



DEPARTMENT OF
ECOLOGY
State of Washington

PFAS in Food Packaging

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Overview

- Introduction
- Overview of our process
- Results from the first alternatives assessment
- Second alternatives assessment and impact of prohibition

Scope: PFAS in food packaging

- Define as a class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.
- Provide oil, grease, and water resistance to packaging.
- PFAS common in fiber-based food packaging:
 - Side-chain fluorinated polymers.
 - Chemical manufacturers have begun voluntarily phasing out several of these side-chain fluorinated polymers.
 - Perfluoropolyethers.
 - Residual PFAS.



Washington State ESHB 2658 (RCW 70A.222.070)

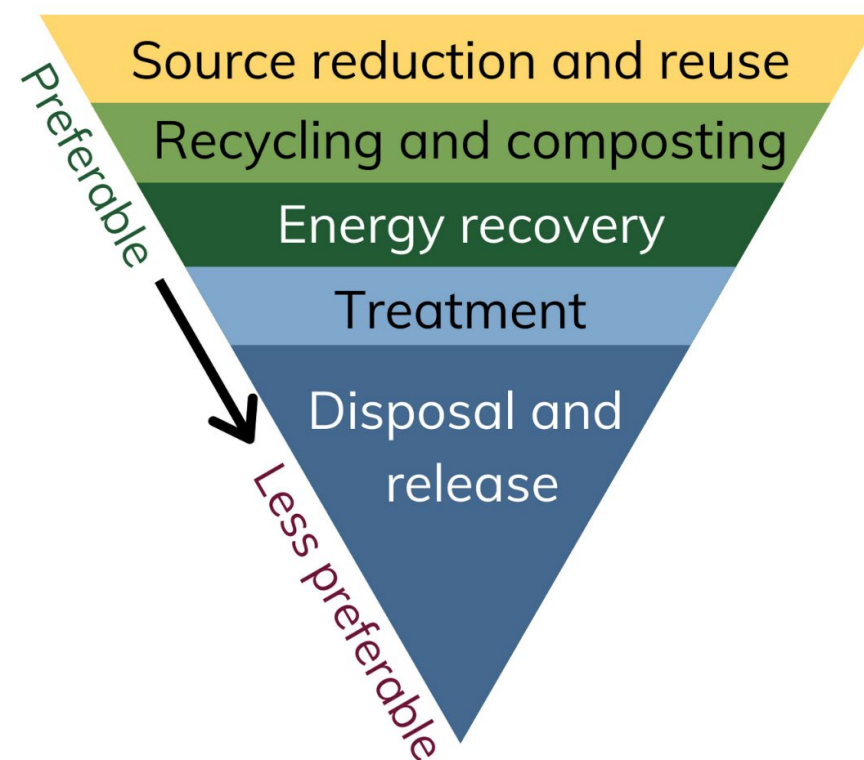
- Prohibits sale or distribution in Washington State of food packaging to which PFAS have been intentionally added in any amount
- BEFORE restriction can take effect, Ecology must conduct an alternatives assessment to identify alternatives that:
 - Are safer
 - Perform as well as PFAS
 - Are readily available and cost comparable
- Prohibition takes effect two years after we submit findings of safer alternatives

Alternatives assessments

- The alternatives assessment framework focuses on reducing risk by avoiding exposure to hazardous chemicals.
- Prioritizes safer alternatives that are commercially available and technically and economically feasible.

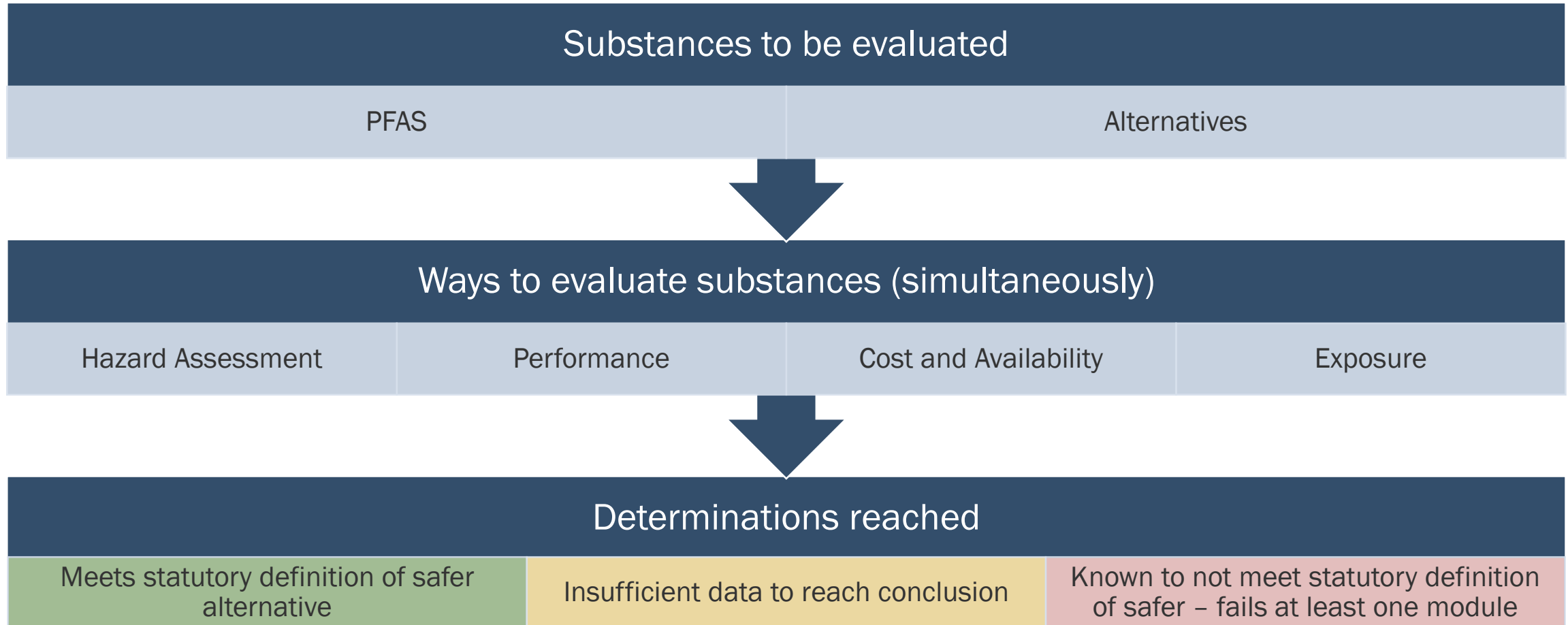
$$\downarrow \text{Hazard} \quad \times \quad \text{Exposure} \quad = \quad \downarrow \text{Risk}$$

Waste Management Hierarchy



IC2 Alternatives Assessment Guide 1.1

Evaluation Process



Stakeholder Involvement

- Stakeholders included:
 - Chemical and packaging manufacturers
 - Environmental groups
 - Trade organizations
 - State, local, federal government
 - Product users
- Ecology sought input on:
 - Project scope
 - Evaluation methodologies
 - PFAS and alternative technologies



First Assessment: Types of Food Packaging Evaluated

Type of food packaging
Wraps and liners
Bags and sleeves
Plates
Bowls
Trays
Food boats
Pizza boxes
French fry cartons
Clamshells
Interlocking folded containers



Alternative Substances Reviewed

Substance	Alternative Type
Uncoated paper	Non-chemical alternative
Petroleum-based waxes	Coating
Bio-based waxes	Coating
Kaolin clay	Coating
PVOH – polyvinyl alcohol	Coating
Siloxanes	Coating
PLA – polylactic acid	Coating or base material
PE – polyethylene	Coating
PET– polyethylene terephthalate	Coating
EVOH – ethylene vinyl alcohol	Coating

Evaluating alternatives – Hazard & Exposure

Assessment Module	Products or substances evaluated?	Question asked
Hazard	Substance	Are there alternative substances that are less hazardous than PFAS?
Exposure	Substance	Do any alternative substances have a similar or lower exposure potential than PFAS?

- To meet our criteria:
 1. Alternative substance is less hazardous than PFAS (using GreenScreen or comparable chemical hazard assessments)
 2. Alternative substance is a substance of low hazard concern -OR- has properties or exposure data indicating a similar or lower exposure potential than PFAS

Evaluating alternatives – Hazard

Assessment Module	Products or substances evaluated?	Question asked
Hazard	Substance	Are there alternative substances that are less hazardous than PFAS?

TABLE 1. **Example GreenScreen Hazard Summary Table for a Chemical**

Group I Human					Group II and II* Human									Ecotex		Fate		Physical	
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						SINGLE	REPEATED*	SINGLE	REPEATED*										
DG	L	L	M	M	DG	L	L	M	M	L	L	L	L	L	L	vH	M	L	L

Glossary of GreenScreen® Hazard Endpoint Abbreviations

AA Acute Aquatic Toxicity
AT Acute Mammalian Toxicity
B Bioaccumulation
C Carcinogenicity
CA Chronic Aquatic Toxicity

D Developmental Toxicity
E Endocrine Activity
F Flammability
IrE Eye Irritation
IrS Skin Irritation

M Mutagenicity and Genotoxicity
N Neurotoxicity
P Persistence
R Reproductive Toxicity
Rx Reactivity

SnS Sensitization (Skin)
SnR Respiratory Sensitization
ST Systemic/Organ Toxicity

* Repeated exposure

Findings – Hazard & Exposure Assessments

Substance	Determination
Uncoated paper	Less hazardous than PFAS*
Petroleum-based waxes	Less hazardous than PFAS*
Bio-based waxes	Less hazardous than PFAS*
Kaolin clay	Less hazardous than PFAS*
PVOH – polyvinyl alcohol	Less hazardous than PFAS*
Siloxanes (based on vinyl silicone polymer)	NOT less hazardous than PFAS
PLA – polylactide (based on degradation and residual breakdown products)	Less hazardous than PFAS*
PE – polyethylene	Insufficient data to draw conclusion
PET– polyethylene terephthalate	Insufficient data to draw conclusion
EVOH – ethylene vinyl alcohol	Insufficient data to draw conclusion

* Sufficiently low hazard concern: no exposure evaluation needed

Evaluating alternatives – Performance, Cost & Availability

Assessment Module	Products or substances evaluated?	Question asked
Performance	Product	Are alternative products oil/grease resistant or leak resistant?
Cost and Availability	Product	Are alternative products readily available in sufficient quantity and are they cost comparable?

- To meet our criteria:
 1. Offered for sale from multiple sources
 2. Has technical/promotional information or that verifies it meets performance
 3. Price of alternative product is comparable (when available)

Findings – Performance Assessment

- Performance requirements:
 - Oil and grease resistance (all)
 - Leak/spill resistance (as applicable)
- Findings:
 - Generally found alternative products functionally equivalent to PFAS-containing food packaging
 - A small subset of PFAS-free molded fiber or polylactic acid (PLA) plastic products had limited performance for high heat or very oily substances

Findings – Cost and Availability Assessment

- Findings:
 - Found PFAS-free food packaging products offered for sale in all food packaging types we considered
 - Some alternatives are available in sufficient quantities for certain food packaging types
 - Some alternatives are price comparable with similar PFAS-containing products
 - Reusable product are an available, cost comparable option for some types of food packaging

First Assessment: Types of Food Packaging Evaluated

Alternative Reviewed	Determination
Wraps and liners	

Finding	Hazard	Performance	Cost and Availability	Exposure
Safer alternative =	Less Hazardous	Favorable performance	Available and cost comparable	Same/lower exposure potential
Not safer alternative =	Less Hazardous	Not favorable performance	Available and cost comparable	Same/lower exposure potential
Insufficient information =	Less Hazardous	Favorable performance	Insufficient information about availability	Same/lower exposure potential

First Assessment Results

- Four types food packaging have identified safer alternatives:
 - Wraps and liners
 - Plates
 - Food boats
 - Pizza boxes
- Other six types of food packaging need to be re-assessed
- Types of alternatives identified as safer:
 - Non-chemical options (e.g. paper)
 - Chemical treatment alternatives
 - System alternatives (e.g. reusables)

Second Assessment

- First assessment was published in February 2021; started second assessment immediately
- Collected feedback on first assessment from stakeholders and incorporated in second assessment when appropriate
- Re-evaluated food packaging when no safer alternatives were identified; focused on filling in data gaps identified in first assessment
- Assessment is currently being finalized

Future Work: Implementation

- Encouraging distributors to switch to PFAS-free paper food packaging before prohibition begins
- Working with other agency groups to publicize information and encourage compliance
- Identifying ways to encourage switch to more desired alternatives, especially reusable products





Questions?

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