cradle to cradle products innovation institute

# Cradle to Cradle Certified Material Health Assessor Call

**18 August 2021**

# PURPOSE

*Increase alignment and consistency in the way Material Health assessments are conducted by providing a venue for open dialogue between our four Material Health assessment organizations*

# AGENDA

1. Transition to Using the Material Health Assessment Methodology (MHAM) Updates
2. MHAM Updates (with focus on recent clarifications)
3. How to Use the New Recycled Content Assessment Methodology List of Analytes
4. Discussion Topic: Assessor Experience Applying the New Recycled Content Assessment Methodology
5. Open discussion - can be dispersed throughout the presentation or save till the end (as you wish)

# Transition to Using the Material Health Assessment Methodology Updates

# TRANSITION

## FOR VERSION 3.1 PRODUCT CERTIFICATIONS

Applies to both Cradle to Cradle certifications and Material Health Certificates

- Use of the updates to the Material Health Assessment Methodology will be **required** for all V3.1 assessment summary forms received on or after **1 January, 2022.** Before this date, the updates may optionally be used.
- The subject to review limit for monomers will remain at 1000 ppm under V3.1
- Use of the new Recycled Content Assessment Methodology will be optional for all V3.1 certifications (the prior method may be used under v3.1 including after 1 January)
- C2CPII will be updating the Material Health Assessment Methodology and V3.1 Guidance soon to integrate the changes.

# Material Health Assessment Methodology Updates

# PERSISTENCE & BIOACCUMULATION ENDPOINTS

**Prior**

- Prior P&B hazard cut-offs do not align with the REACH definition of a PBT or provide a method of identifying vPvBs.
- Because P&B do not factor into the overall assessment rating on their own (they are only considered along with other hazards), it's possible to have a vPvB substance at Gold or Platinum level.
- GREEN hazard cut-off for B is more conservative, and the GREEN hazard cut-off for P is less conservative than other references.

**Update**

- All cut-offs are now more closely aligned with REACH and GHS. GreenScreen was considered as well.
- There are new **PURPLE** hazard categories for P&B
- vPvBs are flagged through a combined PB flag
- If the combined PB hazard flag is **PURPLE** or **RED**, exposure must be assumed (except for a few unlikely scenarios) and the material will be **X-assessed**
- This means that vPvBs may not be used at Gold (some are also restricted at the V4.0 Silver level if SVHCs and at Bronze if on the RSL)

# PERSISTENCE: More Conservative

| GREEN | YELLOW | RED | PURPLE | GREY |
|---|---|---|---|---|
| **Version 3.1 Persistence Hazard Rating Criteria:** | | | | |
| T1/2 < 30/90 days in water/ soil or sediment;<br><br>Readily biodegradable (>70 % within 28 days) based on OECD guidelines (301);<br><br>Predicted to be readily biodegradable by QSAR results | 30/90 day < T1/2 < 60/180 days in water/ soil or sediment;<br><br>10% < DOC removal < 70% based on OECD guidelines (301)<br><br>10% < ThOD removal < 60% based on OECD guidelines (301)<br><br>Inherently biodegradable based on OECD guidelines (302, 304A);<br><br>Predicted to be degradable within weeks to months by QSAR | **T1/2 > 60/180 days in water/ soil or sediment**<br><br>DOC and ThOD removal < 10% based on OECD guidelines<br><br>Predicted to be recalcitrant by QSAR results. | Not Applicable | No relevant data for classification or substance is considered inorganic and not applicable |
| **Version 4.0 Persistence Hazard Rating Criteria:** | | | | |
| T1/2 < 16 days in water, soil or sediment (Still aligns with the GHS aquatic tox approach.)<br><br>T1/2 < 2 days in air (aligned with REACH) | 16 days ≤ T1/2 ≤40 days in fresh or estuarine water<br><br>16 days ≤ T1/2 ≤ 60 days in marine water<br><br>16 days ≤ T1/2 ≤ 120 days in fresh or estuarine water sediment or soil | 40 ≤ T1/2 ≤ 60 days in fresh or estuarine water.<br><br>note: there is no RED value for marine water. See PURPLE value.<br><br>120 ≤ T1/2 ≤ 180 days in fresh or estuarine water | **T1/2 > 60 in marine, fresh or estuarine water**<br><br>**T1/2 > 180 days in marine, fresh or estuarine water sediment or in soil**<br><br>(aligned with REACH 'vP' definition for vPvBs) | No change |

# BIOACCUMULATION: Less Conservative

| GREEN | YELLOW | RED | PURPLE | GREY |
|---|---|---|---|---|
| **Version 3.1 Bioaccumulation Hazard Rating Criteria:** | | | | |
| BCF/BAF < 100 by experimental or QSAR results if log Kow < 6 *or* log Kow < 2 *or* Molecular weight > 1000 | 100 < BCF/BAF ≤ 500 by experimental or QSAR results if log Kow < 6 | **BCF/BAF > 500 by** experimental or QSAR results if log Kow < 6 | Not Applicable | No relevant data for classification.<br><br>log Kow>2 and no additional information |
| **Version 4.0 Bioaccumulation Hazard Rating Criteria:** | | | | |
| BCF/BAF < 500 by experimental or QSAR results if log Kow < 6 *or* log Kow < 2 *or* Molecular weight > 1000<br><br>(aligned with GHS aquatic tox related values) | 500 ≤ BCF/BAF ≤ 2000 by experimental or QSAR results if log Kow < 6 | **2000 < BCF/BAF ≤ 5000** by experimental or QSAR results if log Kow < 6<br><br>(aligned with REACH 'B' definition for PBTs) | **BCF/BAF > 5000** by experimental or QSAR results if log Kow < 6.<br><br>(aligned with REACH 'vP' definition for vPvBs) | No change |

# PERSISTENCE & BIOACCUMULATION: Combined Hazard Flag

| Persistence Hazard Rating | Bioaccumulation Hazard Rating | Combined PB Hazard Flag |
|---|---|---|
| PURPLE | PURPLE | **PURPLE** |
| PURPLE | RED | **RED** |
| RED | PURPLE | **RED** |
| RED | RED | **RED** |
| GREY | RED or PURPLE | **RED** |
| RED or PURPLE | GREY | **RED** |
| GREY | GREY | **GREY** |

Any other combination of hazard ratings may formally be assigned a combined PB hazard flag of 'GREEN'. This means that the combined PB flag does not affect the overall assessment rating of a material unless it is PURPLE, RED, or GREY.

In addition, the hazard ratings for Persistence and Bioaccumulation factor into the combined aquatic toxicity flag, where they may lead to 'RED', 'YELLOW', or 'GREEN' ratings depending on the aquatic toxicity endpoints. A PURPLE rating may be treated as a RED rating when deriving the combined aquatic toxicity risk flag when employing the current table in the Material Health Assessment Methodology (page 69).

# CLIMATIC RELEVANCE ENDPOINT

**Prior**

- List based.
- Does not provide a method for identifying YELLOW or grey hazards. Substances receive either a GREEN or RED rating.

**Update**

- Provides a method of rating substances based on their Ozone Depletion Potential (ODP), Global Warming Potential (GWP), volatility, and chemical class (for organohalogens).
- For example: Some blowing agents that were previously GREEN will now fall in the YELLOW range, and volatile organohalogens without ODP or GWP data will be considered ‘grey’.

# CLIMATIC RELEVANCE ENDPOINT

| GREEN | YELLOW | RED | GREY |
|---|---|---|---|
| Not listed in Annexes to the Montreal Protocol, ODP = 0 and 100-yr GWP = 0<br><br>OR<br><br>Insufficient data to categorize as RED, YELLOW or GREEN based on the Montreal protocol, GWP and ODP. Substance is not volatile (i.e., boiling point is > 260 °C). | Not listed in Annexes to the Montreal Protocol, ODP = 0 and<br><br>0 < 100-yr GWP ≤ 10<br><br>OR<br><br>Insufficient data to categorize as RED, YELLOW or GREEN based on the Montreal protocol, GWP and ODP, substance is volatile (i.e., boiling point < 260 °C) but not a volatile organohalogen.<br><br>An organohalogen is any substance containing a fluorine, bromine, chlorine or iodine - carbon bond. | GHS Category 1: Listed in Annexes to the Montreal Protocol.<br><br>OR<br><br>ODP > 0 and/or 100-yr GWP > 10 | Insufficient data to categorize as RED, YELLOW or GREEN.<br>Substance is a volatile (i.e., boiling point < 260 °C) organohalogen.<br><br>Note: The Grey hazard rating is only relevant to volatile organohalogens that cannot be categorized as RED, YELLOW or GREEN due to lack of data. |

# ASSESSMENT OF EFFLUENT AND SLUDGE

**Prior**

- Assessment applies to product-relevant chemicals that enter the effluent.
- If a chemical with a RED or GREY hazard rating is above detection limits in the effluent it is x/grey assessed. If it is below detection, environmental exposure may be considered negligible.
- Issues: (1) The approach may be overly conservative in some cases (2) Hazardous chemicals may not be in the effluent, but are instead released with sludge or to air, which does not factor into the assessment. C-assessment possible when highly hazardous substances are disposed of with sludge or volatized to air.

**Update**

- Product relevant chemicals that enter **effluent, sludge**, or volatize from effluent/sludge are all in scope.
- Assessment is applied to each compartment that the chemical is expected to be present in (effluent, sludge, air) and the fate of sludge is considered (e.g., incineration, landfill, land applied).
- For effluent: Allowance to demonstrate that the chemical is present at safe levels based on objective limits (same as prior), predicted no effect concentrations, or whole effluent toxicity testing.
- Optional: If a chemical with a RED hazard is expected to be entering the effluent, sludge, and/or air it may be x-assessed without doing additional assessment work or analytical testing.

# ASSESSMENT OF POLYMERS

**Prior**

- The usual chemical subject to review limit (V3.1 and V4.0) is 100 ppm. However, under the prior method, the limit is 1000 ppm for monomers.
- Exposure assessment for monomers not permitted (except for the inhalation route of exposure).
- Issue: This approach is inconsistent with how other substances are assessed and may not be conservative enough because some monomers are highly hazardous.

**Update**

- Residual monomers and oligomers are subject to review at 100 ppm (or lower if the RSL limit is lower – e.g. vinyl chloride limit is 5 ppm or 1 ppm for certain applications – or if there is a lower SCL). Now only required under V4.0
- An exposure assessment may be conducted for all exposure routes (unless above the RSL limits). Reminder: exposure assessment only allowed for inhalation route under prior method. This will stay the same if applying the 1000 ppm subject to review limit under V3.1 certifications

# INHALATION EXPOSURE – V4.0

- Exposure Methodology (Use phase):

iii. **HH - Inhalation/ release of volatiles: Will volatile chemicals be unavailable for contact to occur during use?** The product is used exclusively outdoors. Definition of volatile for the purpose of this question: Boiling point is less than 240°C (the opposite of the threshold indicated in Step 1, point #5). Consider in the context of use stage temperatures.

**OR, Has the product passed the Cradle to Cradle Certified VOC testing requirement?**

- Under V4.0 there are 'low' and 'very low' categories of VOC emissions. Passing one of the 'very low' tests is required to assume negligible exposure via inhalation under V4.0.

# EXTERNALLY MANAGED COMPONENTS (EMCs)

EMCs: Parts where exposure isn't likely during use or end of use (because the part is fully enclosed and there is a fully managed/controlled recycling system with 'guaranteed take back'). Under these conditions it isn't necessary to fully define and assess all materials inside the part.

EMCs tend to be complex parts (e.g. electronics) that are likely to contain hazardous substances.

**Prior**

- Requirements do not ensure that parts are fully sealed or actively cycled.
- Not stringent enough to justify a pass on obtaining full material disclosure and assessing per the usual methods.

**Update**

- V4.0 Platinum level active cycling requirements apply (including to V3.1 certifications). *Actively cycle a minimum percentage of the ~~product's~~ EMC's materials based on the duration of the ~~product's~~ EMC's use phase.* For long use phase products where active cycling is not yet occurring (because they haven't been on the market long enough), only those Active Cycling requirements that CAN be met are mandatory. This is to 'implement a program to increase the cycling rate or quality of the product for its next use'
- Outdoor use products: IEC IP, NEMA rating or similar required to ensure parts are sealed.
- If less than 95% is returned, landfilling is assumed and leach testing is required.
- Assessment of externally managed components is now covered in the Material Health Assessment Methodology (rather than in the standard itself).

# Recycled Content Assessment Methodology

# RECYCLED CONTENT ASSESSMENT METHODOLOGY

**Prior**

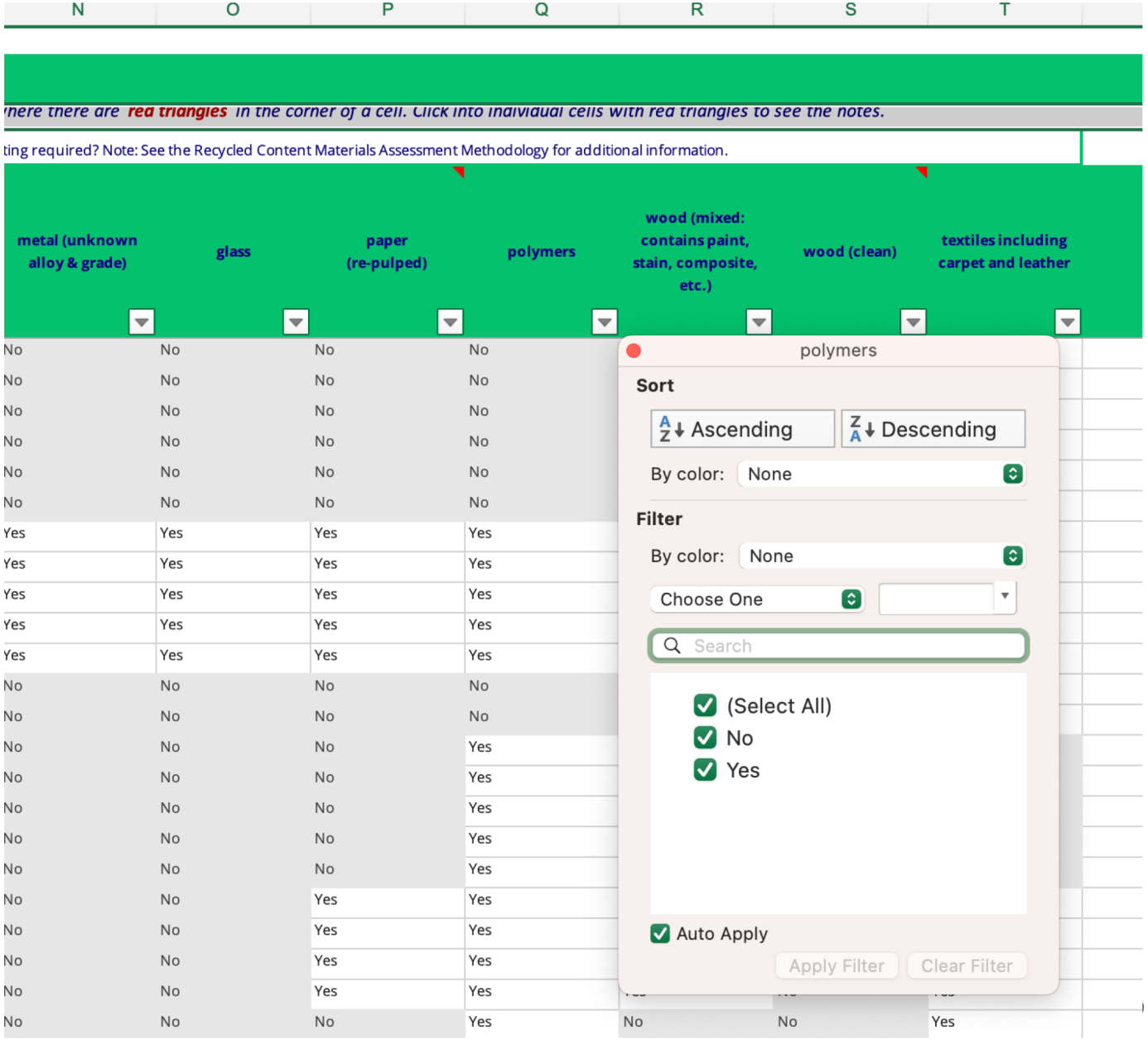
- Very precautionary. Difficult for post-consumer recycled materials to meet the Silver level Material Health requirements
- Reason for prior approach: In some cases, recycled content = reduced quality from a material health perspective. Did not want to encourage recycling to the detriment of material health.
- Issue: Prior method can discourage the use of recycled materials including when there is no trade-off.

**Update**

- Provides a stringent, yet feasible, pathway for post-consumer recycled content ('type 3' and 'type 4' materials per the prior method) to be used at Silver level and above.
- Includes a list of analytes to test for at V3.1 Basic/V4.0 Bronze and Silver levels to confirm compliance with the V4.0 RSL, organohalogen restrictions, and also the Candidate list (SVHCs). Lists based on worst case scenarios.
- Provides a method for reducing the list of analytes from those provided. Considerations: Historical use in applicable region, physical properties of substance, and processing conditions. NOTE: this was already done by C2CPII, but we were not able to take into consideration specific recycled material sources or age of material in the stream. Assessor experience – difficult to reduce further.
- Basic/Bronze testing is almost the same as prior (additional: arsenic and more metals for BNs)
- Test methods are not specified. Rely on ISO 17025 labs to determine appropriate methods given the analytes and limits. Note: Most limits are total concentration but some are leached amounts.

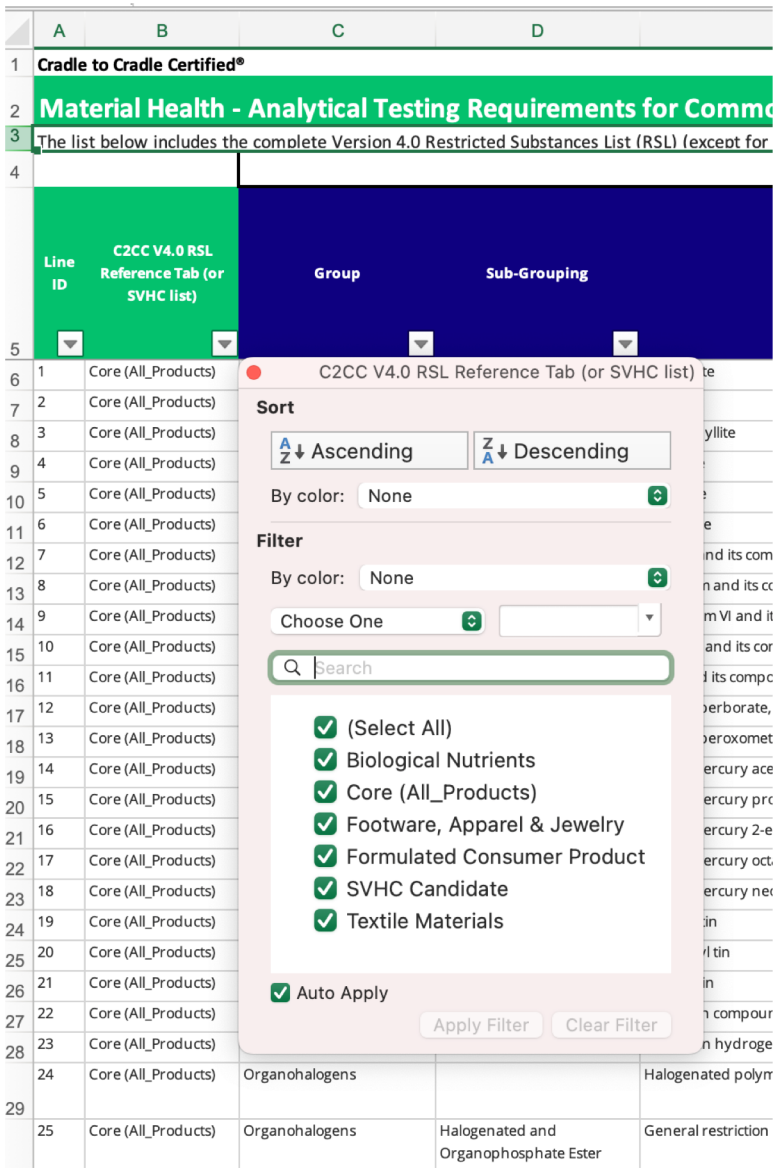
# RECYCLED CONTENT LIST OF ANALYTES: How-To

**1. Columns N-T**: Filter for “YES” in the column applicable to the recycled material stream. If the recycled content stream is post-consumer plastic, but you will be using the material in a textile, use the polymer column, not the textile column.



# RECYCLED CONTENT LIST OF ANALYTES: How-To

**2. Column B:** Filter out the RSL lists that are not applicable to the product type. EXCEPT do not filter out formulated consumer products. For example, if the recycling stream is a post-consumer plastic and the material/final product will not be used in textile, apparel, jewelry, or footwear, you can filter out the restricted substances on these RSL lists. In addition, you can filter out the biological nutrient list.

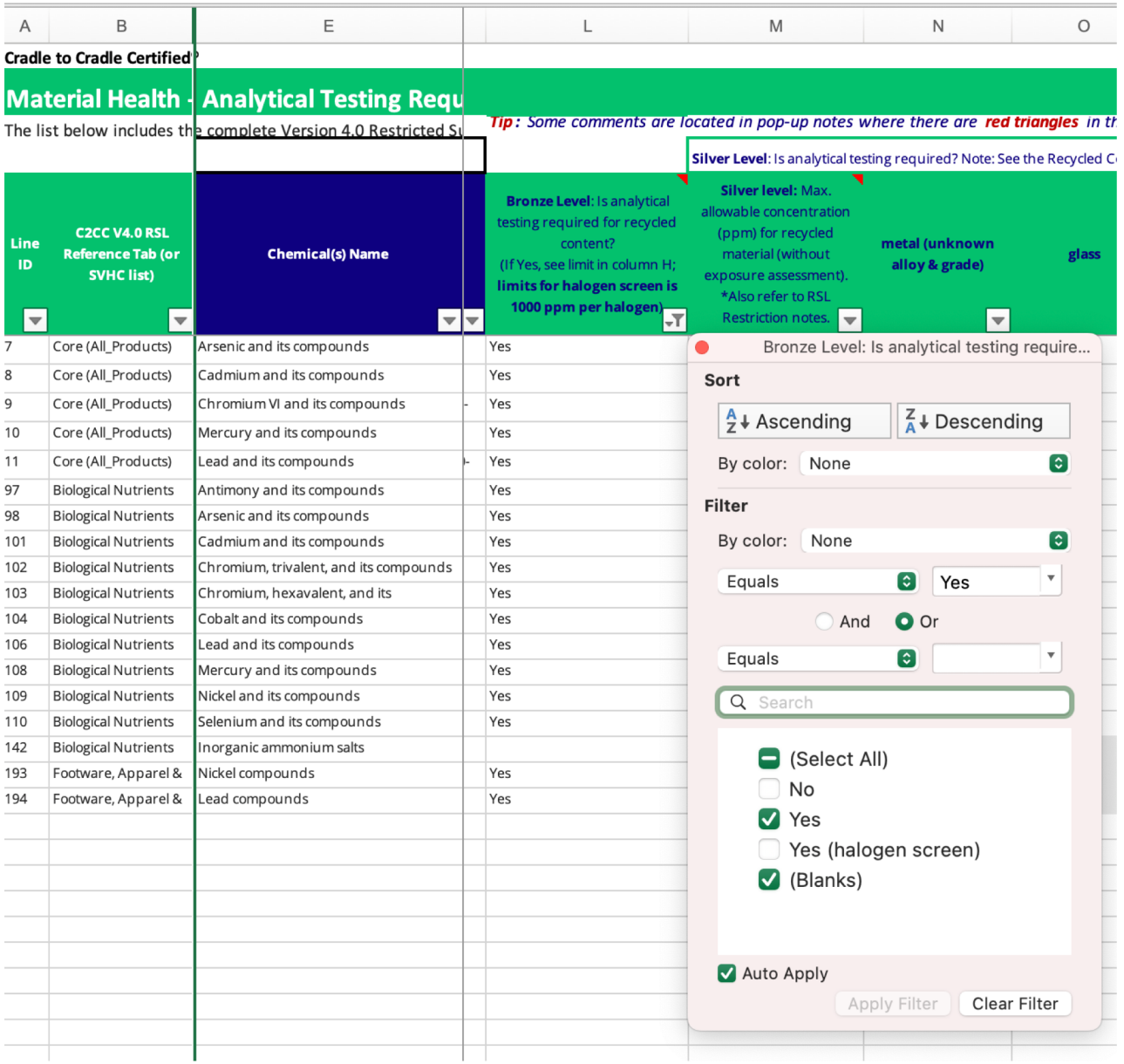


# RECYCLED CONTENT LIST OF ANALYTES: How-To

## Bronze Level

**3.** Decide if the applicant wants to apply at Bronze or Silver-Platinum. **If applying at Bronze, filter for 'Yes' in column L** to see what has to be tested for at Bronze. Bronze testing is for halogens (Br, Cl, F not I), metals and metalloids

There will be many organohalogens listed, but - these can all be covered by a halogen screen at Bronze. **Filter out 'Yes (halogen screen)' to see just the metals and metalloids.**



# RECYCLED CONTENT LIST OF ANALYTES: How-To

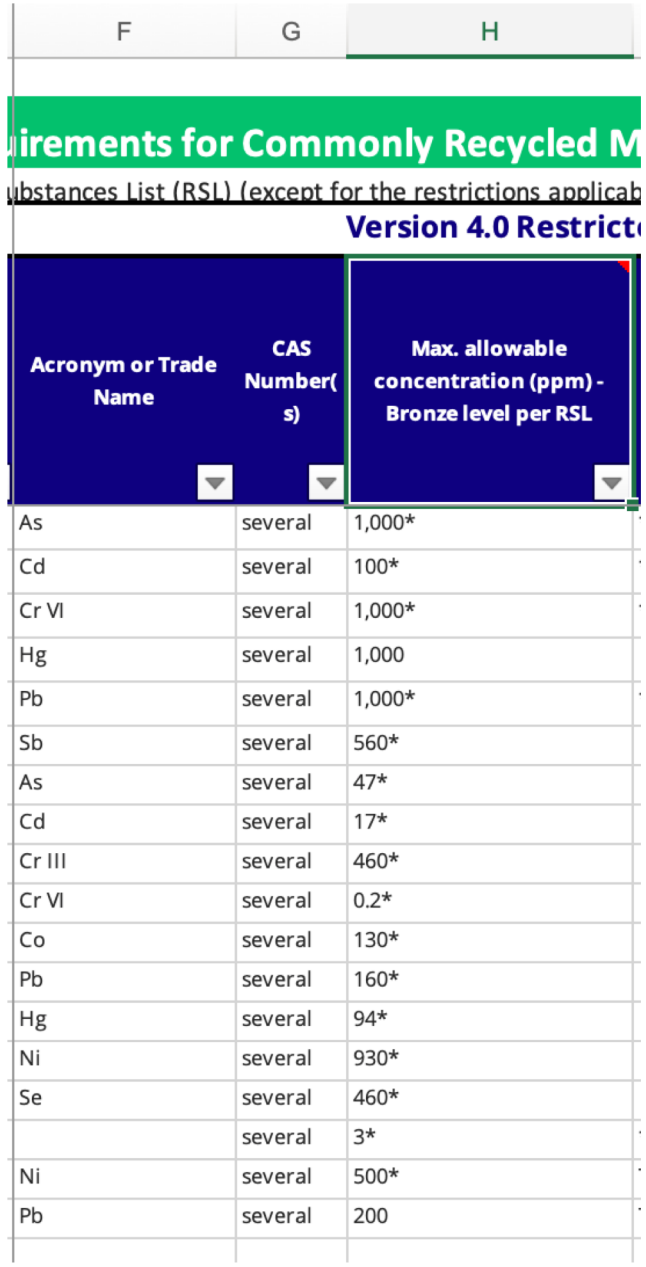
## Bronze Level

**4. Limits for metals are in column H** (these are directly from the RSL itself).

Be sure to also **check the restriction notes** because for some material types different limits and/or test types apply than those in column H (e.g. leach limits and tests for BNs)

**Limits for Br, Cl, F are 1000 ppm each for recycled content at Bronze.**

**(Silver: Test for Iodine too)**



| F | G | H |
|---|---|---|
| irements for Commonly Recycled M | | |
| ubstances List (RSL) (except for the restrictions applicab | | |
| Version 4.0 Restrict | | |
| **Acronym or Trade Name** | **CAS Number(s)** | **Max. allowable concentration (ppm) - Bronze level per RSL** |
| As | several | 1,000* |
| Cd | several | 100* |
| Cr VI | several | 1,000* |
| Hg | several | 1,000 |
| Pb | several | 1,000* |
| Sb | several | 560* |
| As | several | 47* |
| Cd | several | 17* |
| Cr III | several | 460* |
| Cr VI | several | 0.2* |
| Co | several | 130* |
| Pb | several | 160* |
| Hg | several | 94* |
| Ni | several | 930* |
| Se | several | 460* |
| | several | 3* |
| Ni | several | 500* |
| Pb | several | 200 |

# RECYCLED CONTENT LIST OF ANALYTES: How-To

## Bronze Level

For the Bronze level, the applicable restrictions for organohalogen substances of special concern are:

1. PFASs: Per- or polyfluoroalkyl substances are defined as fluorinated organic chemicals containing at least one fully fluorinated carbon atom. PFAS-based materials, including fluoropolymers and PFAS-coatings, are not permitted for use (except in exempt materials/parts as noted below). If present as an impurity or minor additive in an otherwise non-fluorinated organic material, carbon-bonded fluorine within PFASs in the material must be < 1,000 ppm of the homogeneous material by weight.
2. HFRs: Halogenated flame retardants are defined as any chlorinated or brominated substance added to a material for the purpose of increasing heat/fire resistance or decreasing flammability. In addition to the restrictions on specific HFRs on the RSL, carbon-bonded chlorine and bromine within any flame retardant in the material (intentionally added or present as an impurity) must be < 1,000 ppm of the homogeneous material by weight (except in exempt materials/parts as noted below).

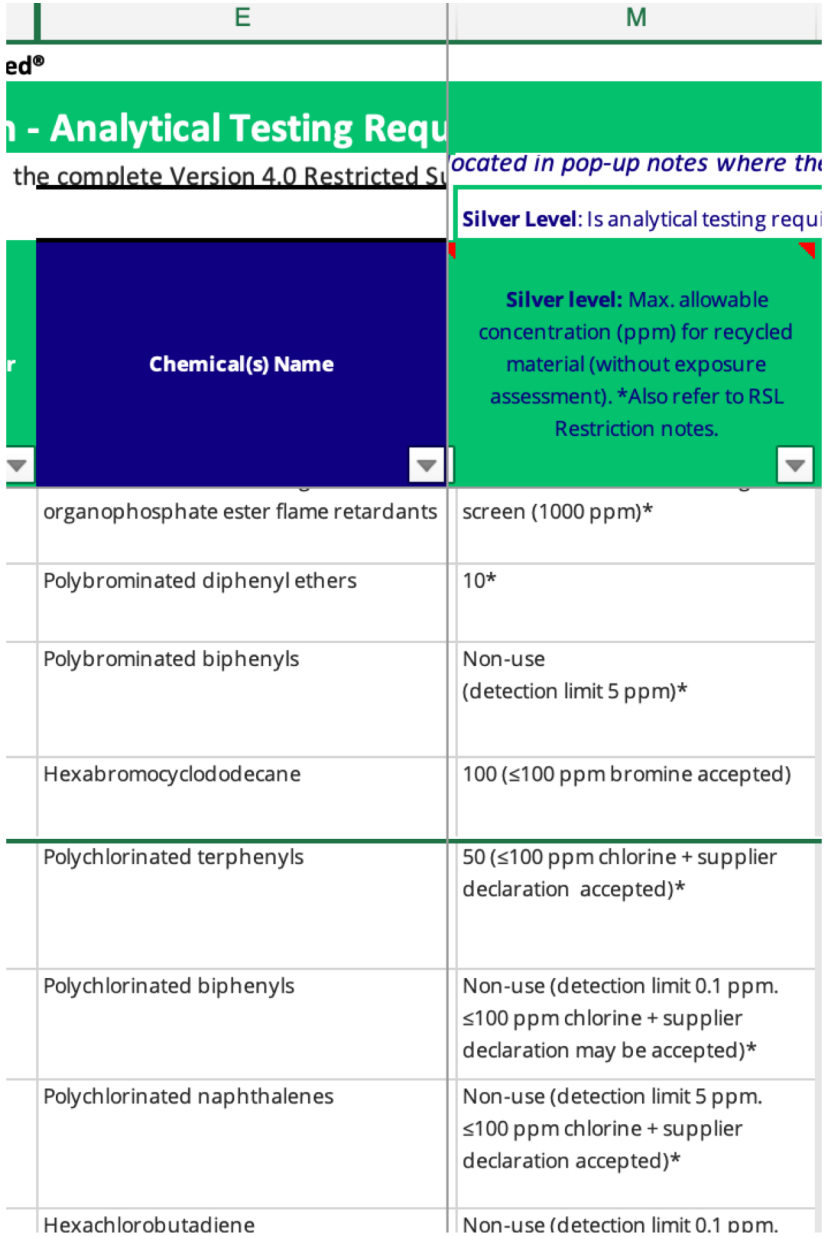
NOTE: The Bronze level halogen screen can miss many things. For example, organohalogen restriction #2 requires < 1000 ppm carbon bonded Br + Cl . Also, limits are much lower than 1000 ppm for some organohalogens on the RSL.

# RECYCLED CONTENT LIST OF ANALYTES: How-To

## Silver Level

**4. Limits are per column M.** If the RSL limit is >100 ppm, these limits will be 100 ppm. If RSL limit is < 100 ppm, then the RSL limit applies.

For most of the organohalogens with limits below 100 ppm, there is a note that says if a halogen screen shows the halogen to be < 100 ppm, then a supplier declaration can cover the difference. If there isn't a note like that in column M then you have to test for the substance specifically.



| E | M |
|---|---|
| ed® | |
| - Analytical Testing Requ | |
| the complete Version 4.0 Restricted Su | ocated in pop-up notes where the |
| | **Silver Level**: Is analytical testing requi |
| **Chemical(s) Name** | **Silver level:** Max. allowable concentration (ppm) for recycled material (without exposure assessment). *Also refer to RSL Restriction notes. |
| organophosphate ester flame retardants | screen (1000 ppm)* |
| Polybrominated diphenyl ethers | 10* |
| Polybrominated biphenyls | Non-use (detection limit 5 ppm)* |
| Hexabromocyclododecane | 100 (≤100 ppm bromine accepted) |
| Polychlorinated terphenyls | 50 (≤100 ppm chlorine + supplier declaration accepted)* |
| Polychlorinated biphenyls | Non-use (detection limit 0.1 ppm. ≤100 ppm chlorine + supplier declaration may be accepted)* |
| Polychlorinated naphthalenes | Non-use (detection limit 5 ppm. ≤100 ppm chlorine + supplier declaration accepted)* |
| Hexachlorobutadiene | Non-use (detection limit 0.1 ppm. |

# RECYCLED CONTENT ASSESSMENT METHODOLOGY

## RSL declarations

- **Silver level** testing alone may be used to verify RSL compliance for recycled content if the testing demonstrates that all of the applicable limits have been met. In this case, no RSL declaration is required.

- RSL declarations are required for any intentional inputs to the recycled content (including when full material disclosure has been obtained). This is true for all materials and for verification of RSL compliance in general (not just recycled material).

- If only the **Bronze level** testing has been conducted (i.e. the testing for metals and metalloids + halogen screen), an RSL declaration is required in addition to the testing.

# Discussion: Assessor Experience Applying the Recycled Content Assessment Methodology

**Suggestions? Challenges?**
**Labs you are having success with? Other?**

# Open Discussion and Q&A

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# THANK YOU