Indoor Air Quality Exposure Limits at Health Canada

Development and Use

Indoor Air Contaminants Assessment Section
Water and Air Quality Bureau
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Outline

• Indoor Air Program at Health Canada
• Prioritization of Indoor Air Contaminants
• Residential Indoor Air Quality Guidelines (RIAQG)
• Indoor Air Reference Levels (IARLs)
• Uses of risk assessment products
• Standards Development
Health Canada’s Indoor Air Program

MANDATE
“To promote and protect the health of Canadians by evaluating, researching, and communicating the health effects of indoor air contaminants, and to contribute to developing solutions for improving indoor air quality.”

Health Canada’s Indoor Air Program:
  - conducts risk assessments to better understand adverse health impacts of exposure to air pollution;
  - leads health research to understand exposure and health impacts in the Canadian context;
  - conducts outreach and engagement on indoor and outdoor air quality to communicate guidance and strategies to reduce exposure.
IACAS Risk Assessment Prioritization

Purpose: to identify, screen and rank indoor air contaminants for full assessment

- **Literature**
- **Research**
- **Partners**

**Develop List of Indoor Air Contaminants**

**Health-risk based prioritization**

- Recently published inhalation health effects data
- Canadian exposure data (e.g. Health Canada residential studies)

**Determine action for each priority contaminant**

- Consider data gaps, government priorities, stakeholder needs
- Possible outcomes include RIAQG, IARL, need for data, re-evaluation
Residential Indoor Air Quality Guidelines (RIAQGs) are voluntary objectives under the Canadian Environmental Protection Act (CEPA 1999)

- Contain calculated health-based exposure limits, using currently available scientific data
- Take into account highly exposed and susceptible populations
- Used to characterize risk and provide scientific basis for risk mitigation recommendations to reduce exposure and/or protect health
Risk Assessment (RIAQG)

1. Priority Contaminant
2. Hazard Assessment
3. Dose-Response Assessment
4. Exposure Assessment
5. Research
6. Feasibility
7. RfC/RSC
8. Risk Characterization
9. Guideline Value

Key steps:
- Sources: Indoor concentrations
- Literature-based Key Health Endpoints
- RfC/RSC
- Health risk: Higher likelihood of health risk, Health risk less likely
- Exposure limit

Risk Characterization:
- Higher likelihood of health risk
- Health risk less likely
Guidelines and Guidance for Indoor Air Contaminants

Guidelines
- Acetaldehyde (2017)
- Acrolein (2021)
- Carbon Dioxide (2021)
- Carbon Monoxide (2006)
- Formaldehyde (2006)
- Naphthalene (2013)
- Nitrogen Dioxide (2015)
- Ozone (2010)
- Radon
- Toluene (2011)
- Xylenes (2022)

Guidance
- Benzene (2013)
- Fine Particulate Matter (PM$_{2.5}$) (2012)
- Mould (2007)
Indoor Air Reference Levels (IARLs)

- Supplement to RIAQGs
- **Evaluation of inhalation Toxicological Reference Values** (TRVs) and hazard assessments from other jurisdictions
- Include **cancer and non-cancer endpoints**
- Regularly updated
- Advantages
  - Rapid screening
  - May be used for establishing product emission standards
- Limitations
  - Not Health Canada risk assessments
  - Only chronic endpoints
<table>
<thead>
<tr>
<th>IARLs</th>
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<tbody>
<tr>
<td>Chloroform</td>
<td>1,3-Butadiene</td>
<td>Methyl ethyl ketone</td>
<td></td>
</tr>
<tr>
<td>Cyclohexane</td>
<td>1,4-Dichlorobenzene</td>
<td>Methyl isobutyl ketone</td>
<td></td>
</tr>
<tr>
<td>Dichloromethane</td>
<td>2-Butoxyethanol</td>
<td>Propionaldehyde</td>
<td></td>
</tr>
<tr>
<td>Epichlorohydrin</td>
<td>2-Ethoxyethanol</td>
<td>Propylene oxide</td>
<td></td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>3-Chloropropene</td>
<td>Styrene</td>
<td></td>
</tr>
<tr>
<td>Ethylene oxide</td>
<td>Acetone</td>
<td>Tetrachloroethylene</td>
<td></td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>Aniline</td>
<td>Toluene diisocyanate</td>
<td></td>
</tr>
<tr>
<td>Isopropylbenzene</td>
<td>Carbon tetrachloride</td>
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</tbody>
</table>

*Updated as RIAQGs: Acrolein, Acetaldehyde, Xylenes*
Uses for our Risk Assessment Products

• Communication and outreach products
  – Risk mitigation strategies to reduce exposure for people who live in Canada

• Guidance for public spaces and air health issues
  – Monitoring and response framework
  – Triggers for action (e.g., ventilation schedules in ice arenas)

• RIAQGs/IARLs as benchmarks for RAs within the federal, provincial and territorial governments

• Inform research priorities
  – Identify susceptible and highly exposed people
  – Testing of risk mitigation strategies

• Building codes and product standards
Standards Development: Formaldehyde

- Consistent with CARB (ATCM) 93120
- Testing in accordance with ASTM E1333 or ASTM D6007
- Health Canada included in Technical Committee

- Long-term guideline value from RIAQG for formaldehyde was the basis for maximum allowable chamber concentrations
- Exposure studies and emission testing supported the potential benefit
- CSA standard was the foundation of the Formaldehyde Emissions from Composite Wood Products Regulations (enacted 2021)
Other standards

Carbon Monoxide Alarms

• Inclusion of low-level CO display, with action recommendations that align with RIAQG
• Follow-up included infographics and Detect to Protect retail campaign

Electrostatic Air Cleaners

• RIAQG for Ozone (20 ppb) included as a recommendation to reduce exposure *(unable to meet health-based guideline)*
• Follow-up included Choosing A Portable Air Purifier
For More Information

• Health Canada’s Residential Indoor Air Quality Guidelines

• Subscribe to HC air mailing list:
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