Per- and Polyfluoroalkyl Substances in Food Packaging Alternatives Assessment

March 23, 2021

The webinar will begin shortly.
Audio connection logistics

• For audio connection, we recommend using your computer speaker.
• If you are unable to join using computer audio, use “Call In” to access dial-in information.
• To open the audio options, select the three dots icon in the menu at the bottom of your screen.

[Image of audio options interface]
Webinar logistics

• All lines are muted.
• All questions should be typed into the Q & A box.
  • Ask them anytime, we will address at the end.
• Send all technical difficulty issues to the host via the chat box.
• To open the chat box, select the chat button at the lower right hand side of your screen.
• In the event of major technical difficulties, we will reschedule the webinar.
Topics for today

1. Regulatory overview and statutory requirements
2. Background and scope
3. Assessment findings
4. Implementation and future steps
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

• Determinations must be made using alternatives assessment.
  • Must evaluate less toxic chemicals and nonchemical alternatives.
  • Must follow Interstate Chemicals Clearinghouse (IC2) guidelines.
  • Must use IC2 modules to evaluate potential alternatives for:
    • Chemical hazards
    • Exposure
    • Performance
    • Cost
    • Availability

• Results must be supported by external peer review
  • Washington State Academy of Sciences
Statutory elements – effective dates

• Ecology did not submit findings in 2020.
  • Prohibition in RCW 70A.222.070(1) does not take effect in 2022.

• Instead, we follow provisions in RCW 70A.222.070(5):
  • If no safer alternatives identified by January 1, 2020, Ecology directed to repeat assessment process annually starting January 1, 2021.
  • Prohibition takes effect two years after Ecology submits the report.

• Ecology published and submitted first set of findings to the Legislature in February 2021.
The First PFAS in Food Packaging Alternatives Assessment
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.

Hazard × Exposure  Risk

Waste Management Hierarchy

Source reduction and reuse
Recycling and composting
Energy recovery
Treatment
Disposal and release

Preferable
Less preferable
## IC2 AA Guide 1.1 Evaluation Process

### What will be evaluated

<table>
<thead>
<tr>
<th>PFAS</th>
<th>Alternatives</th>
</tr>
</thead>
</table>

### Modules to evaluate alternatives (simultaneous assessment)

<table>
<thead>
<tr>
<th>Hazard</th>
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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

See an accessible version of this graphic.
Stakeholder involvement

• Followed IC2 Guide Level 2 Stakeholder Involvement Module

• Stakeholders included:
  • Chemical and packaging manufacturers
  • NGOs
  • Trade organizations
  • State, local, federal government
  • Product users

• Provided input on:
  • Project scope
  • Evaluation methodologies
  • PFAS and alternative technologies
Definitions

• "Perfluoroalkyl and polyfluoroalkyl substances" or "PFAS chemicals" means:
  • A class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.

• Definition of food package:
  • Intended for direct food contact.
  • Comprised, in substantial part, of paper, paperboard, or other materials originally derived from plant fibers.
Scope: PFAS in food packaging

• 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 have begun voluntarily phasing out several of these side-chain fluorinated polymers.
  • Perfluoropolyethers.
  • Residual PFAS.
Final AA scope

Identified ten food packaging applications from three original categories.

Category 1: Food contact paper
- Wraps & liners
- Bags & 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

<table>
<thead>
<tr>
<th>Alternative substance</th>
<th>Alternative substance type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncoated paper</td>
<td>Process</td>
</tr>
<tr>
<td>Petroleum-based waxes</td>
<td>Chemical</td>
</tr>
<tr>
<td>Bio-based waxes</td>
<td>Chemical</td>
</tr>
<tr>
<td>Kaolin clay</td>
<td>Chemical</td>
</tr>
<tr>
<td>PVOH – polyvinyl alcohol</td>
<td>Chemical</td>
</tr>
<tr>
<td>Siloxanes (based on vinyl silicone polymer)</td>
<td>Chemical</td>
</tr>
<tr>
<td>PLA – polylactide (based on degradation and residual breakdown products)</td>
<td>Chemical or material</td>
</tr>
<tr>
<td>PE – polyethylene</td>
<td>Chemical</td>
</tr>
<tr>
<td>PET– polyethylene terephthalate</td>
<td>Chemical</td>
</tr>
<tr>
<td>EVOH – ethylene vinyl alcohol</td>
<td>Chemical</td>
</tr>
</tbody>
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## IC2 AA Guide 1.1 Evaluation Process

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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 |

See an [accessible version](#) of this graphic.
Different definitions of alternatives

PLA Foam
• Alternative substance
• Hazard
• Exposure

PLA Foam Tray
• Alternative product
• Performance
• Cost
• Availability
Hazard Module

Based on IC2 Guide Level 2 Hazard Module

- Process treatments
- Polymers
- Functional additives
- Degradation products
- Monomers >0.01%
- Byproducts & impurities >0.01%

See an accessible version of this graphic.
Findings – Hazard Module

EPA Safer Chemicals Ingredients List

- Assessed using EPA Safer Choice hazard criteria.
- Only chemicals listed with “green circle” were designated low concern.

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<th>Determination</th>
</tr>
</thead>
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<tr>
<td>Uncoated paper</td>
<td>Low concern</td>
</tr>
<tr>
<td>Petroleum-based waxes</td>
<td>Low concern</td>
</tr>
<tr>
<td>Bio-based waxes</td>
<td>Low concern</td>
</tr>
<tr>
<td>Kaolin clay</td>
<td>Low concern</td>
</tr>
<tr>
<td>PVOH – polyvinyl alcohol</td>
<td>Low concern</td>
</tr>
</tbody>
</table>
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

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

<table>
<thead>
<tr>
<th>Group I Human</th>
<th>Group II and II* Human</th>
<th>Ecotex</th>
<th>Fate</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>M</td>
<td>R</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>DG</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

**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

See an [accessible version](#) of this graphic.
Findings – Hazard Module

• We conducted or reviewed GreenScreen® hazard assessments for two alternative substances.
• Assessed components of PLA in absence of PLA formulation information.
• Unable to use similar process for other polymer coatings.

<table>
<thead>
<tr>
<th>Alternative substance</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siloxanes (based on vinyl silicone polymer)</td>
<td>Benchmark-1 (Avoid—Chemical of Concern)</td>
</tr>
<tr>
<td>PLA – polylactic acid (based on components of polymer)</td>
<td>Consistent with Benchmark-3 (Use but still opportunity for improvement)</td>
</tr>
</tbody>
</table>
Findings – Hazard Module

• Did not receive GreenScreen® hazard assessment for the side-chain fluorinated polymer PFAS prior to peer review.

• Reviewed publicly available GreenScreen® hazard assessments for two PFAS associated with side-chain fluorinated polymers used in food packaging.

• Benchmark scores are 1 (Avoid Chemical of High Concern).

<table>
<thead>
<tr>
<th>Substance</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:2 Fluorotelomer alcohol</td>
<td>Benchmark-1 (Avoid—Chemical of Concern)</td>
</tr>
<tr>
<td>Perfluorohexanoic acid</td>
<td>Benchmark-1 (Avoid—Chemical of Concern)</td>
</tr>
</tbody>
</table>
# Findings – Hazard Module

<table>
<thead>
<tr>
<th>Alternative substance</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncoated paper</td>
<td>Less hazardous than PFAS</td>
</tr>
<tr>
<td>Petroleum-based waxes</td>
<td>Less hazardous than PFAS</td>
</tr>
<tr>
<td>Bio-based waxes</td>
<td>Less hazardous than PFAS</td>
</tr>
<tr>
<td>Kaolin clay</td>
<td>Less hazardous than PFAS</td>
</tr>
<tr>
<td>PVOH – polyvinyl alcohol</td>
<td>Less hazardous than PFAS</td>
</tr>
<tr>
<td>Siloxanes (based on vinyl silicone polymer)</td>
<td>NOT less hazardous than PFAS</td>
</tr>
<tr>
<td>PLA – polylactide (based on components of polymer)</td>
<td>Less hazardous than PFAS</td>
</tr>
<tr>
<td>PE – polyethylene</td>
<td>Insufficient data to draw conclusion</td>
</tr>
<tr>
<td>PET– polyethylene terephthalate</td>
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</tr>
</tbody>
</table>
Exposure Module

• Based on IC2 Guide Level 1 Exposure Assessment Module.
• Compares chemicals by evaluating differences in:
  • Chemical properties.
  • Exposure pathways.
  • Exposure concerns.
• Using the IC2 Guide, the exposure evaluation may be unnecessary if:
  • The alternative was determined to be of low concern during the hazard evaluation (EPA SCIL green circle, Benchmark-3 or -4).
  • The alternative has persistent, bioaccumulative, and/or toxic properties of concern.
Performance Module

• 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.
• Consideration beyond IC2 Guide: alternatives should “perform as well as or better than PFAS chemicals.”
Findings – Performance Module

• Performance requirements:
  • Oil and grease resistance (all).
  • Leak/spill resistance (as applicable).

• Findings:
  • Generally found alternative substances functionally equivalent to PFAS-containing food packaging.
  • A few PFAS-free molded fiber or polylactic acid (PLA) plastic products had limited performance for high heat or very oily substances.
Cost & Availability Module

- Based on the IC2 Guide Level 1 Cost & 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?

- Considerations beyond Level 1:
  - “Safer alternatives must be readily available in sufficient quantity and at a comparable cost.”
Availability assessment

• IC2 Guide questions to identify a favorable alternative:
  • Is the alternative currently used in the application of interest?
  • Is the alternative currently offered for sale for the application of interest? Will it be relatively easy to obtain the alternative from a supplier? Are there other options or suppliers if one supplier cannot meet demand?

• Referenced the Ontario Toxics Reduction Program reference tool.
Example – Availability assessment

Bowls made using PLA as a barrier:

<table>
<thead>
<tr>
<th>Food packaging type</th>
<th>Alternative coating or material</th>
<th>Number of large manufacturers identified*</th>
<th>Number of other manufacturers identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowls</td>
<td>PLA-coated</td>
<td>3 identified</td>
<td>15 identified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Earthchoice (Pactiv)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eco-Products (Novolex)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solo (Dart)</td>
<td></td>
</tr>
<tr>
<td>Bowls</td>
<td>PLA foam</td>
<td>0 identified</td>
<td>1 identified</td>
</tr>
</tbody>
</table>

*Identified in an industry market report.
Findings – Availability assessment

• Found PFAS-free food packaging products offered for sale in all food packaging applications we considered.
• Some alternative products are available in sufficient quantities.
• Evidence indicating a current PLA raw material shortage.
Findings – Cost assessment

• Followed IC2 Guide and statutory requirements to assess cost:
  • Requirement for safer alternatives to be “readily available... at a comparable cost.”
  • IC2 guide: Is the price of the alternative close to the current?

• Defined “comparable cost” as a 10% price increase between comparable products (e.g. 10” inch plates).

• Findings:
  • Some alternative products were price comparable with similar PFAS-containing products.
  • Information availability (both PFAS-containing and alternatives) impacted our assessment.
Reusable options

• Findings:
  • Availability of reusable options depends on:
    • Food packaging type.
    • Location.
    • Access to additional equipment.
  • Reusable dinnerware is readily available
  • Switching from disposable to reusable dinnerware is cost comparable for many businesses.

• Conclusion: Reusable plates, bowls, trays, and food boats are an available, cost comparable option for some.
# IC2 AA Guide 1.1 Evaluation Process

<table>
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<tr>
<th>What will be evaluated</th>
<th>Alternatives</th>
</tr>
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<tbody>
<tr>
<td>PFAS</td>
<td></td>
</tr>
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</table>

## Modules to evaluate alternatives (simultaneous assessment)

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Performance Evaluation</th>
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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

See an [accessible version](#) of this graphic.
Findings – Simultaneous assessment

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

- Is less hazardous than the PFAS option.
- Has a better exposure evaluation 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 wraps and liners

<table>
<thead>
<tr>
<th>Application and alternative reviewed</th>
<th>Hazard Module</th>
<th>Exposure Assessment Module</th>
<th>Performance Evaluation Module</th>
<th>Cost and Availability Module</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wraps and liners, wax-coated</td>
<td>U.S. EPA Safer Choice—Low concern</td>
<td>Low concern—Not applicable</td>
<td>Favorable</td>
<td>Favorable</td>
<td>Wax-coated alternatives meet criteria</td>
</tr>
</tbody>
</table>
# Findings – Food packaging applications

<table>
<thead>
<tr>
<th>Application reviewed</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wraps and liners</td>
<td>Wax-coated alternatives safer</td>
</tr>
<tr>
<td>Bags and sleeves</td>
<td>Insufficient information available</td>
</tr>
<tr>
<td>Plates</td>
<td>Clay-coated and reusable alternatives safer</td>
</tr>
<tr>
<td>Bowls</td>
<td>Insufficient information available</td>
</tr>
<tr>
<td>Trays</td>
<td>Insufficient information available</td>
</tr>
<tr>
<td>Food boats</td>
<td>Clay-coated and reusable alternatives safer</td>
</tr>
<tr>
<td>Pizza boxes</td>
<td>Uncoated alternatives safer</td>
</tr>
<tr>
<td>French fry cartons</td>
<td>Insufficient information available</td>
</tr>
<tr>
<td>Clamshells</td>
<td>Insufficient information available</td>
</tr>
<tr>
<td>Interlocking folded containers</td>
<td>Insufficient information available</td>
</tr>
</tbody>
</table>
Assessment challenges

• Knowledge of fundamental product information:
  • Does the product contain PFAS?
  • Identity of the alternative product (when labeled generically).

• Access to proprietary information:
  • Specific alternative substance formulations.
  • Product pricing information.

• We will continue working with food packaging and chemical manufacturers to get this information.
Implementation and future steps
Sale and distribution prohibition

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

• Still developing implementation plan.
• Outreach to affected stakeholders about restrictions:
  • Manufacturers.
  • Grocers and other retailers.
  • Hospitality associations.
  • Restaurants, food service organizations, and other end users.
• Will continue to provide updates through:
  • Stakeholder webpage at bit.ly/pfas-food-aa
  • Email lists (signup on stakeholder site).
  • Regular webinars.
Next steps – Our second assessment

• Review and refine scope:
  • Modify definitions included in AA scope.
  • Identify changes in availability of food packaging materials.

• Collect new information:
  • Availability
  • Cost
  • Performance
  • Chemical composition and hazard information
# Expected Timeline

<table>
<thead>
<tr>
<th>Action</th>
<th>Expected timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Now</td>
</tr>
<tr>
<td>Revising scope (if needed)</td>
<td>Now</td>
</tr>
<tr>
<td>Identify additional food packaging chemicals or materials to include, if any</td>
<td>Now</td>
</tr>
<tr>
<td>Collect new information (cost, availability, performance, etc.)</td>
<td>Now – End 2021</td>
</tr>
<tr>
<td>Assess need for further PFAS in food packaging alternatives assessments</td>
<td>Now – Early 2022</td>
</tr>
</tbody>
</table>
Get involved!

• If you haven’t already, join our mailing list.
• Public webinar:
  April 14 from 2 – 3:30 PM PST
  • Provide feedback about the first AA.
  • Give us suggestions for the second AA.
• Comment on draft documents:
  • Draft documents for second AA scope expected late spring 2021.
Alternatives assessment team

• Ecology team:
  • Rae Eaton, Ken Zarker, Marissa Smith, Craig Manahan, Kimberly Goetz, Lauren Tamboer, Katya Kniazeva, Kasia Patora, Amber Sergent

• Washington State Department of Health:
  • Holly Davies

• SRC, Inc. (contractors for first PFAS AA):
  • Cathy Rudisill, Courtney Hard, Jennifer Rhoades-Hamacher
Questions?

Contact us!

Webpage: 
bit.ly/pfas-food-aa

Rae Eaton: 
rae.eaton@ecy.wa.gov
## Evaluating alternatives

<table>
<thead>
<tr>
<th>Assessment module</th>
<th>IC2 Guide level used</th>
<th>Products or substances evaluated?</th>
<th>Information collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Assessment</td>
<td>Level 2</td>
<td>Substance</td>
<td>Previous hazard assessments, toxicological data, authoritative chemical lists, physical characteristics of substance</td>
</tr>
<tr>
<td>Exposure Evaluation</td>
<td>Level 1</td>
<td>Substance</td>
<td>Exposure data, physical characteristics of substance</td>
</tr>
<tr>
<td>Performance</td>
<td>Level 1</td>
<td>Product</td>
<td>Promotional information, opinions of consumers</td>
</tr>
<tr>
<td>Cost and Availability</td>
<td>Level 1*</td>
<td>Product</td>
<td>Price information, product manufacturer information, case studies</td>
</tr>
</tbody>
</table>

* Modified to include additional statutory requirements.
Hazard Module

• GreenScreen List Translator
  • Screens chemicals against set of authoritative lists.
  • Only chemicals that score “List Translator 1 (LT-1)” were designated high concern.

• EPA Safer Chemicals Ingredients List
  • Originally Design for the Environment program.
  • Assessed using EPA Safer Choice hazard criteria.
  • Compare toxicity data against GHS thresholds.
  • Only chemicals listed with “green circle” were designated low concern.
**Findings – Hazard Module**

EPA SCIL identified these alternative substances with green circles—considered low concern.

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<td>PVOH – polyvinyl alcohol</td>
<td>Low concern</td>
</tr>
</tbody>
</table>
End of presentation.
Simultaneous decision framework

• The general process of a simultaneous decision framework has four sequential steps:
  • Identifying the scope of the assessment
  • Collecting information for the assessment modules
  • Performing a simultaneous analysis of the information collected.
  • Drawing conclusions about the alternatives based on that analysis.

• For this assessment, the scope was defined both by what potential alternatives were evaluated and what PFAS the alternatives were compared against. Information was collected for four assessment modules simultaneously: hazard, exposure, performance, and cost and availability.

• During the simultaneous analysis, the results of each assessment module were then compared to the pre-defined criteria for a safer alternative.

• Each alternative was determined to be a safer alternative, not a safer alternative, lacking the data needed to complete the analysis.
Hazard module

• A flow chart describing the approach used to assess the hazards of chemical mixtures used to provide oil and grease resistance to food packaging. For each mixture, which could either contain PFAS or one of the chemical alternatives identified in Section 3, the following chemical components could have been included in the assessment:
  • Polymers.
  • Functional additives.
  • Degradation products.
  • Monomers that have greater than a 0.01% concentration.
  • Byproducts or impurities that have greater than a 0.01% concentration.
  • Base materials consisting paper, paperboard, and plant-based pulp are assumed to low concern and were not assessed under this approach.

• (Text description continued on the next slide.)
Hazard module continued

• First, each chemical was screened using the GreenScreen List Translator™. If the chemical is determined to have a list translator score of 1 (LT-1) then it is a chemical of high concern and the chemical mixture is not evaluated further. If the chemical receives any other score the hazard assessment continues.

• Next, the remaining chemicals are screened using the EPA Safer Chemical Ingredients List (SCIL). Chemicals that are designated with a green circle on SCIL is considered a chemical of low concern. If the chemical is identified as low concern, then the hazard evaluation for that chemical is finished. If a chemical is not on that list, then the assessment continues.

• Finally, the remaining chemicals undergo GreenScreen® evaluation. The chemical will be assigned a benchmark score of 1 to 4 or a benchmark score of U (unknown) if there are inadequate data to evaluate the chemical under the benchmark criteria. Both the final benchmark score and the GreenScreen® evaluation report may be used to determine whether an alternative substance is safer than PFAS.
Example GreenScreen® evaluation

• An example GreenScreen® evaluation showing:
  • Data gaps for carcinogenicity and acute mammalian toxicity.
  • Very high persistence.
  • Moderate bioaccumulation, neurotoxicity (single and repeat), developmental toxicity, and endocrine activity.
• Low across all other endpoints:
  • Mutagenicity
  • Reproductive toxicity
  • Systemic toxicity (single and repeat)
  • Skin and respiratory sensitization
  • Skin and eye irritation
  • Acute and chronic aquatic toxicity
  • Reactivity
  • Flammability
Stakeholder representation

- Government: 12%
- Foodservice packaging supplier: 2%
- Chemical manufacturer: 7%
- Suppliers/coatings: 2%
- Paper producers: 11%
- Coaters: 2%
- Trade Organizations: 13%
- Purchasers/users: 7%
- NGO: 16%
- Other: 9%
- Packaging Product manufacturers: 19%