

In a consumer study launched by Groupe SEB in 2024, two-thirds of consumers say they prefer channels that allow the recycling of kitchen utensils (waste disposal centre, domestic recycling, in-store deposit).

This proportion is 47% in the USA, and rises to 73% in France or 80% in Sweden. In other cases, kitchen utensils are thrown away with household waste.

In the United States, 47% of kitchen utensils are recycled; This lower number can be explained in particular by a higher level of donations than in the rest of the surveyed countries (15%).

Global view of last disposal method for worn out pan

Over the 12 countries surveyed, similar results are seen for the last disposal method. Except in China where it is the top method, going to a store to recycle a worn-out pan is not common.

	Total	France	Germany	Italy	Nether-lands	Denmark	Norway	Sweden	Poland	Czech Republic	Hungary	USA	China
Basis	3249	273	257	328	252	263	256	260	299	261	248	281	271
I took it to a waste disposal center	36%	36%	33%	42%	25%	57%	42%	59%	22%	46%	30%	9%	13%
I threw it in the recyclable household waste	20%	22%	15%	13%	19%	16%	14%	16%	33%	16%	22%	16%	31%
I threw it in the non-recyclable household waste	19%	13%	30%	23%	31%	7%	19%	10%	28%	15%	20%	26%	7%
I took it to my usual store which organizes a collection and a recycling operation	11%	14%	8%	10%	14%	7%	15%	6%	6%	5%	6%	11%	31%
I kept it at home	8%	5%	9%	8%	6%	5%	6%	6%	6%	11%	12%	11%	12%
I donated it to an association	5%	8%	5%	4%	1%	3%	4%	2%	4%	5%	4%	15%	6%
Other	2%	2%	0%	1%	4%	4%	1%	1%	1%	3%	5%	1%	0%
Incineration / Landfill	19%	13%	30%	23%	31%	7%	19%	10%	28%	15%	20%	26%	7%
Recycling	66%	73%	56%	64%	58%	80%	71%	82%	61%	67%	58%	47%	75%

toluna harris interactive

P2BIS: And what did you do with your last worn-out pan?

X% Top 3 last disposal methods in the country

XX/XX Significant differences vs total 12 countries at 95%

CURRENT SOLUTIONS FOR END-OF-LIFE MANAGEMENT OF COATED ARTICLES ARE CONSIDERED SATISFACTORY

PTFE IS COMPATIBLE WITH LANDFILLING

2024 - EPA confirms fluoropolymers are waste compatible with all types of landfills

In a guidance document regarding the destruction of PFAS, the Environmental Protection Agency (EPA) highlights the specificity of fluoropolymers such as PTFE and their compatibility with landfills, including municipal landfills.

> *Landfill disposal in all landfill types: Landfill disposal of stable polymeric PFAS. Stable polymeric PFAS, such as polytetrafluoroethylene (TeflonTM) and fluorinated ethylene propylene (FEP), are large molecules that are not susceptible to hydrolysis or oxidation. They are neither volatile nor water soluble and, as a result, they are expected to remain within the waste mass for long periods of time. This PFAS category tends not to migrate with the leachate and is unlikely to volatilize with the LFG; therefore, permitted hazardous and municipal solid waste (MSW) landfills (MSWLFs) may provide a good disposal option.*
>
> Environmental Protection Agency, Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances and Materials Containing Perfluoroalkyl and Polyfluoroalkyl Substances - April 2024

2023 - ITRC considers fluoropolymers to have no impact on the environment

In a 2024 report, the Interstate Technology Regulatory Council recognizes that fluoropolymers (including PTFE) are stable, insoluble and do not degrade and therefore have no impact on the environment.

> *[...] a stable, insoluble fluoropolymer such as PTFE may pose little environmental/ ecological or health risk once it is in a product.*
>
> Interstate Technology Regulatory Council, Per and poly-fluoroalkyl substances, September 2023

2021 - The Dutch National Institute for Public Health and the Environment (RIVM) confirms that in view of its characteristics, a PTFE coated article in landfill would not decompose

By confirming the stability and non-degradation temperatures of PTFE, the RIVM indicated that it will not degrade in the event of long-term burial.

> *According to this study, **PTFE can be used for a long time at 260 °C** and for a short time up to a temperature of 450 °C without loss of mass due to the formation of fluorine-containing gases.*
>
> Rijksinstituut voor Volksgezondheid en Milieu, Per- and polyfluorinated substances in waste incinerator flue gases, December 2021

2021 - Study confirms fluoropolymers do not degrade if landfilled

This study highlights that due to multiple factors, fluoropolymers such as PTFE do not degrade in the environment when buried. In addition, they have good UV resistance.

> *[...] fluoropolymers are highly unlikely to degrade in landfill conditions. They have high UV resistance, are not subject to degradation by microbiological activity, and fluoropolymer decomposition temperatures are not reached in landfills. Their inertness to chemicals and insolubility in water and other solvents adds to their stability in landfills.*
>
> ColePalmer, UV Properties of Plastics: Transmission and Resistance, March 2021

INCINERATION IS AN ACCEPTABLE SOLUTION FOR THE END OF LIFE OF PFAS

2024 - EPA considers that incineration, especially in hazardous waste incinerators, may be a good option for destroying PFAS

In its 2024 guidance document, the Environmental Protection Agency states that while landfilling is a satisfactory pathway for managing PFAS at the end of life, incineration could be an even better option.

> *Hazardous waste combustors (HWCs), [...] may be more effective at adequately destroying (mineralizing) PFAS.*
>
> Environmental Protection Agency, Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances and Materials Containing Perfluoroalkyl and Polyfluoroalkyl Substances- April 2024

2021 - RIVM reaffirms that PTFE is completely thermally degraded at combustion at 850°C

In this study, the Rijksinstituut voor Volksgezondheid en Milieu confirms that at 800°C, the temperature corresponding to EU municipal incinerators at the lowest temperatures, PTFE is completely destroyed.

> *For PTFE it can be concluded that complete thermal decomposition is achieved at a temperature of about 800°C.*
>
> Rijksinstituut voor Volksgezondheid en Milieu, Per- and polyfluorinated substances in waste incinerator flue gases, December 2021

2019 - KIT study confirms that Municipal incineration of PTFE using best available technologies (BAT) should be considered an acceptable form of waste treatment

Karlsruher Institut für Technologie (KIT) study confirms, via field tests, that the incineration of PTFE at 1100°C is a suitable solution for the treatment of waste containing it.

> *Therefore, municipal incineration of PTFE using best available technologies (BAT) is not a significant source of the studied PFAS and should be considered an acceptable form of waste treatment.*
>
> Karlsruher Institut für Technologie, Waste incineration of Polytetrafluoroethylene (PTFE) to evaluate potential formation of per- and Poly-Fluorinated Alkyl Substances (PFAS) in flue gas, April 2019

2024 - KIT STUDY provides strong evidence that fluoropolymers, including PTFE, can be effectively mineralized through high-temperature incineration at 1100°C and even at 850°C

This study, focused on municipal incinerators to European standards (i.e. 850°C), underlines that these temperatures are satisfactory for the disposal of fluoropolymers. This is therefore also true for incinerators operating at higher temperatures, as in the United States.

> *Statistical analysis of the results confirmed non-detect to negligible levels of PFAS evidencing mineralization of fluoropolymers. There was no discernible effect of temperature on the mineralization of fluoropolymer and testing at 860°C versus 1095°C did not show evidence of an increase in PFAS emissions.*
>
> Karlsruher Institut für Technologie, Mineralization of fluoropolymers from combustion in a pilot plant under representative european municipal and hazardous waste combustor conditions, September 2024

2021 - Survey results show that typical municipal waste-to-energy combustion operating conditions in the U.S. are furnace temperature above 1160°C

In this study, researchers from the University of Delaware indicate that while industry standards recommend a temperature of 850°C for municipal incinerators, incinerators in the United States typically operate above 1160°C.

> *Survey results show that typical municipal waste-to-energy combustion operating conditions in the U.S. are furnace temperature above 1160°C, gas residence time above 2.4 s [...].*
>
> Giraud et al, Combustion operating conditions for municipal Waste-to-Energy facilities in the U.S., July 2021

RECYCLING OF ALUMINUM MEETS THE STANDARDS OF INCINERATION AND REDUCE ENVIRONMENTAL IMPACT

Recycling processes for aluminum, contained for example in non-stick pans, coupled with post-treatment solutions at high temperatures, make it possible to completely degrade fluoropolymers such as PTFE, consistent with the studies observed concerning incineration.

This solution also considerably reduces the carbon footprint of the kitchenware industry. Indeed, the use of recycled aluminum reduces the carbon footprint by 95% compared to primary aluminum.

CONCLUSION

In view of the current use of the pots and pans, as well as the requirements of the competent authorities and the state of the scientific literature, the end-of-life of PTFE used in the non-stick coating does not pose an environmental or human health problem.

Current pathways to manage the end-of-life of coated articles are appropriate and effective in preserving human health and the environment. The question of the end-of-life of fluoropolymers such as PTFE is, therefore, not a criterion for restricting their use in consumer, professionnal and industrial applications, including in contact with food.

SAFETY OF PTFE

KEY ELEMENTS

The term PFAS is a generic name that encompasses thousands of very different substances. While some are unquestionably recognized as harmful, others recognized as safe and approved for use by regulatory authorities. This is particularly the case with non-stick cookware (PTFE).

Since the 1970s, public health authorities around the world have taken a unanimous position on PTFE: it is inert, non-bioaccumulative, not water soluble and therefore safe for consumers. As recently as Janyary 2025, FDA states the use of non-stick coatings is approved.

> *Some PFAS are approved for use in the manufacture of non-stick cookware coatings. These coatings are made of molecules that are polymerized (i.e., joined together to form large molecules) and applied to the cookware through a heating process that tightly binds the polymer coating to the cookware.*

Other competent, trusted authorities in this area have clearly ruled PTFE can be used for food contact:

- FDA : (2025) : *"The PFAS used in manufacturing of gaskets that **come into contact with food do not pose a safety risk** because they are also made of molecules that are polymerized."*

- ITRC (2023) : *"[...] a stable, insoluble fluoropolymer such as PTFE may pose little environmental/ecological or health risk once it is in a product."*

- American Cancer Society (2024) : *"While some PFAS can be used in making some non-stick cookware coatings, they are joined together in large molecules (polymerized) and are tightly bound to the cookware, **so very little is capable of getting into food**, according to the FDA."*

- EFSA (2020) : *"These studies concluded that **fluoropolymer food contact materials were not likely to be a major source of PFASs**."*

- BFR (Germany, 2018) : *"The BfR **has no data which would indicate that**, under normal usage conditions (no overheating), **any PTFE-coated cookware**, ovenware or frying pans currently available on the market **transfer fluorinated chemicals to food in quantities suitable for endangering human health**."*

This consensus scientific view is shared by environmental advocacy groups, such as the Environmental Working Group (EWG):

> *In February 2024, **the Environmental Working Group (EWG)**, stressed that PTFE is not a significant source of exposure : "But even though it's always been the poster child for PFAS exposure, this cookware is not anticipated to be a major source of exposure.*
>
> *'Forever chemicals': Top 3 ways to lower your exposure | Environmental Working Group*

FEDERAL DRUGS ADMINISTRATION (FDA)

2015 - The safety of PTFE allows its use in medical implants

PTFE is used in the medical field because of its chemical inertness and surface properties. One example is the Standard established by the FDA, which specifies the characteristics of PTFE grades suitable for use as medical implants. It should be noted that medical implants are approved on a case-by-case basis by the authorities and not by class of materials only.

> *Perfluorocarbon high polymers exhibit extraordinary thermal and chemical stability and do not require stabilizing additives of any kind.*
>
> FDA: Excerpted from Recognized Consensus Standards F754-08 (Reapproved 2015) Recognized Consensus Standards: Medical Devices (fda.gov)

2021 – FDA confirms biocompatibility of PTFE in implants

The independent organization ECRI (Emergency Care Research Institute) was commissioned by the FDA to carry out a literature review and produce a report on the knowledge of the biocompatibility of PTFE. After analysis of 52 studies, no local response to PTFE implants was demonstrated, and no worsening of systemic responses.

> *The included studies most often found no difference in local responses, including patency, thrombosis, stenosis, or occlusion, when comparing a PTFE graft to a reference material or technique. The quality of evidence is low.*
> *Studies indicate there is no difference in systemic responses, including mortality, myocardial infarction, and ischemia, when comparing a PTFE graft to other materials or techniques. The quality of evidence is low.*
> *Studies of stent-grafts indicate PTFE stent-grafts yield better patency and stenosis results than percutaneous transluminal angioplasty (PTA). The quality of evidence is moderate, as this was reported in almost all human studies. Some studies found PTFE stent-grafts to have better patency than bare metal stents, but other studies found no difference.*
>
> ECRI: Polytetrafluoroethylene (PTFE): Medical Device Material Safety Summary (fda.gov)

2024 - PTFE as well as other fluorinated polymers are authorized by authorities for their use in products intended for food contact

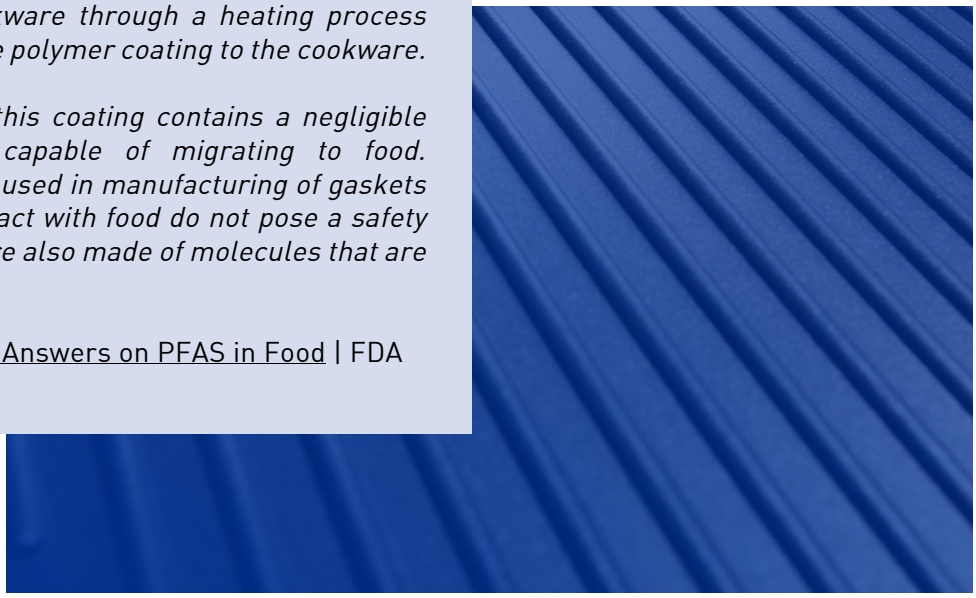
The FDA authorizes the use of fluoropolymers in food contact (with the exception of paper packaging), and more specifically the use of PTFE.

> ***177.1550 Perfluorocarbon Resins.***
> *Perfluorocarbon resins identified in this section may be safely used as articles or components of articles intended to contact food, subject to the provisions of this section:*
>
> ***Identity.*** *For the purpose of this section, perfluorocarbon resins are those produced by:*
> *- The homopolymerization and/or copolymerization of hexafluoropropylene and tetrafluoroethylene,*
> *- The copolymerization of perfluoropropylvinyl ether and tetrafluoroethylene (CAS Reg. No. 26655-00-5). The resins shall meet the extractive limitations in paragraph (d) of this section.*
>
> FDA: Excerpt from Code of Federal Regulation Title 21 Section 177.1550 CFR - Code of Federal Regulations Title 21 (fda.gov)

2025 – The Food and Drug Administration reaffirms that PTFE is approved for food contact

In January 2025, the FDA confirmed that fluoropolymers intended for use in the manufacture of coated cookware and food contact seals are approved and do not pose a safety risk, as they are made of polymerized molecules.

> *Some PFAS are approved for use in the manufacture of non-stick cookware coatings. These coatings are made of molecules that are polymerized (i.e., joined together to form large molecules) and applied to the cookware through a heating process that tightly binds the polymer coating to the cookware.*
>
> *Studies show that this coating contains a negligible amount of PFAS capable of migrating to food. Similarly, the PFAS used in manufacturing of gaskets that come into contact with food do not pose a safety risk because they are also made of molecules that are polymerized.*
>
> FDA: Questions and Answers on PFAS in Food | FDA



AMERICAN CANCER SOCIETY

2024 - The American Cancer Society Confirms That PTFE is Safe to Use in Cookware

In its updated publication in March 2024, the American Cancer Society reaffirms that the use of fluoropolymers in coated cookware is safe:

> *While some PFAS can be used in making some non-stick cookware coatings, they are joined together in large molecules (polymerized) and are tightly bound to the cookware, so very little is capable of getting into food, according to the FDA.*
>
> American Cancer Society: Perfluorooctanoic Acid (PFOA), Perfluorooctane Sulfonate (PFOS), and Related Chemicals | American Cancer Society

INTERSTATE TECHNOLOGY REGULATORY COUNCIL (ITRC)

2023 - The ITRC confirms the special status of fluoropolymers, and particularly PTFE

The ITRC, in its search for criteria for determining the environmental impact of PFAS, found that PTFE poses little risk to the environment and human health, distinguishing it from other PFAS considered to be of concern:

> *[...] a stable, insoluble fluoropolymer such as PTFE may pose little environmental/ ecological or health risk once it is in a product.*
>
> ITRC: Per and Poly fluoroalkyl substances / Interstate Technology Regulatory Council

WORLD HEALTH ORGANISATION (WHO)

1979 - The WHO acknowledges that PTFE is not toxic if ingested

The International Agency for Research on Cancer (IARC), an intergovernmental agency created in 1965 by the United Nations World Health Organization. IARC regularly publishes monographs, which are reviews of the body of knowledge established on the carcinogenicity of the agents examined.

In a review of a rat study, IARC concluded that after ingestion of 25% PTFE for 90 days, PTFE had no toxicological impact. IARC also specified that the material did not produce skin irritation and did not act as an allergen.

> *No toxicity was observed in male and female rats fed PIFE for 90 days, even with a level of 25% in the diet.*
> *The polymer has not been found to produce skin irritation or to act as an allergenic agent. (Clayton, 1962; Zapp, 1962).*
>
> Extract of IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans Volume 19, page 295 (1979) IARC Publications Website - Some Monomers, Plastics and Synthetic Elastomers, and Acrolein

1987 - IARC classifies PTFE in Group 3

In its 1987 monograph, IARC classified PTFE as Group 3 of agents that are not classifiable as carcinogenic to humans.

Source : IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Supplement 7, page 70 (1987) IARC Publications Website - Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1–42.

These IARC elements are crucial in establishing the safety of PTFE. They are widely used in the sector and the fluoropolymer industry in general.

EUROPEAN FOOD SAFETY AUTHORITY (EFSA)

2016 - EFSA clarified that a high molecular weight fluoropolymer poses no risk if ingested

EFSA is the European authority responsible for establishing scientific opinions to ensure food chain safety. In a 2016 scientific opinion on the risk analysis of chemicals in food, EFSA's Scientific Committee specified that the risk analysis of polymers used in food additives, i.e. those that can be ingested, must consider the molecular weight, i.e. size. For fluoropolymers, EFSA proposed a threshold of 1,500 Daltons (a unit of measurement for the mass of a polymer). Above the threshold size, EFSA states that polymers are unlikely to be absorbed across the gastrointestinal barrier and therefore are not considered to be a health hazard.

By comparison, PTFE is characterized by sizes ranging from hundreds of thousands to tens of millions of Daltons, well above the threshold of 1500 Daltons.

> *The safety assessment of polymeric additives and oligomers should take into consideration the molecular mass. Compounds with a molecular weight above 1,000 Da are unlikely to be absorbed by the gastrointestinal tract and so they are not considered to present a toxicological hazard, unless they are hydrolysed or induce a local effect on the gastrointestinal tract, such as stomatitis, esophagitis and or mucositis. If the latter can be excluded, a cut-off value for the molecular mass at 1,000 Da is recommended, as it covers any shape of molecules influencing the likelihood of absorption. 11 Most substances below 600 Da are absorbed and the rate of absorption is determined by factors other than size and shape of the molecule. For poly- and per-fluoro compounds, a cut-off value of 1,500 Da could be appropriate, because the molecular volume of C-F is smaller than that of C-H molecules of the same molecular mass.*
>
> Extrait de EFSA Journal 2016;14(1):4357
> Recent developments in the risk assessment of chemicals in food and their potential impact on the safety assessment of substances used in food contact materials - 2016 - EFSA Journal - Wiley Online Library

2020 - EFSA again confirmed that fluoropolymers in contact with food were not a major source of exposure to PFAS

Although migration to food is possible, the amount would be minimal, on the order of µg/kg, a level much lower than the background levels of PFAS in food, which are the main source of exposure.

> *These studies concluded that fluoropolymer food contact materials were not likely to be a major source of PASs. PFCAs, particularly PFOA, and fluorotelomer alcohols (FTOHs) have been shown to be released from coated cookware at normal cooking temperatures (179-233°C surface temperature). Therefore, they have the potential to migrate into food during the cooking process, but studies are inconclusive and show that only relatively small amounts are released into foods, when compared to concentrations that are found in the raw food.*
>
> EFSA 2020: Risk to human health related to the presence of perfluoroalkyl substances in food - 2020 - EFSA Journal - Wiley Online Library

EUROPEAN UNION

2011 - EU Regulation (10/2011) authorizes TFE (PTFE monomer) in food contact articles

Regulation 10/2011 on plastic materials and articles coming into contact with food includes the TFE (CAS No. 116-14-3) in Annex I, as a monomer that can be intentionally used for the production of polymers intended to come into contact with foodstuffs. TFE can therefore be used for the polymerization of PTFE intended for food contact.

Règlement EU 2011

FRANCE

The Institut national de Recherche et de sécurité (INRS) confirms that PTFE does not degrade under normal conditions of use of cookware appliances

The INRS reference body for occupational risk prevention in France confirms that the normal operating temperatures of stoves are much lower than the temperatures at which PTFE begins to deteriorate, i.e. from 350°C, and that PTFE degrades from 450°C.

Fiche INRS PTFE

2024 - French Ministry of Health confirms the safety of PTFE

In June 2025, the Public Health Information Service (SPIS) of the Ministry of Labour, Health, Solidarity and Families confirmed that the use of non-stick kitchen utensils is safe.

> *PTFE is theoretically a PFAS, but its stability and safety have been confirmed, which is not the case for the vast majority of PFAS.*
>
> Service public d'information en Santé (SPIS) : Les poêles anti-adhésives sont-elles dangereuses ? | Santé.fr, june 6th, 2024

UNITED KINGDOM – HEALTH AND SAFETY EXECUTIVE

2023 - HSE confirms that PTFE is a 'low hazard' substance

Fluoroplastics (including fluoropolymers, including PTFE) are considered "low hazard" substances and therefore eligible for an exemption or derogation from a potential restriction proposal under the upcoming UK REACH.

> *Exemptions could also be considered for PAS (as individual substances or groups) for which comprehensive reliable evidence of low hazard or safe use can be provided or consideration may be given to exemption on socioeconomic grounds and subject to the availability of alternatives.*
> *The restriction(s) set out above need not apply to low hazard groups or low risk uses, for example; fluoroplastics or fluoroelastomers (low hazard groups), intermediates, uses in sealed/contained systems (including use as heat exchange fluids in heat pumps and refrigeration systems), (low risk uses). These could be highlighted as derogations to any restriction proposal.*
>
> UK HSE avril 2023 : Analysis of the most appropriate regulatory management options

GERMANY - DAS BUNDESINSTITUT FÜR RISIKOBEWERTUNG (BFR)

2018 - German Institute for risk assessment clarifies that coated cookware does not pose a danger to human health

> *The BfR has no data which would indicate that, under normal usage conditions (no overheating), any PTFE-coated cookware, ovenware or frying pans currently available on the market transfer fluorinated chemicals to food in quantities suitable for endangering human health.*
>
> Das Bundesinstitut für Risikobewertung (BfR) , German Federal Institute for Risk Assessment BfR: Selected questions and answers on cookware, ovenware and frying pans with a non-stick coating made of PTFE - BfR (bund.de)

In addition, the BfR reaffirms that the concentration of compounds emitted from coated cookware is so low that it does not pose a health risk to users.

> *According to the latest available data, the quantities of these substances which can potentially be released if the dishes are used for their intended purpose are so low that no risk to health should be assumed.*
>
> Das Bundesinstitut für Risikobewertung (BfR) , German Federal Institute for Risk Assessment BfR: Selected questions and answers on cookware, ovenware and frying pans with a non-stick coating made of PTFE - BfR (bund.de)

SCIENTIFIC STUDIES

2010 – Cooking oils degrade at much lower temperatures than PTFE

The degradation temperature of oils and greases is typically below 200°C. For example, formaldehydes are emitted from 180°C for coconut oils, virgin olive oils, etc.

> *Emissions of volatile organic compounds, including aldehydes, formed during heating of cooking oils: coconut, safflower, canola, and extra virgin olive oils were studied at different temperatures: 180, 210, 240, and 240 °C after 6h.*

Katragadda and al (2010). Emissions of volatile aldehydes from heated cooking oils - ScienceDirect

2020 – PTFE is a polymer of low concern

A 2018 scientific paper argues that PTFE should be considered a polymer of low concern. The concept of polymer of low concern, developed by the OECD, is taken up by the authors and applied to fluoropolymers. The authors base their analysis on the molecular mass of the polymers considered, their chemical inertia, insolubility, the absence of reactive functional group, etc.

In a subsequent article, Ian Cousins, a leading advicate against PFAS, nevertheless acknowledges that polymer size is a factor in assessing the safety of these substances.

Source : Environ. Sci. Technol. 2020, 54, 12820-12828
Are Fluoropolymers Really of Low Concern for Human and Environmental Health and Separate from Other PFAS? | Environmental Science & Technology (acs.org)

> *Molecular weight (MW) is an important predictor of biological effect because very large molecules (>1000-10000 Da) are too large to penetrate cell membranes (Supplemental Data in Beer 1993, p.14). Because large molecular weight polymers cannot enter the cell, they cannot react with "target organs," such as the reproductive system, and are not bioavailable. "Therefore, as the Mn of a polymer increases, a reduced incidence of potential health concern effects might be expected.*

(OECD 2009, p 20).

Extract of: Integr Environ Assess Manag 2018:316–334 A critical review of the application of polymer of low concern and regulatory criteria to fluoropolymers - Henry - 2018 - Integrated Environmental Assessment and Management - Wiley Online Library

2024 – Korean study again demonstrates the safety of PTFE if ingested

A Korean study has once again demonstrated the safety of PTFE when ingested. No toxic effects were observed in mice that ingested PTFE fragments. Additionally, PTFE was not detected in the blood following administration.

> *The single-dose toxicity test confirmed the LD50 of PTFE using doses of 500, 1000, and 2000 mg / kg. During the two-week observation period after a single administration, no deaths or clinical signs of toxicity were recorded (data not shown) and no weight changes (Figure 2a-d) due to PTFE microplastic administration were observed.*
> *A single-dose toxicity study was performed to identify an approximate lethal dose of FIFE microplastics in two size ranges. No morbidity or death in mice was observed, and no specific clinical symptoms were recorded. Further, no significant weight changes were associated with exposure to microplastics when compared to control animals (Figure 2a-d).*

Extract of: Polymers 2022, 14, 2220. Polymers | Free Full-Text | In Vivo Toxicity and Pharmacokinetics of Polytetrafluoroethylene Microplastics in ICR Mice (mdpi.com)