Exposure and Hazard Driven Prioritization for Evaluation of Chemicals in Canadian Drinking Water

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Acknowledgments

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Federal-Provincial-Territorial Committee on Drinking Water (FPT-CDW)
Guidelines for Canadian Drinking Water Quality

• Collaboration with FPT-CDW
• Microbiological indicators
• Chemicals & radiological parameters likely to be found:
  – in a large number of Canadian drinking water supplies
  – at levels that could lead to adverse health effects in humans
• Contains key exposure, health, analytical & treatment information to develop a maximum acceptable concentration for a substance in drinking water
• Used by provinces & territories to establish their own requirements
Which Substances Have The Highest Priority For Guideline Development?

Micro Indicators

Rolling revision
Prioritization of Chemical Contaminants

1. Data gathering

Includes input from FPTs, new science, existing priorities, international activities, emerging contaminants, monitoring data, pesticide sales, and other data

2. Triage

3. Health-based list

Exposure & Hazard using RISK21 Framework & incorporating NAMs

4. Priority assessment groups
RISK21 Framework: Triage Information & Develop Health-based Priority List

1. Problem Formulation
2. Exposure & Toxicity Input
   - Tier 1
   - Tier 2
   - Tier 3
   - Tier 4
3. Risk Plot
4. Decision
   - Enough precision to make a decision?

Exposure & Toxicity Input:
- High priority
- Low priority

Risk Plot:
- Toxicity range
- Exposure range
- Refine

Increasing refinement, resource, & time
1. Problem Formulation

**Purpose:** priority setting for further evaluation

**Scenario:**
- 421 chemicals potentially present in DW
- Varying amount of prior knowledge (properties, exposure & toxicity). Third party analysis of hazard
- Make decision using available info before more resource intensive info

**Exposure:**
- Lifetime drinking water, standard exposure values (worst case when necessary)
- Healthy Canadian population

**Decision point:** MOE set at 1:100 (conservative, since hazard values already incorporate factors of uncertainty)
2. Tiered Exposure & Hazard Assessments

Published exposure & toxicity information was provided in a report by Sanexen (2018). \(^1\)US EPA Chemistry dashboard (Wamaugh et al., 2014 Environ Sci Technol 48). \(^2\)mg/kg bw per day were converted to mg/L assuming 70kg bw, 1.5L/day water intake, assuming 100% drinking water allocation for worst-case scenario situation. \(^3\)Assuming 70kg bw, 1.5L/day water intake, 0.2 allocation factor and 10\(^{-6}\) cancer risk.
3. Risk Plot: “Enough precision to make a decision”? 
4. Decision or Refine with Additional Data from Next Information Tier?

- **421 Chemicals (RISK21: Tier 1)**
- **145 Chemicals (RISK21: Tier 2)**
- **91 Chemicals (RISK21: Tier 3)**
- **69 Chemicals**
  - Wait need data → Tier 4

**Flow Diagram:**
- 290 Chemicals Low Priority
  - (7) 274 Chemicals
  - (47) Chemicals
  - (9) Chemicals
- 62 Chemicals High Priority
  - (2) Chemicals
  - (13) Chemicals
Prioritization of Chemical Contaminants

1. Data gathering

2. Triage

3. Health-based list

Exposure & Hazard using RISK21 Framework

4. Priority assessment groups
1: Risk assessment group 1. 21 chemicals
2 & 3: Risk assessment group 2. 24 chemicals
4. Risk assessment group 3. 6 chemicals \(\rightarrow\) Tier 4

“High” health-based priority list

Health-based “wait” list
Next Steps & Initiatives

• Finalize & publish the priority list & methodology
• Re-adjust priorities as needed to reflect new important information as it becomes available
• Continue a proactive approach on chemical priorities
  – Track exposure levels/monitoring program from main agencies (e.g., ECCC)
  – Track international activities/updates on human health risk assessments
Thank you

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