



The webinar will begin shortly.

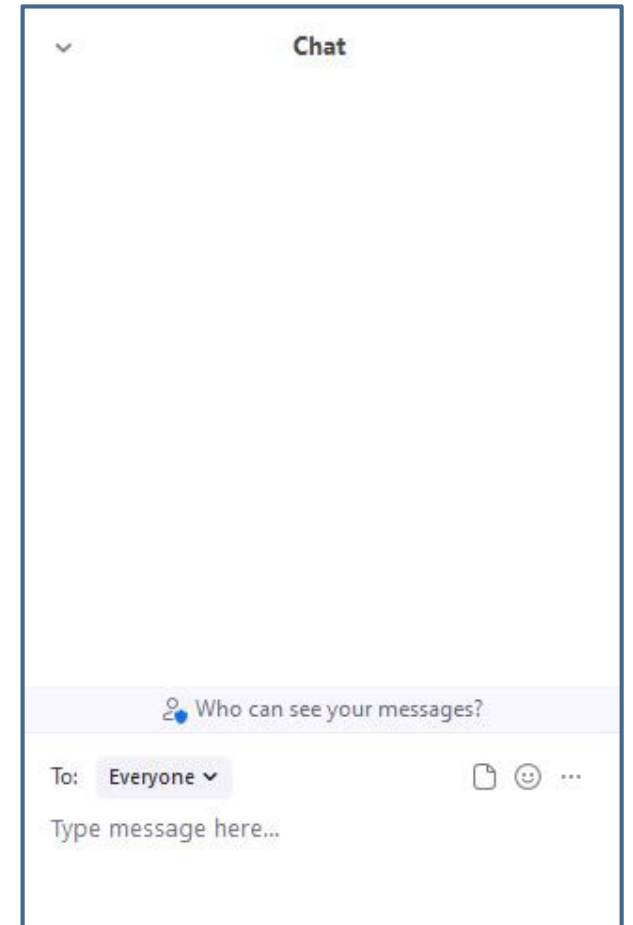
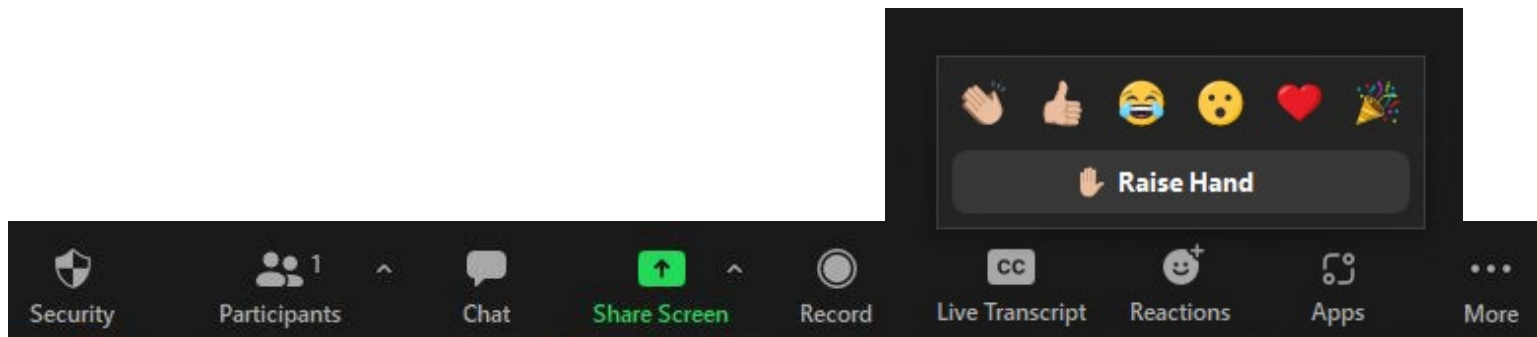


Per- and Polyfluoroalkyl Substances in Food Packaging Alternatives Assessment

June 6, 2022

Webinar logistics

- Technical issues? Send to **host** in chat
- Questions/comments? Send to **everyone** in chat
- We will address at the end during discussion
- Raise hand to share verbal input or ask questions





Per- and Polyfluoroalkyl Substances in Food Packaging Alternatives Assessment

June 6, 2022

Topics for today

1. Regulatory overview and statutory requirements
2. Background and first assessment summary
3. Scope of second assessment
4. Second assessment findings
5. Next steps and third assessment
6. Questions and discussion



Regulatory Overview and Statutory Requirements



ESHB 2658 (2018)—what it does

- Codified at [RCW 70A.222.070](#)
- In WA, prohibits sale of food packaging with intentionally added PFAS
- Prohibitions are by “specific food packaging application,” not all packaging generally
- **BEFORE** restriction can take effect, Ecology must:
 - Identify safer alternatives are available
 - Publish findings in Washington State Register
 - Submit report to the Legislature

Statutory elements—determinations

- Must make determinations using alternatives assessment
 - Must evaluate less toxic chemicals and nonchemical alternatives
 - Must follow Interstate Chemicals Clearinghouse (IC2) guidelines
 - Must use IC2 modules to evaluate alternatives for:
 - Chemical hazards
 - Exposure
 - Performance
 - Cost
 - Availability
- External peer review must support results
 - For second assessment, used IC2

Definitions

- "Perfluoroalkyl and polyfluoroalkyl substances" or "PFAS chemicals":
 - A class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom
- Food package:
 - Intended for direct food contact
 - Comprised, in substantial part, of paper, paperboard, or other materials originally derived from plant fibers



First PFAS in Food Packaging Alternatives Assessment



Scope

- PFAS provide oil, grease, and water resistance to packaging
- Applied to surface or into plant fiber slurry
- Considered PFAS common in fiber-based food packaging:
 - Side-chain fluorinated polymers
 - Chemical manufacturers voluntarily phasing out several of these
 - Perfluoropolyethers
 - Residual PFAS

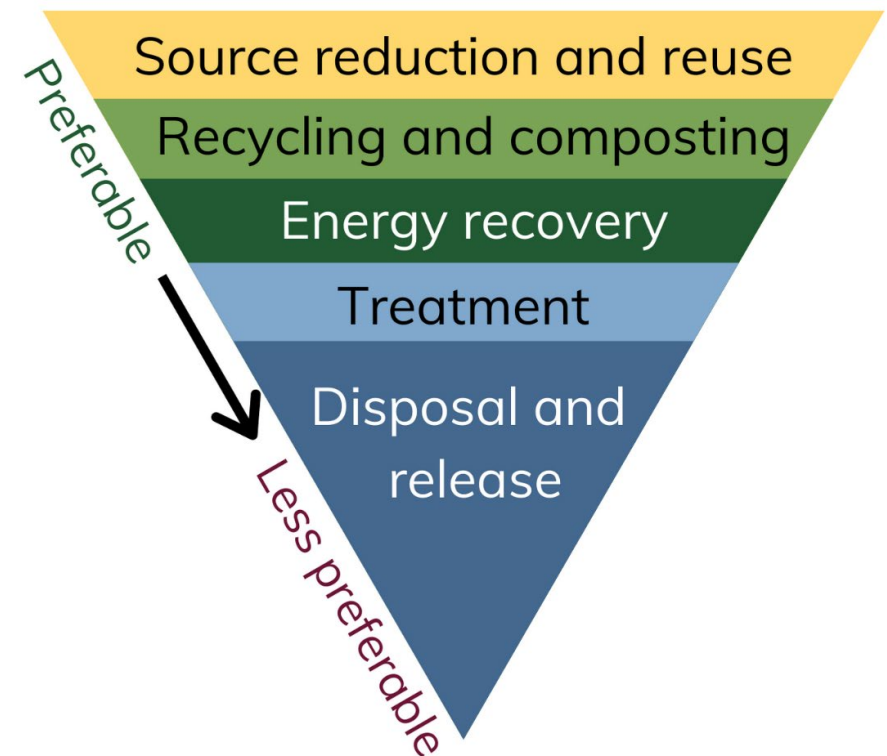


Alternatives assessments

- Alternatives assessment framework focuses on reducing risk by avoiding exposure to hazardous chemicals
- Identify safer alternatives that are:
 - Commercially available
 - Technically and economically feasible

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

Waste Management Hierarchy



IC2 AA Guide 1.1 evaluation process

What will be evaluated

Food packaging applications

Alternatives



Modules to evaluate alternatives

Hazard

Performance evaluation

Cost and availability

Exposure assessment



Determinations reached

Meets statutory definition of safer alternative

Insufficient data to reach conclusion

Known to not meet statutory definition of safer—fails at least one module

Stakeholder involvement

- Stakeholders include:
 - Chemical and packaging manufacturers
 - Nonprofits
 - Trade organizations
 - State, local, federal government
 - Product users
- Provided input on:
 - Project scope
 - Evaluation methodologies
 - PFAS and alternative technologies



First AA scope

Identified ten food packaging applications from three categories.

Category 1:

Food contact paper

- Wraps and liners
- Bags and sleeves

Category 2:

Dinnerware

- Plates
- Bowls
- Trays
- Food boats

Category 3:

Take-out containers

- Pizza boxes
- French fry cartons
- Clamshells
- Interlocking folded containers

Alternative substances reviewed

Alternative substance	Alternative substance type
Uncoated paper	Process
Petroleum-based waxes	Chemical
Bio-based waxes	Chemical
Kaolin clay	Chemical
PVOH—polyvinyl alcohol	Chemical
Siloxanes (based on vinyl silicone polymer)	Chemical
PLA—polylactide (based on degradation and residual breakdown products)	Chemical or material
PE—polyethylene	Chemical
PET—polyethylene terephthalate	Chemical
EVOH—ethylene vinyl alcohol	Chemical

Findings: Food packaging applications

Application reviewed	Determination
Wraps and liners	Wax-coated alternatives safer
Bags and sleeves	Insufficient information available
Plates	Clay-coated and reusable alternatives safer
Bowls	Insufficient information available
Trays	Insufficient information available
Food boats	Clay-coated and reusable alternatives safer
Pizza boxes	Uncoated alternatives safer
French fry cartons	Insufficient information available
Clamshells	Insufficient information available
Interlocking folded containers	Insufficient information available

First assessment impact

- Ecology submitted report in February 2021
- Effective date of prohibition is February 2023
- Applies only to:
 - Wraps and liners
 - Plates
 - Food boats
 - Pizza boxes



Second assessment purpose

- Collect new information and address data gaps for these applications
- Focused on six applications where we did not identify safer alternatives in first assessment:
 - Bags and sleeves
 - Bowls
 - Trays
 - French fry cartons
 - Clamshells
 - Interlocking folded containers

Feedback addressed in second assessment

- Revised definitions of food packaging applications:
 - Original definitions focused on both similar structure and function
 - Examined when packaging products are used interchangeably
- Assessed PFAS as a group
- Revised method for determining cost

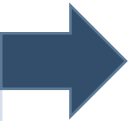
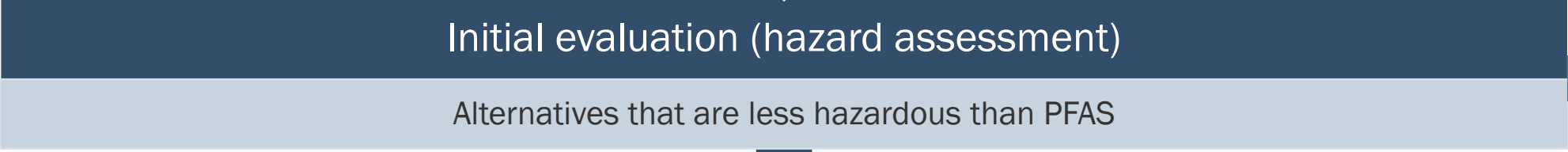
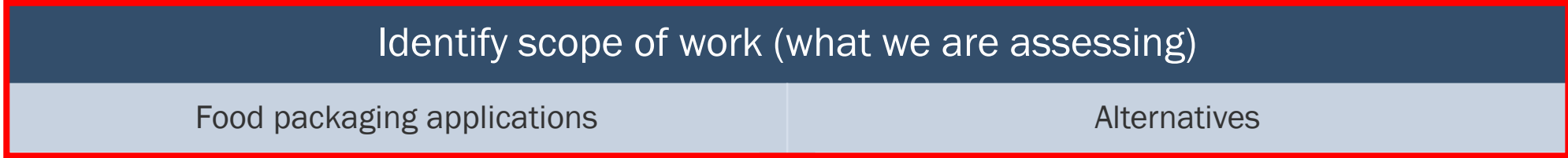




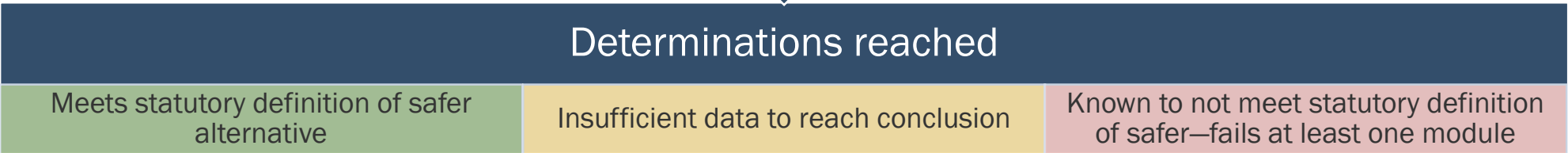
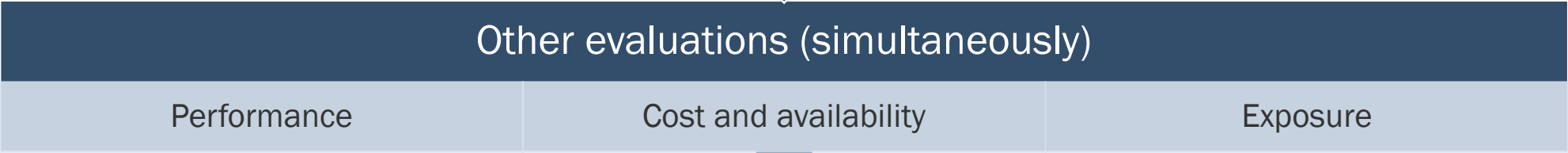
Second Assessment Scope



General process: Second assessment



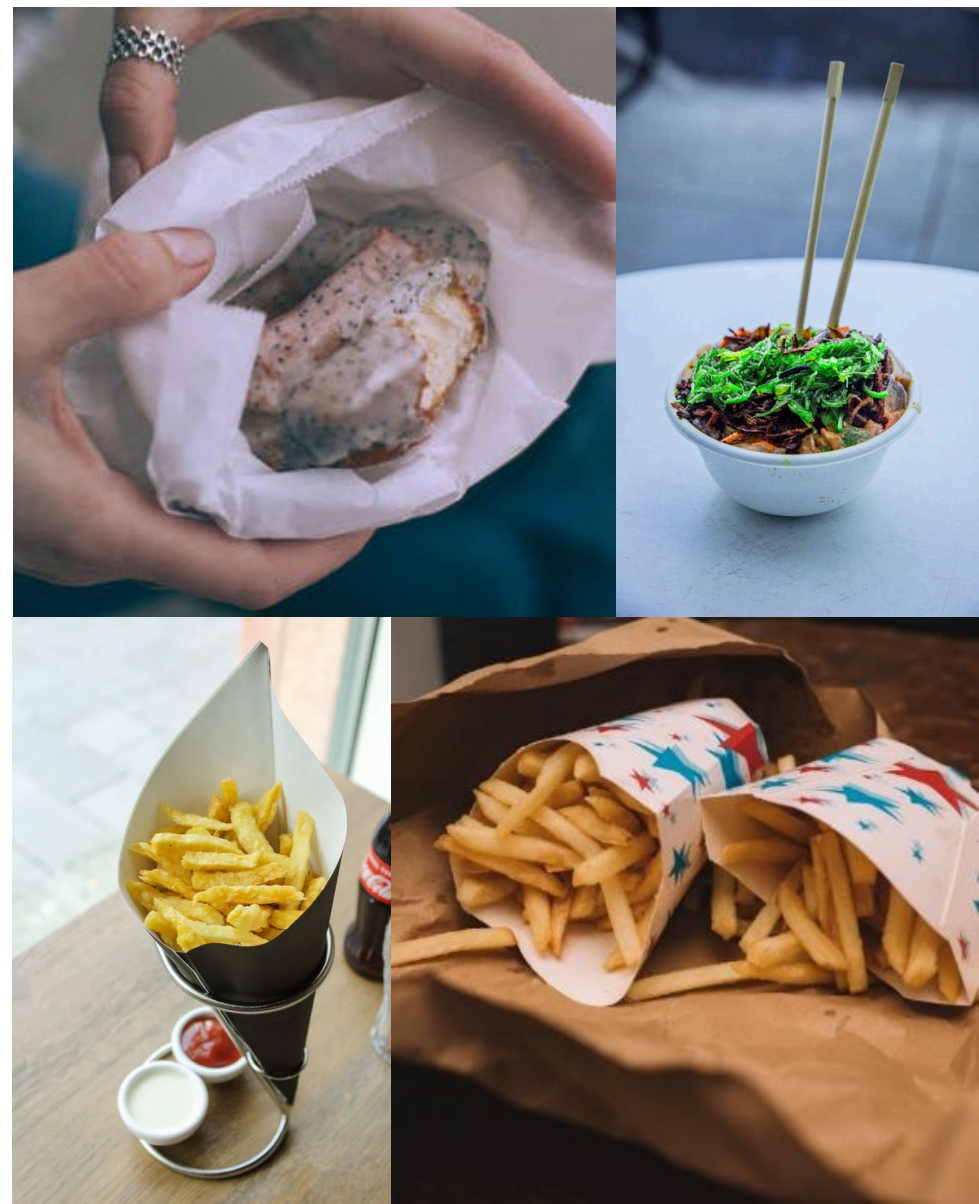
Known to not meet statutory definition of safer—alternative not less hazardous



Defining “specific food packaging applications”

- Bags and sleeves
- Bowls: Bowls, portion cups
- Open-top containers: French fry cartons, paper trays*

*Bowls, bags, or sleeves can function as open-top containers



Defining “specific food packaging applications”

- Closed containers: Clamshells, bakery boxes, deli containers
- Flat serviceware: Plates, cafeteria-style trays



Alternative substances reviewed

We added several alternatives based on stakeholder input

Alternative substance	Alternative substance type
Uncoated paper	Process
Petroleum-based or bio-based waxes	Chemical
Clay coating	Chemical
PVOH—polyvinyl alcohol	Chemical
Siloxanes	Chemical
PLA—polylactide	Chemical or material
PE—polyethylene (multiple forms)	Chemical or material
PET—polyethylene terephthalate	Chemical or material
PP—polypropylene (alone or as composite with talc)	Chemical or material
EVOH—ethylene vinyl alcohol	Chemical
Aluminum metal	Material

Talking about alternatives

PLA

- Can be chemical (PLA-coated paper) or material (PLA Foam)
- Hazard
- Exposure

PLA Foam Tray

- Performance
- Cost
- Availability

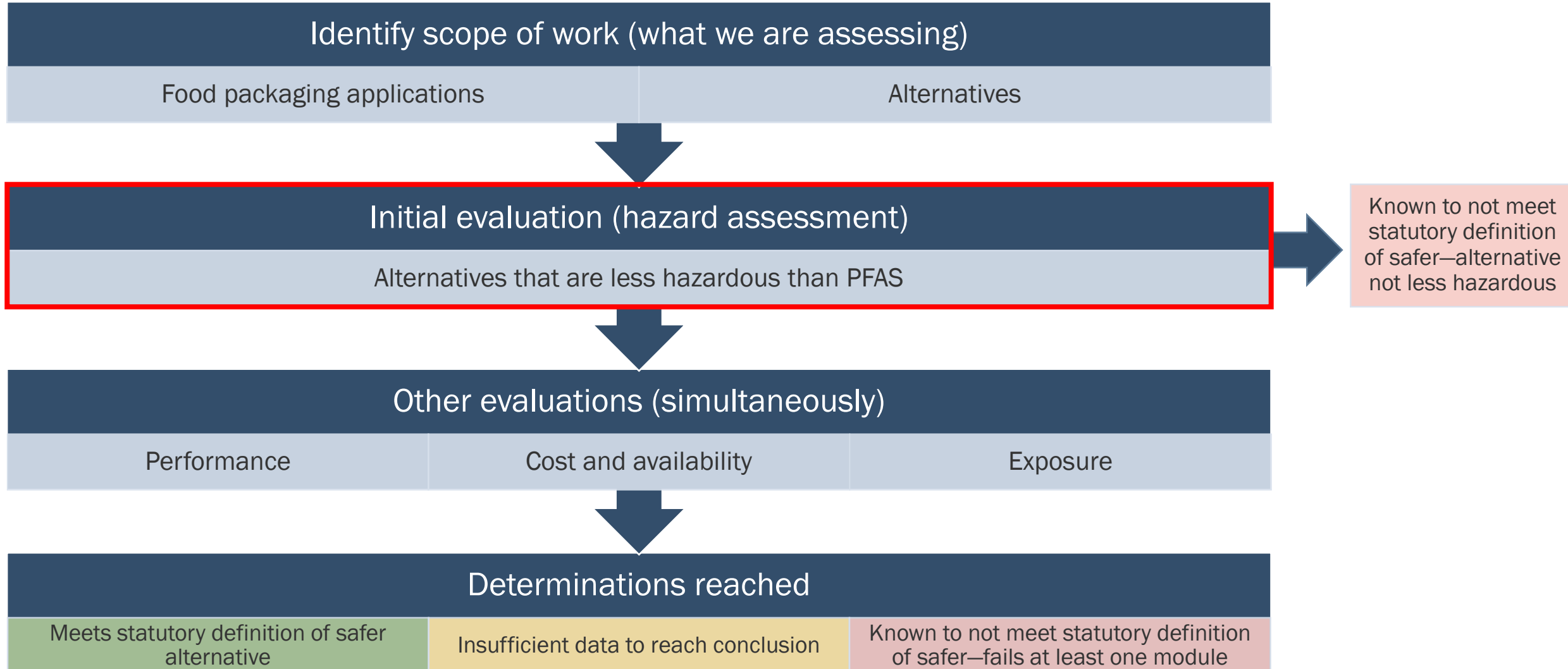




Second Assessment Findings

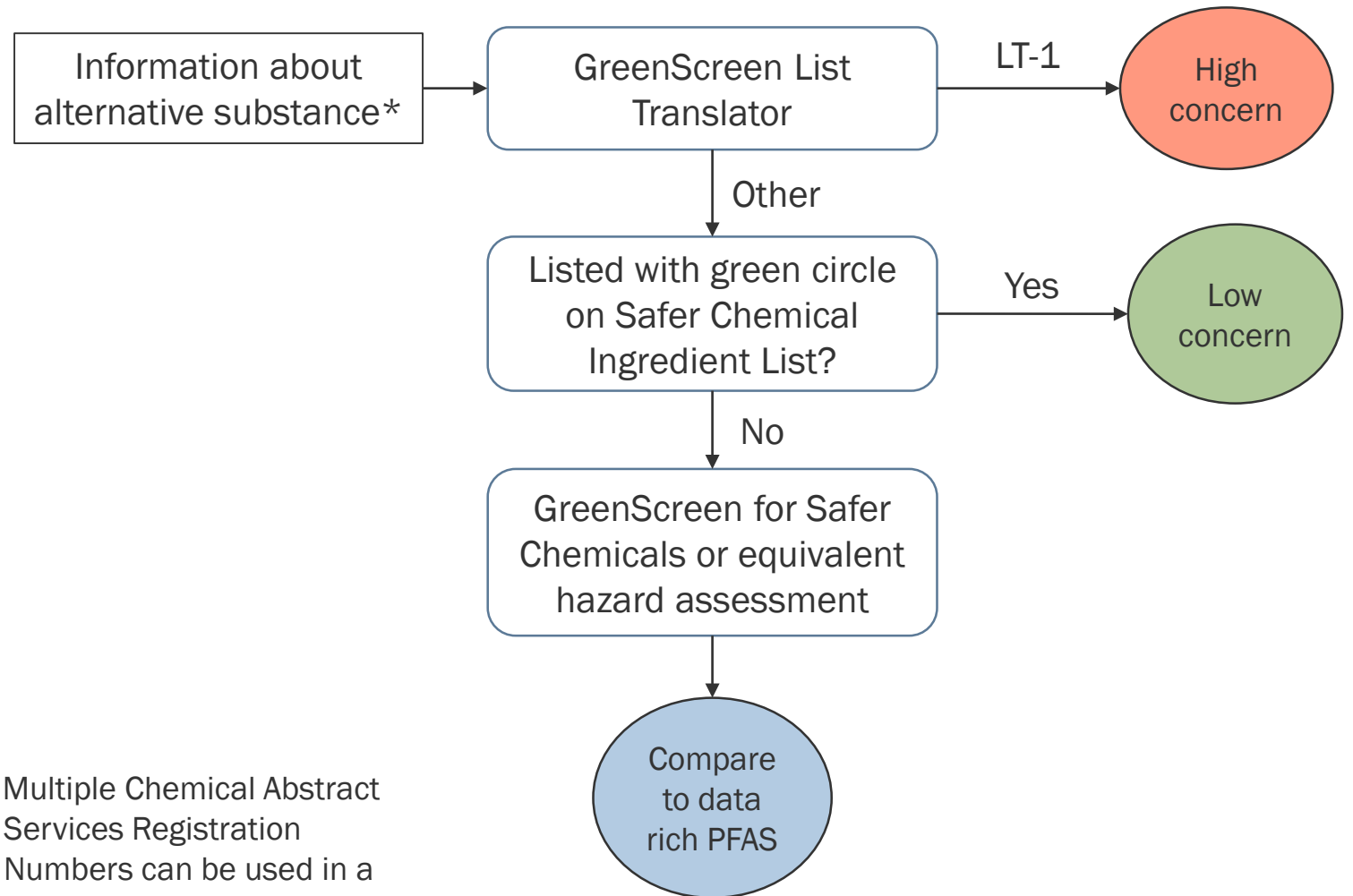


General process: Second assessment



Hazard module

- Based on IC2 Guide Level 2 Hazard Module
- “Data rich PFAS” are chemicals that meet our definition of PFAS with well characterized hazards



*Multiple Chemical Abstract Services Registration Numbers can be used in a single alternatives evaluation

Hazard module

GreenScreen for Safer Chemicals® evaluation

- Based on EPA Safer Choice hazard criteria
- 18 endpoints for human and environmental health
- Translates into four benchmarks from 1 (Avoid) to 4 (Prefer)



Hazard module

- Considered GreenScreen® or equivalent hazard assessment
- Criteria for equivalent hazard assessment included:
 - Ingredient disclosure
 - Hazard endpoint transparency and equivalency to 18 GreenScreen hazard endpoints
 - Assessment method transparency and equivalency
 - Transparency in the process for assessment and re-assessment
 - Independent third-party review
- Identified Scivera GHS+ and ChemFORWARD as equivalent sources for hazard assessments

Findings: Hazard module

EPA Safer Chemicals Ingredients List

- Assessed using EPA Safer Choice hazard criteria
- Only chemicals listed with “green circle” designated low concern
 - Indicating they are less hazardous than PFAS

Alternative substance	Determination
Uncoated paper	Low concern
Petroleum-based or bio-based waxes	Low concern
Clay coating	Low concern
PVOH—polyvinyl alcohol	Low concern

Findings: Hazard module

Based on evaluation of data rich PFAS, alternatives must score the equivalent of BM-2 or better to be less hazardous than PFAS

Alternative substance	Determination
Siloxanes (based on vinyl silicone polymer)	NOT less hazardous than PFAS—not assessed further
PLA—polylactide (based on components of polymer)	Less hazardous than PFAS—low concern
PE—polyethylene (LDPE, based on components of polymer)	Less hazardous than PFAS
PE (other forms, based on components of polymer)	Not enough information—not assessed further
PET—polyethylene terephthalate	NOT less hazardous than PFAS—not assessed further
PP—polypropylene	Less hazardous than PFAS
PP-talc composite	NOT less hazardous than PFAS—not assessed further
EVOH—ethylene vinyl alcohol	Less hazardous than PFAS—low concern
Aluminum metal	Less hazardous than PFAS

General process: Second assessment

Identify scope of work (what we are assessing)

Food packaging applications	Alternatives
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Initial evaluation (hazard assessment)

Alternatives that are less hazardous than PFAS

Known to not meet statutory definition of safer—alternative not less hazardous



Other evaluations (simultaneously)

Performance	Cost and availability	Exposure
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Determinations reached

Meets statutory definition of safer alternative	Insufficient data to reach conclusion	Known to not meet statutory definition of safer—fails at least one module
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Exposure module

- Based on IC2 Guide Level 1 Exposure Assessment Module
- Compares chemicals by evaluating differences in:
 - Chemical properties
 - Exposure pathways
 - Exposure concerns
- Goal: Identify exposure concerns that might change our decision on whether alternative is safer than PFAS
- If we determined the alternative was of low concern during the hazard evaluation, skipped exposure evaluation
 - EPA SCIL green circle, Benchmark-3, -4, or equivalent

Findings: Exposure module

- Evaluated three alternatives :
 - Aluminum
 - Polyethylene
 - Polypropylene
- Based on available data, determined **aluminum** is likely to have similar exposure concerns to PFAS
- Not enough data to evaluate exposure pathways for **polyethylene** and **polypropylene**



Performance module

- Beyond IC2 Guide: Alternatives should “perform as well as or better than PFAS chemicals”
- Based on the IC2 Guide Level 1 Performance Assessment Module:
 - Is the alternative being used for the same or similar function?
 - Is the alternative available on the commercial market?
 - Do promotional materials state this alternative provides the desired function?
- If performance was unclear after answering these questions, we answered more guiding questions

Findings: Performance module

- Performance requirements
 - Oil and grease resistance (all)
 - Leak/spill resistance (as applicable)
- Findings
 - Generally found alternatives functionally equivalent to PFAS-containing food packaging
 - Rigid polylactic acid (PLA) plastic products had limited performance
 - Temperature dependent
 - Certain untreated paper materials did not meet performance requirements for these types of food packaging



Cost and availability module

- Beyond IC2 Guide
 - “Safer alternatives must be readily available in sufficient quantity and at a comparable cost”
- Based on the IC2 Guide Level 1 Cost and Availability Module
 - Is the alternative currently used in the application of interest?
 - Is the alternative currently offered for sale for the application of interest? Is the price of the alternative close to the current?



Cost and availability module

- Stakeholder feedback about cost evaluation in first assessment
 - Packaging costs didn't account for other costs:
 - Health
 - Environmental impact
 - Cost to switch
 - Prices don't reflect the market or changes in market well
- Changed evaluation to whether **packaging manufacturers currently use the alternative** to make specific types of food packaging
- New approach presumes manufacturers would not use an alternative substance that is not available and cost comparable for them

Findings: Cost and availability module

- Found PFAS-free food packaging products in all applications we considered
- For each type of food packaging, identified at least three alternatives multiple manufacturers use
- PLA raw material shortage no longer a concern



Reusable options

- Findings similar to first assessment
 - Availability of reusable options depends on:
 - Food packaging type
 - Location
 - Access to additional equipment
 - Reusable dinnerware is readily available
 - Many businesses use reusable dinnerware as a cost competitive option
- Conclusion: Reusable bowls, flat serveware, and open-top containers are a favorable option for some



General process: Second assessment

Identify scope of work (what we are assessing)

Food packaging applications	Alternatives
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Initial evaluation (hazard assessment)

Alternatives that are less hazardous than PFAS

Known to not meet statutory definition of safer—alternative not less hazardous



Other evaluations (simultaneously)

Performance	Cost and availability	Exposure
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Determinations reached

Meets statutory definition of safer alternative	Insufficient data to reach conclusion	Known to not meet statutory definition of safer—fails at least one module
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Findings: Simultaneous assessment

To qualify as a safer alternative, a product or substance:

- Is **less hazardous** than the PFAS option
- Shows similar or **improved exposure concerns** than the PFAS option (if required)
- “**Performs** as well or better than the PFAS option”
- Is “**readily available** in sufficient quantity”
- Is available “at a **comparable cost**”

Example: Simultaneous assessment

Alternative product: Wax-coated bags and sleeves

Application and alternative reviewed	Hazard module	Exposure assessment module	Performance evaluation module	Cost and availability module	Determination
Bags and sleeves, wax-coated	U.S. EPA Safer Choice—Low concern	Low concern— Not applicable	Favorable	Favorable	Wax-coated alternatives meet criteria

Conclusions

Food packaging application	Total number identified	Densified paper	Wax-coated	Clay-coated	PLA-coated	PLA foam	Aluminum	Reusable versions
Bags and sleeves	2	Yes	Yes	No	No	No	No	No
Bowls	4	No	No	Yes	Yes	Yes	No	Yes
Flat serviceware	4	No	No	Yes	Yes	Yes	No	Yes
Open-top containers	7	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Closed containers	4	No	No	Yes	Yes	Yes	Yes	No

Final considerations

- Challenges remain
 - Access to proprietary information such as alternative substance formulations
 - Knowledge of fundamental product information
 - Such as the identity of the alternative product (when labeled generically)
- Companies switching from PFAS can use this assessment to identify safer alternatives
 - May need more information to choose alternatives





Next Steps and Third Assessment



Sale and distribution prohibition

- Ecology submitted report in May 2022
- Effective date of prohibition is May 2024
- Applies to:
 - Bags and sleeves
 - Bowls
 - Flat serviceware (such as trays)
 - Open-top containers (such as fry cartons)
 - Closed containers (such as clamshells)



Next step: Third assessment

- First and second assessment covered packaging that holds food for less than 1 week
- Third assessment looking at pre-packaged food
 - Packaging holding food for much longer (days to weeks or years)
 - Packaging involved in cooking or heating products



Next step: Third assessment

- Focused on packaging “comprised, in substantial part, of paper, paperboard, or other materials originally derived from plant fibers”
- Possible packaging types we may include:
 - Microwaveable popcorn bags
 - Wrappers for butter or other foods
 - Baking paper
 - Pet food bags



Get involved!

- Join our mailing list

https://public.govdelivery.com/accounts/WAECY/subscriber/new?topic_id=WAECY_30

- To suggest products we should assess, contact Rae Eaton

rae.eaton@ecy.wa.gov

- For compliance questions, contact Kathleen Gilligan

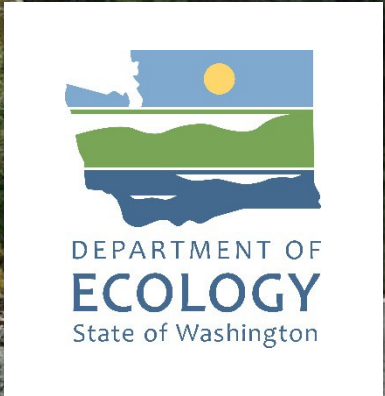
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Alternatives assessment team

- Ecology team
 - Rae Eaton, Minerva Teli, Marissa Smith, Craig Manahan, Kimberly Goetz, Lauren Tamboer, Autumn Falls, Amber Sergent
- Washington State Department of Health
 - Holly Davies





Questions?

Contact us!

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