

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

Ivy Moffat, PhD - ivy.moffat@canada.ca

Water Quality Division,
Healthy Environments & Consumer Safety Branch
Health Canada

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Acknowledgments

Chemical Assessment

Jenny Carney, Sambina Bevilacqua, Shobie Lung, Sarah Labib, Richard Charron, Richard Carrier

Analytical & Treatment

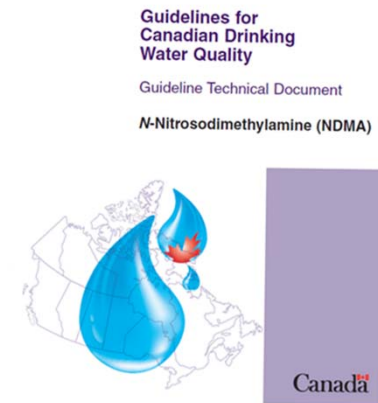
Judy MacDonald, Paula Osborne, Nadia Martinova, France Lemieux, Richard Charron

Federal-Provincial-Territorial Committee on Drinking Water (FPT-CDW)

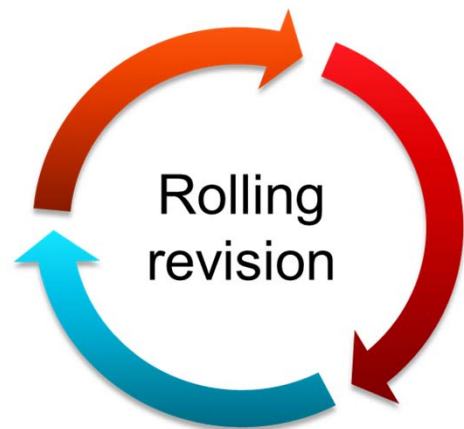


Guidelines for Canadian Drinking Water Quality

- 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



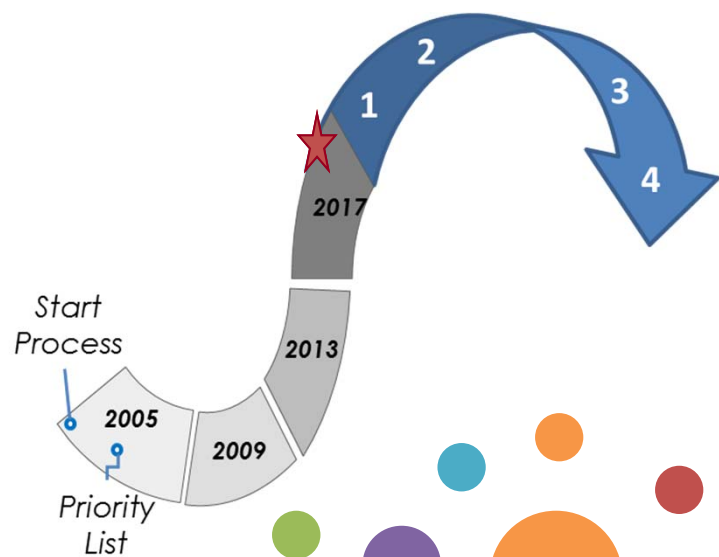
Which Substances Have The Highest Priority For Guideline Development?



Micro Indicators

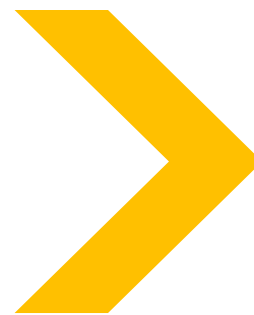


Prioritization of Chemical Contaminants



1. Data gathering

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



2. Triage

Exposure & Hazard using RISK21 Framework & incorporating NAMs

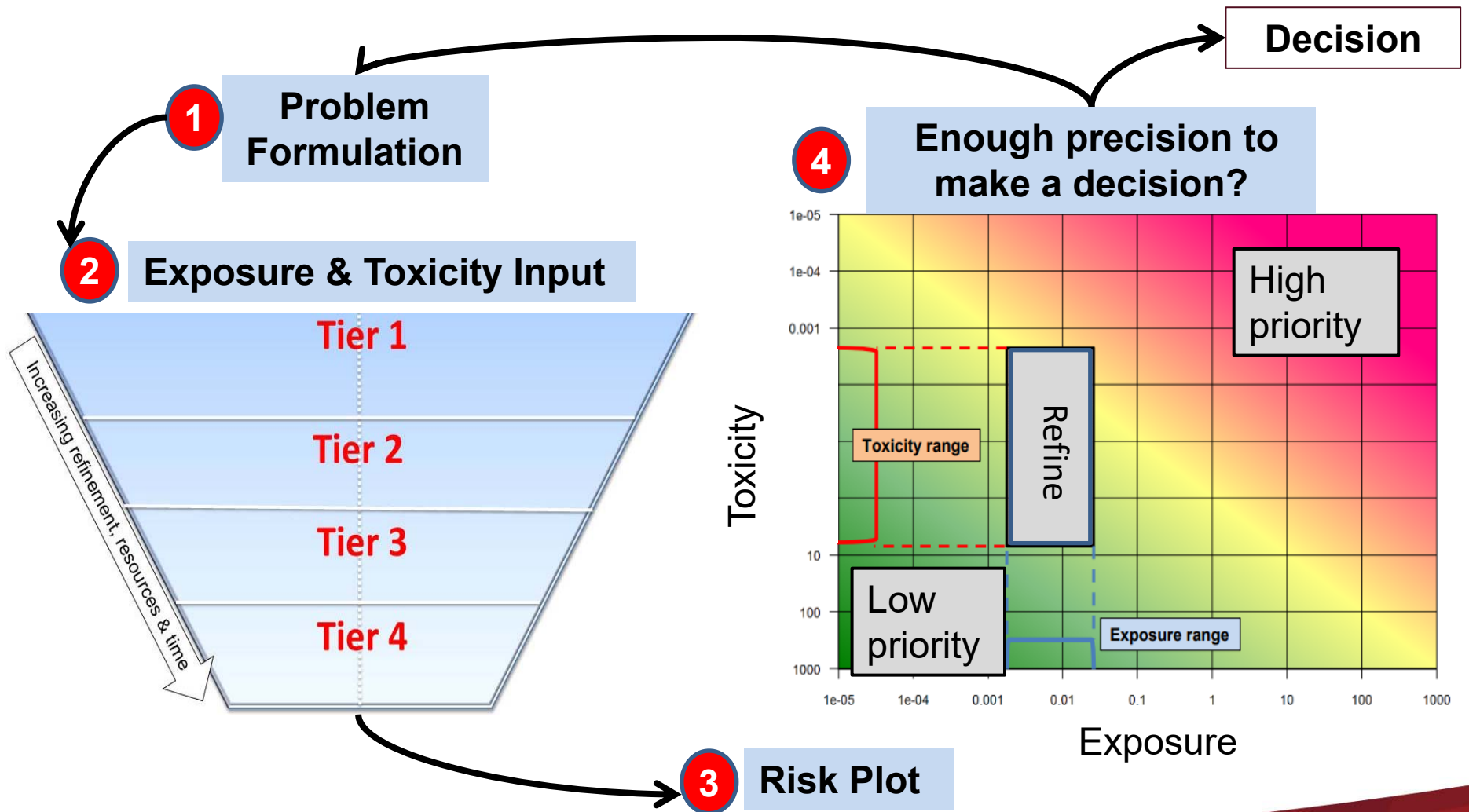


3. Health-based list



4. Priority assessment groups

RISK₂₁ Framework: Triage Information & Develop Health-based Priority List



1. Problem Formulation

Purpose: priority setting for further evaluation

Scenario:

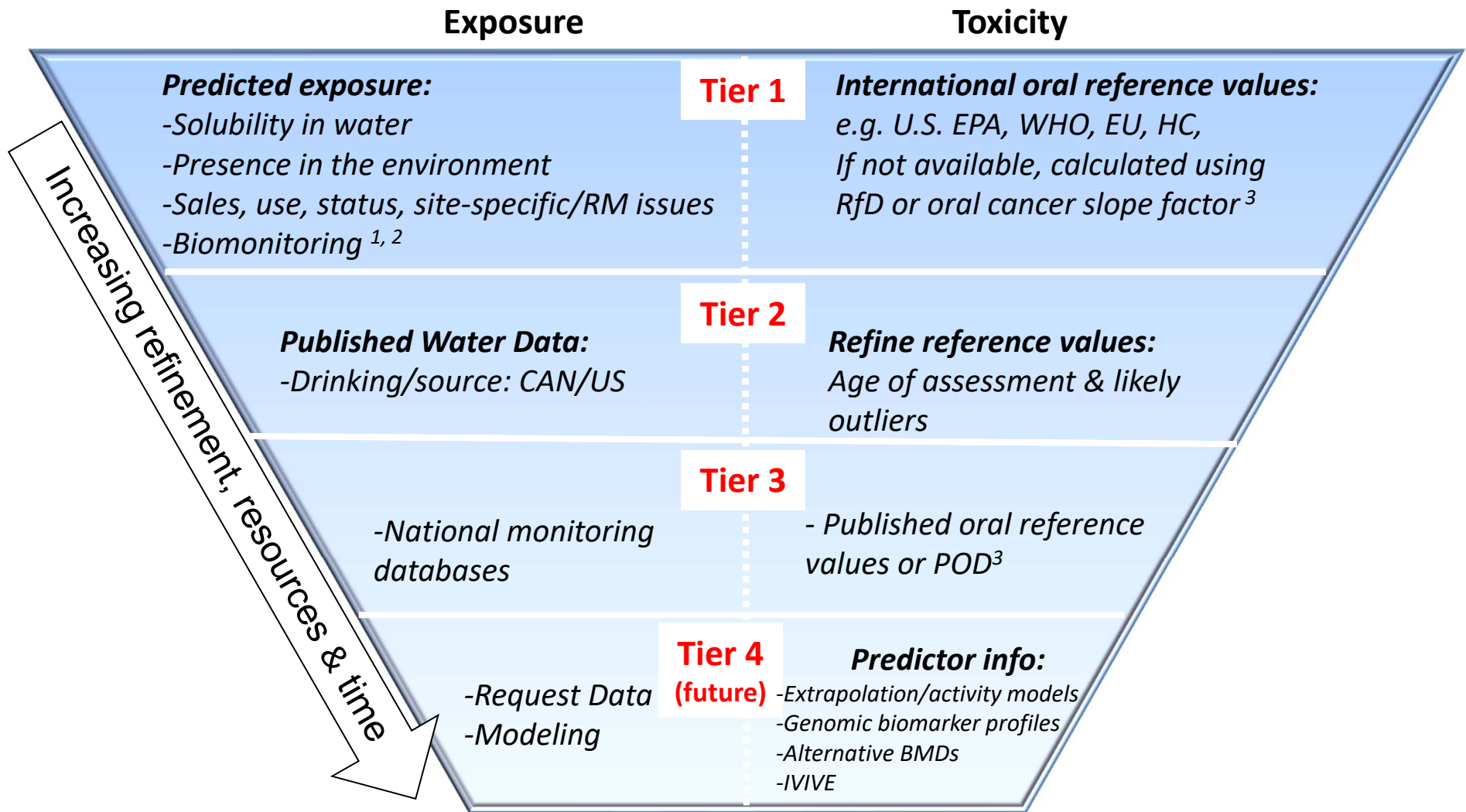
- 421 chemicals potentially present in DW
- Varying amount of prior knowledge (properties, exposure & toxicity). Third party analysis of hazard
- Make decision using available info before more resource intensive info

Exposure:

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

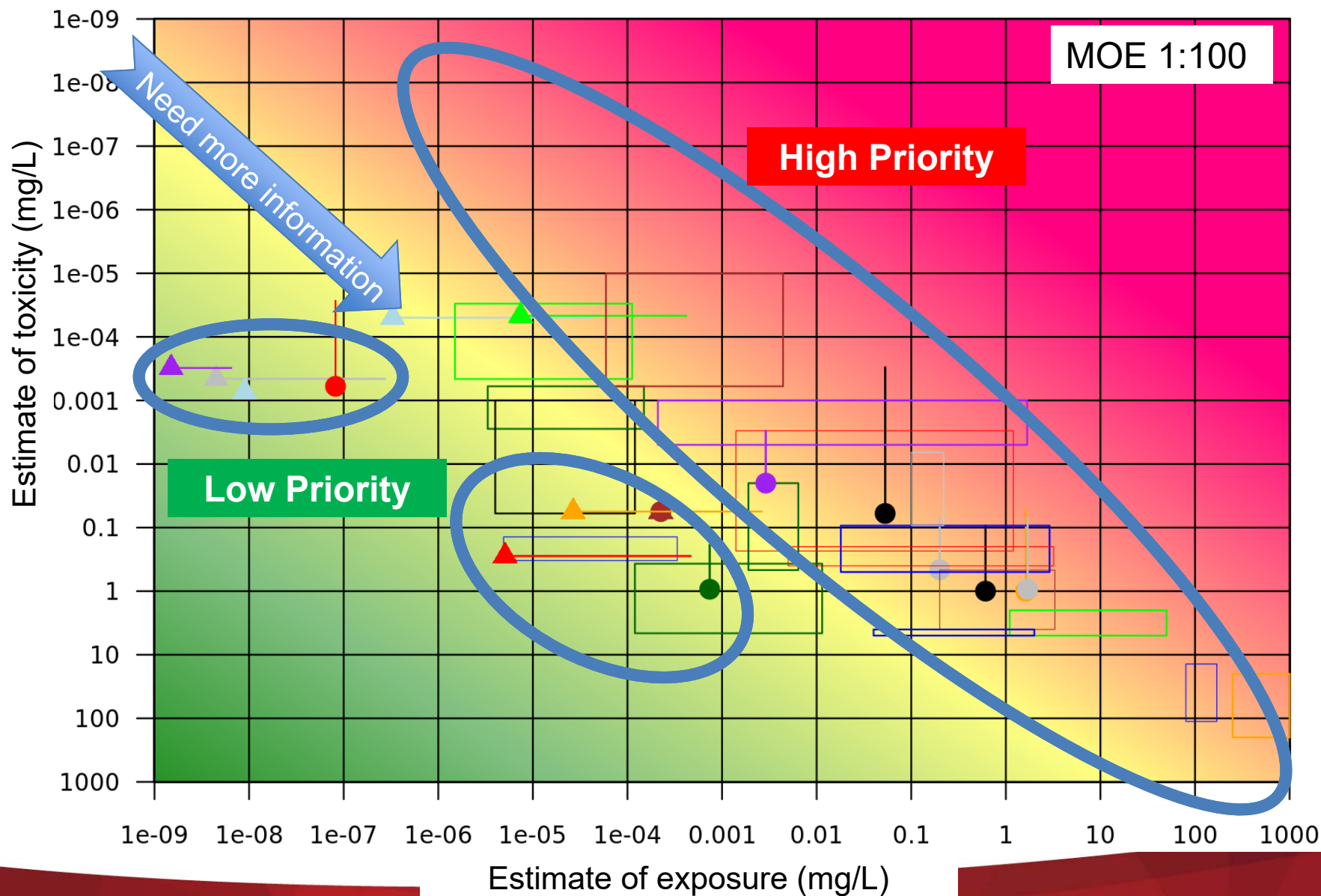
Decision point: MOE set at 1:100 (conservative, since hazard values already incorporate factors of uncertainty)

2. Tiered Exposure & Hazard Assessments

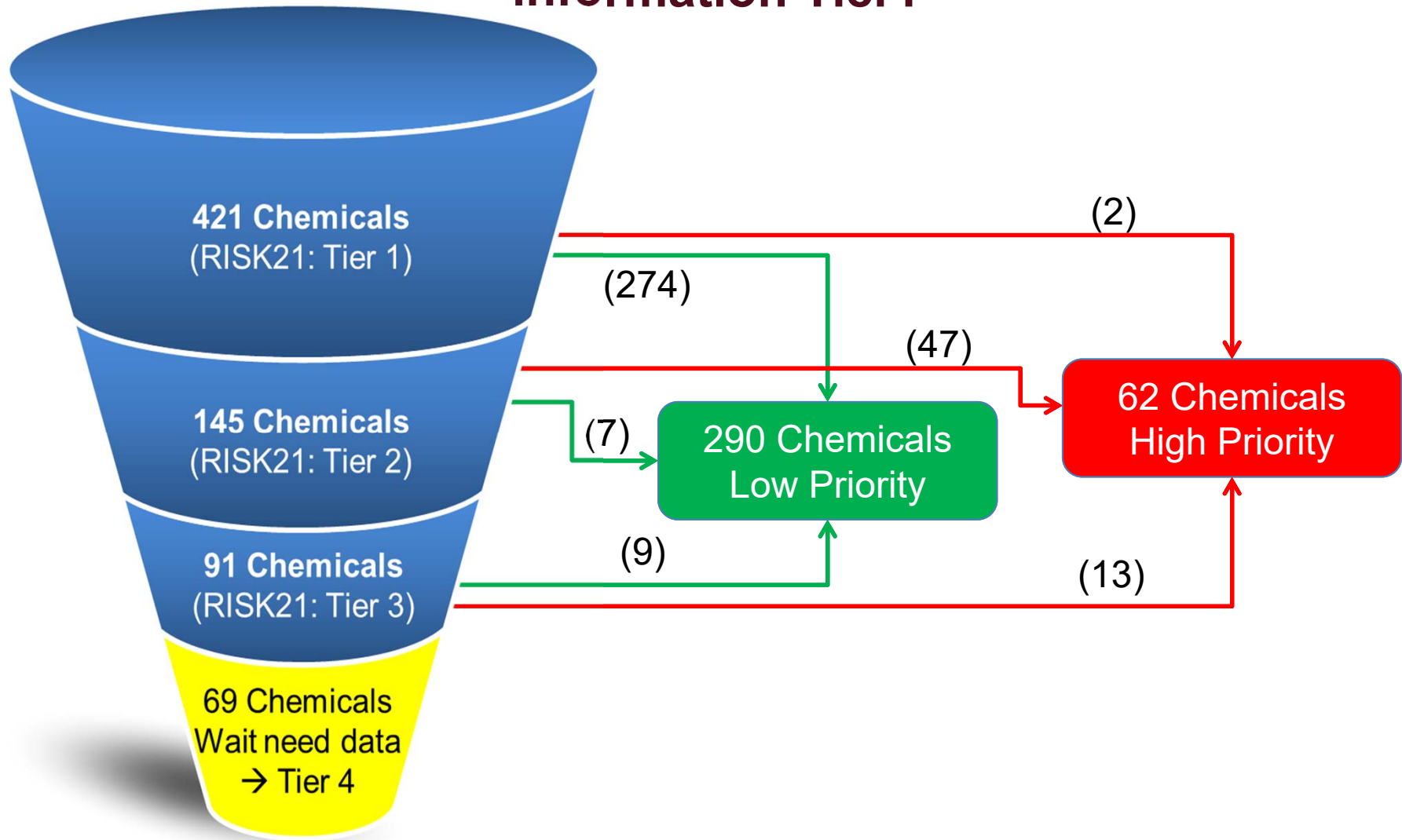


Published exposure & toxicity information was provided in a report by Sanexen (2018). ¹US EPA Chemistry dashboard (Wamaugh et al., 2014 Environ Sci Technol 48). ²mg/kg bw per day were converted to mg/L assuming 70kg bw, 1.5L/day water intake, assuming 100% drinking water allocation for worst-case scenario situation. ³Assuming 70kg bw, 1.5L/day water intake, 0.2 allocation factor and 10⁻⁶ cancer risk.

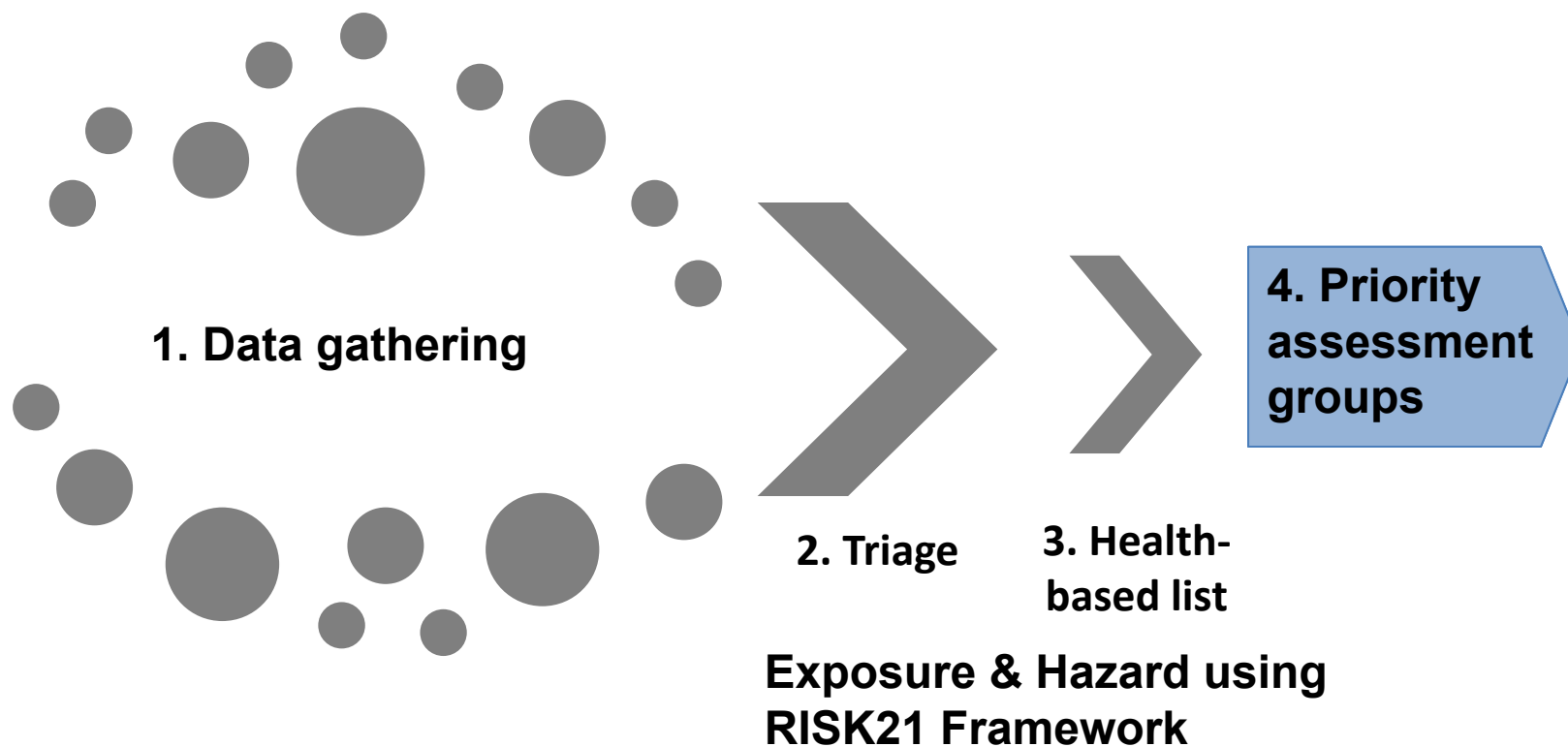
3. Risk Plot: “Enough precision to make a decision”?



4. Decision or Refine with Additional Data from Next Information Tier?

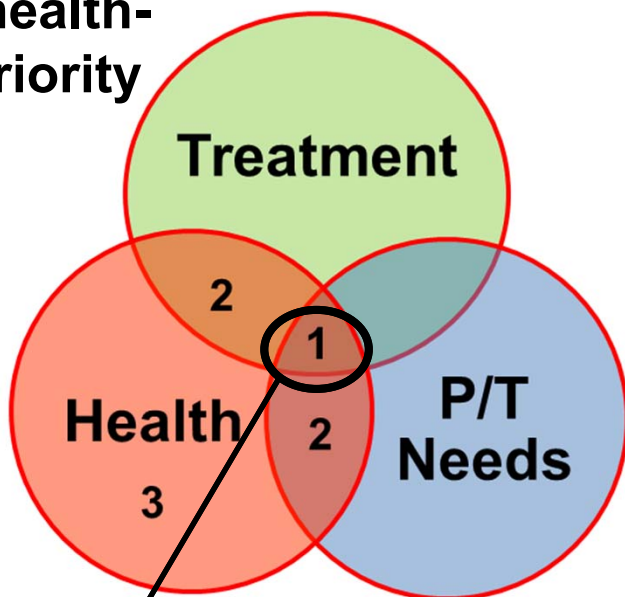


Prioritization of Chemical Contaminants

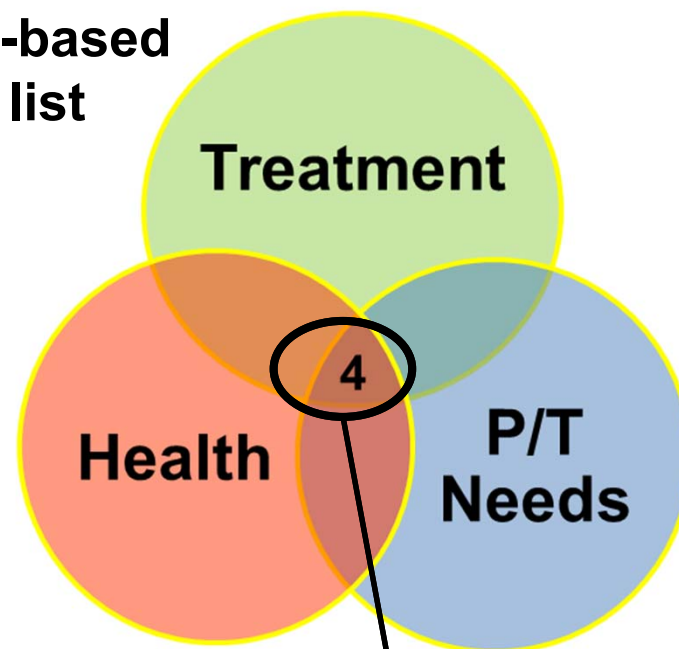


Priority Chemical Assessment Groups

“High” health-based priority list



Health-based “wait” list

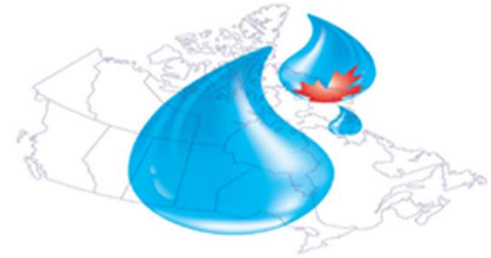


1: Risk assessment group 1.
21 chemicals

2 & 3: Risk assessment group 2.
24 chemicals

4. Risk assessment group 3.
6 chemicals → Tier 4

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

Ivy Moffat

ivy.moffat@canada.ca

<https://www.canada.ca/en/health-canada/topics/health-environment/water-quality-health.html>



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Prioritization Process: Systematic, Scientific, Internationally Harmonized & Transparent



Problem formulation-based



Enough precision to make the decision: tiering system
Approach for data poor chemicals



Flexible, “fit for purpose” (use in priority setting & in assessments of chemical groups)



Faster & efficient use of resources



Toxicity & exposure to inform decision
(exposure considered earlier in the process)



Visual & transparent Risk communication to stakeholders



Resources for Exposure Estimates

Solubility in water:

- ❑ pubchem.ncbi.nlm.nih.gov

Sales, use, status:

- ❑ canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/corporate-plans-reports/pest-control-products-sales-report-2014.html
- ❑ canada.ca/en/health-canada/services/chemical-substances/inventory-updates.html
- ❑ epa.gov/pesticides
- ❑ syngentacropprotection.com/cropmain.aspx#
- ❑ agropages.com/agrodata/

Biomonitoring:

- ❑ comptox.epa.gov/dashboard. Wamaugh et al. (2014), NHANES; CHMS

Resources for Source & Drinking Water Data

- canada.ca/en/environment-climate-change/services/water-overview.html
- ccme.ca/en/resources/canadian_environmental_quality_guidelines/
- environnement.gouv.qc.ca/
- ontario.ca/data/drinking-water-surveillance-program
- gov.mb.ca/waterstewardship/water_info/wsf/index.html
- mae.gov.nl.ca/waterres/cycle/groundwater/well/index.html
- maps.gov.nl.ca/water/reports/adhoc.aspx
- novascotia.ca/nse/water/waterquality.natural.water.contaminants.asp
- bcwatertool.ca/
- saskwater.com/media/publications.php?page=54

International Sources

- rivm.nl/bibliotheek/rapporten/711701092.pdf
- ephtracking.cdc.gov/showWaterLandingSolution.action
- atsdr.cdc.gov/
- [TSCA CDR - US EPA](#)
- epa.gov/tsca-inventory/about-tsca-chemical-substance-inventory
- epa.gov/assessing-and-managing-chemicals-under-tsca
- epa.gov/dwstandardsregulations
- usgs.gov/centers/dakota-water
- cida.usgs.gov/quality/rivers/home
- waterdata.usgs.gov/nwis/
- usgs.gov/mission-areas/water-resources/science/national-water-quality-assessment-nawqa?qt-science_center_objects=0#qt-science_center_objects
- deq.utah.gov/drinking-water/monitoring-reporting-program
- anses.fr/en