2026 Contaminants of Emerging Concern Annual Meeting Summary

Slide 1: 2026 Contaminants of Emerging Concern Annual Meeting

Slide Text and Image Description

Image: photograph of blue body of water, rippling waves, features reflecting sun

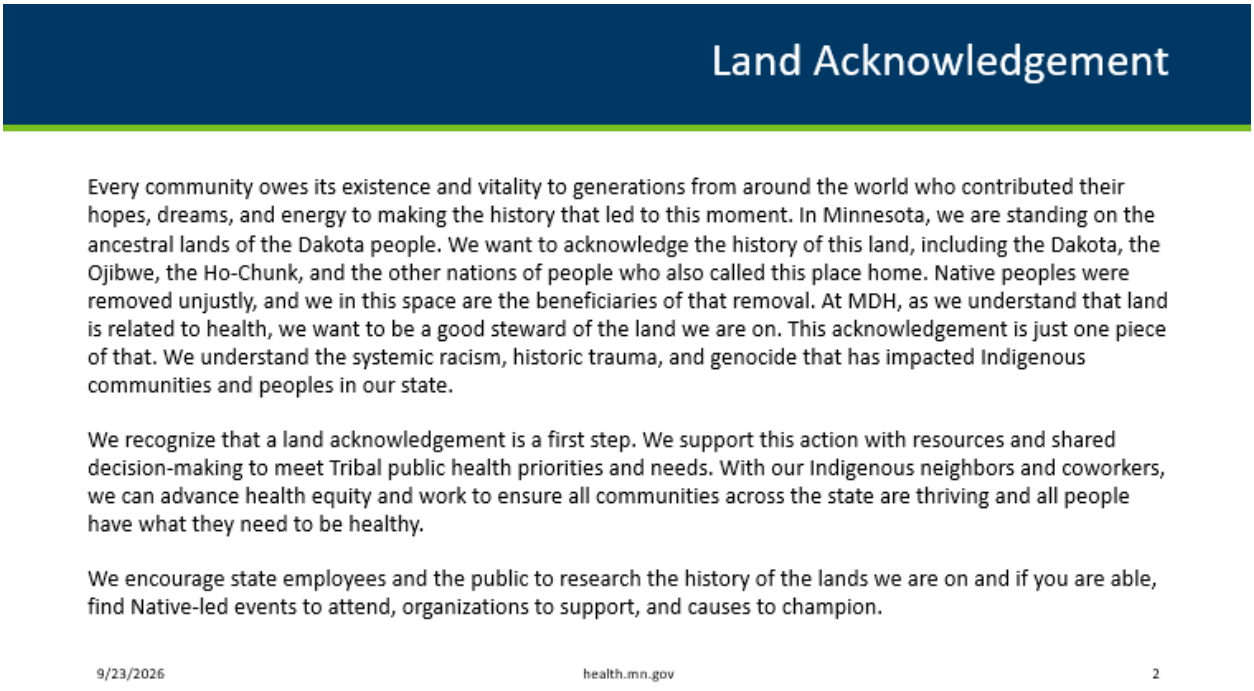
Logo: Minnesota Department of Health

Text:

Health Risk Assessment Unit

Contaminants of Emerging Concern Website (https://www.health.state.mn.us/communities/environment/risk/guidance/dwec/index.html)

Slide 2: Land Acknowledgment



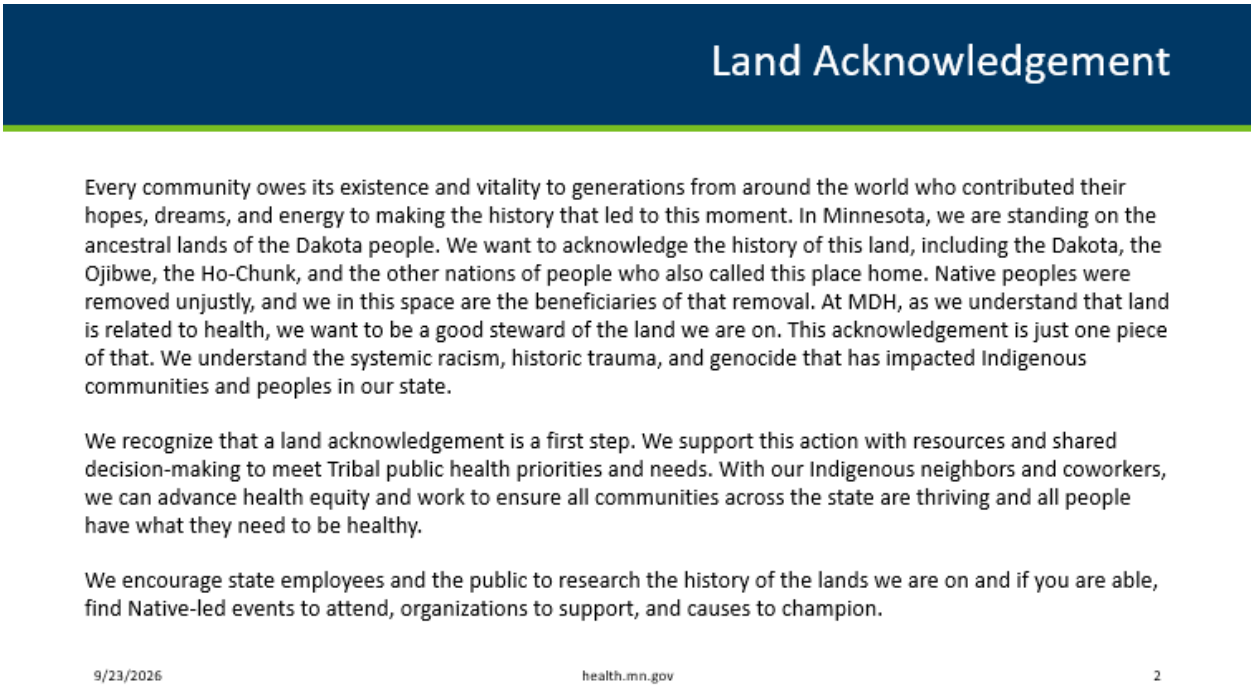
Slide Text and Image Description

Every community owes its existence and vitality to generations from around the world who contributed their hopes, dreams, and energy to making the history that led to this moment. In Minnesota, we are standing on the ancestral lands of the Dakota people. We want to acknowledge the history of this land, including the Dakota, the Ojibwe, the Ho-Chunk, and the other nations of people who also called this place home. Native peoples were removed unjustly, and we in this space are the beneficiaries of that removal. At MDH, as we understand that land is related to health, we want to be a good steward of the land we are on. This acknowledgement is just one piece of that. We understand the systemic racism, historic trauma, and genocide that has impacted Indigenous communities and peoples in our state.

We recognize that a land acknowledgement is a first step. We support this action with resources and shared decision-making to meet Tribal public health priorities and needs. With our Indigenous neighbors and coworkers, we can advance health equity and work to ensure all communities across the state are thriving and all people have what they need to be healthy.

We encourage state employees and the public to research the history of the lands we are on and if you are able, find Native-led events to attend, organizations to support, and causes to champion.

Slide 3: Tribal-State Relations Statement

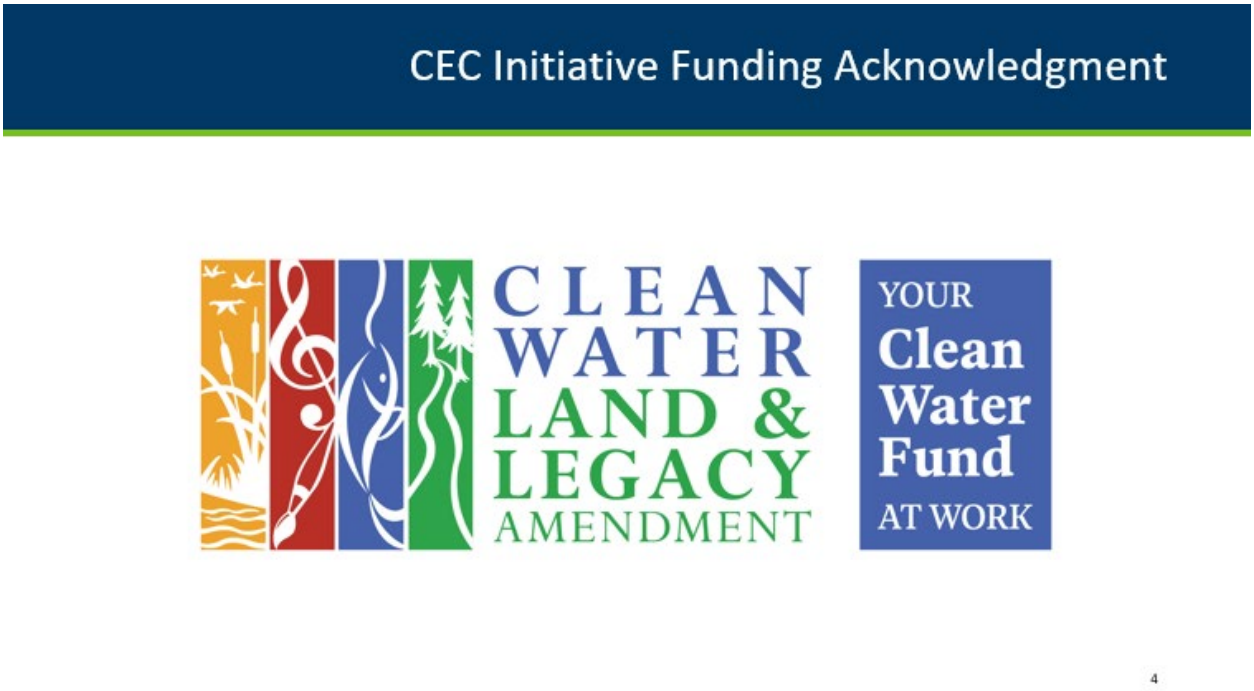


Slide Text and Image Description

The State of Minnesota is home to 11 federally recognized Indian Tribes with elected Tribal government officials. The State of Minnesota acknowledges and supports the unique political status of Tribal Nations across Minnesota and their absolute right to existence, self-governance, and self-determination. This unique relationship with federally recognized Indian Tribes is cemented by the Constitution of the United States, treaties, statutes, case law, and agreements. The State of Minnesota and Tribal governments across Minnesota significantly benefit from working together, learning from one another, and partnering where possible.

The Minnesota Department of Health recognizes, values, and celebrates the vibrant and unique relationships between the 11 Tribal Nations and the State of Minnesota. Partnerships formed through government-to-government relationships with these Tribes will effectively address health disparities and lead to better health outcomes for all of Minnesota.

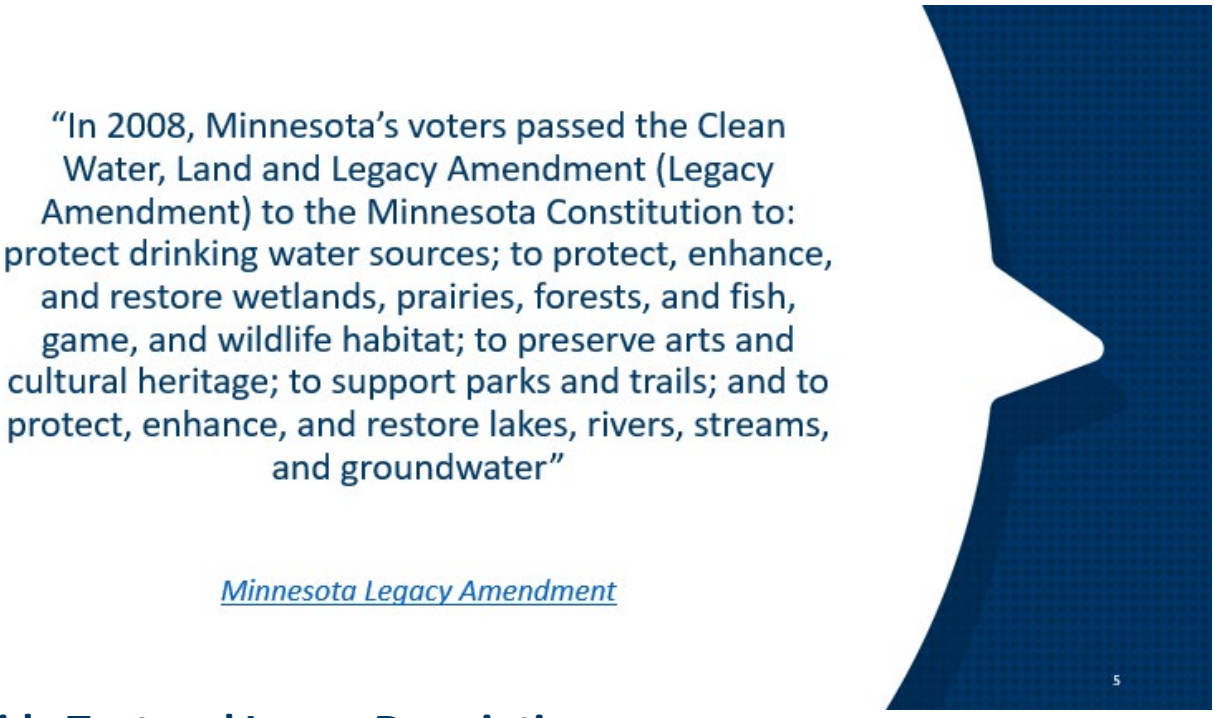
Slide 4: CEC Initiative Funding Acknowledgment



Slide Text and Image Description

Image: Clean Water Land and Legacy Amendment Logo. Your Clean Water Fund at Work.

Slide 5: Minnesota Legacy Amendment

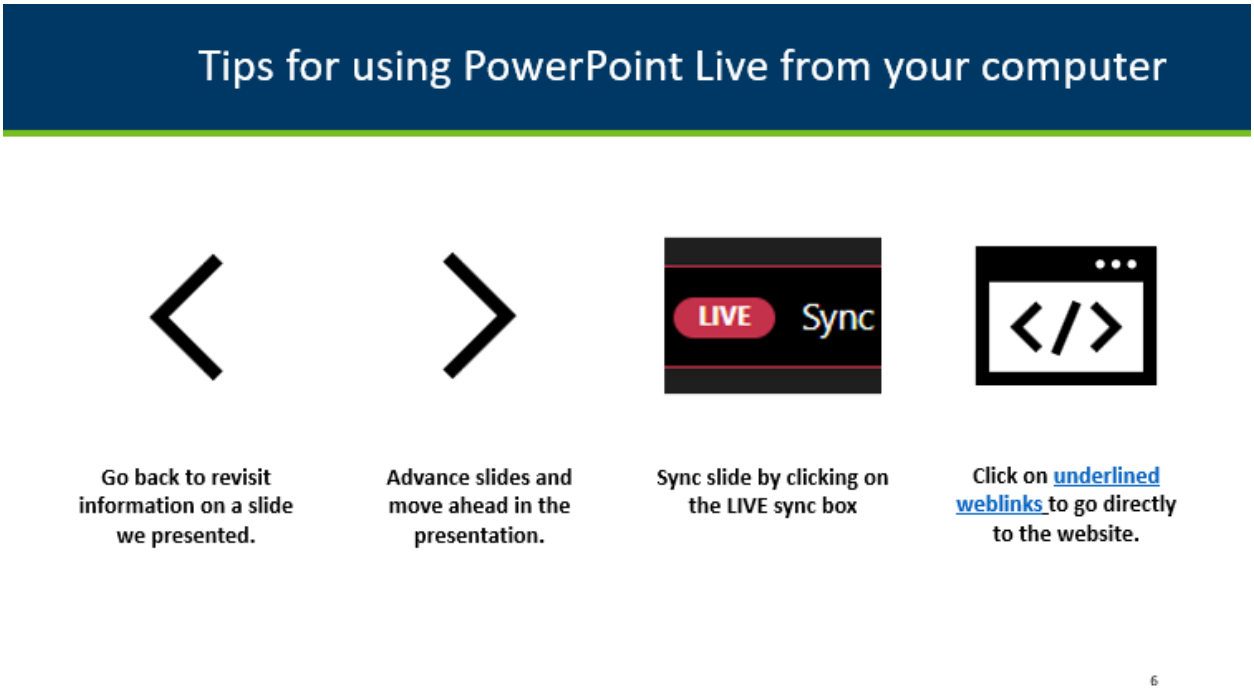


Slide Text and Image Description

"In 2008, Minnesota's voters passed the Clean Water, Land and Legacy Amendment (Legacy Amendment) to the Minnesota Constitution to: protect drinking water sources; to protect, enhance, and restore wetlands, prairies, forests, and fish, game, and wildlife habitat; to preserve arts and cultural heritage; to support parks and trails; and to protect, enhance, and restore lakes, rivers, streams, and groundwater"

Minnesota Legacy Amendment website (http://legacy.mn.gov/)

Slide 6: Tips for Using PowerPoint Live from your computer

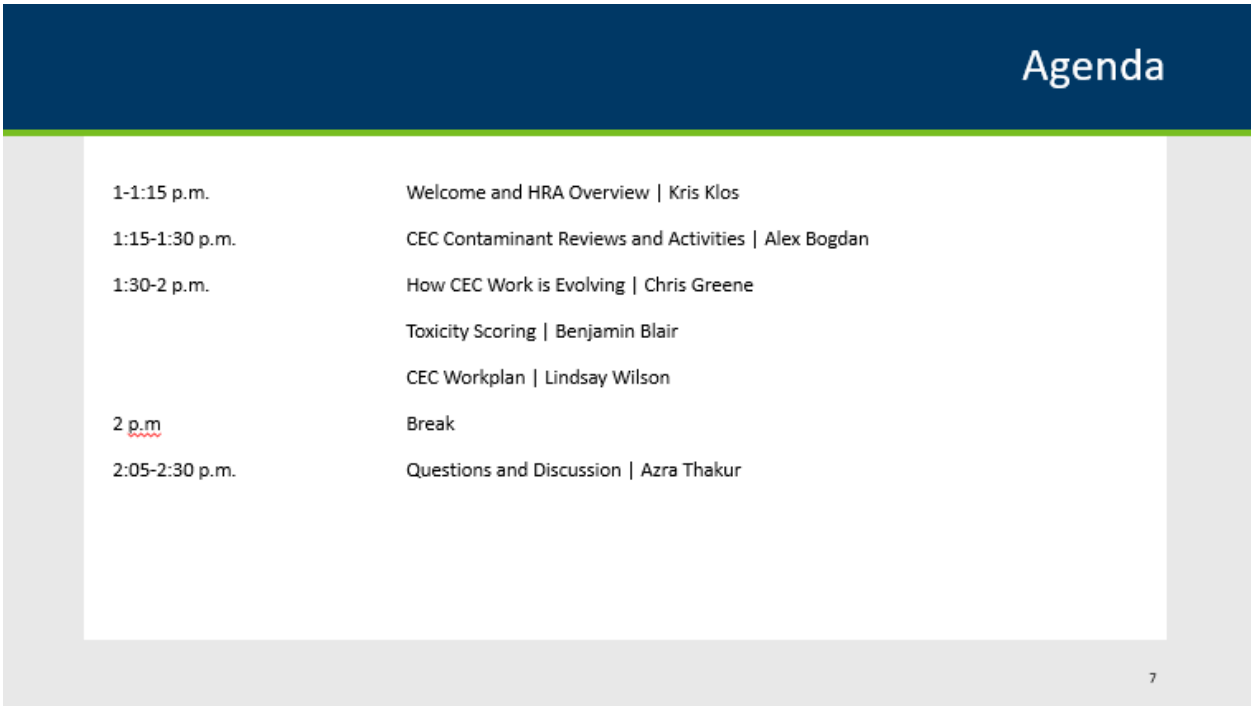


Slide Text and Image Description

Icons from left to right:

- Arrow pointing left: go back to revisit information on a slide we presented
- Arrow pointing right: advance slides and move ahead in the presentation
- LIVE sync: sync slide by clicking on the LIVE sync box
- Internet icon: Click on underlined weblinks to go directly to the website

Slide 7: Agenda



Slide Text and Image Description

Time	Agenda
1-1:15 p.m.	Welcome and HRA Overview—Kris Klos
1:15-1:30 p.m.	CEC Contaminant Reviews and Activities—Alex Bogdan
1:30-2 p.m.	How CEC Work is Evolving—Chris Greene Toxicity Scoring—Benjamin Blair CEC Workplan—Lindsay Wilson
2 p.m.	Break
2-2:30 p.m.	Questions and Discussion—Azra Thakur

Slide 8: Health Risk Assessment Unit

Slide Text and Image Description

Photographs from left to right:

- Kris Klos headshot: Kris Klos, Supervisor
- Water droplet: Health Risk Limits webpage (https://www.health.state.mn.us/communities/environment/risk/guidance/hrlprogram.html)
- Hand filling a water bottle from a stream: Contaminants of Emerging Concern webpage (https://www.health.state.mn.us/communities/environment/risk/guidance/dwec/index.html)
- Fish plated alongside vegetables on a plate: Fish Consumption Guidance webpage (https://www.health.state.mn.us/communities/environment/fish/index.html)

Slide 9: Contaminants of Emerging Concern Team

Slide Text and Image Description

Headshots of Contaminants of Emerging Concern Team members from left to right:

- Ben Blair
- Alex Bogdan
- Chris Greene
- Sarah Fossen Johnson
- Azra Thakur (missing headshot)
- Lindsay Wilson

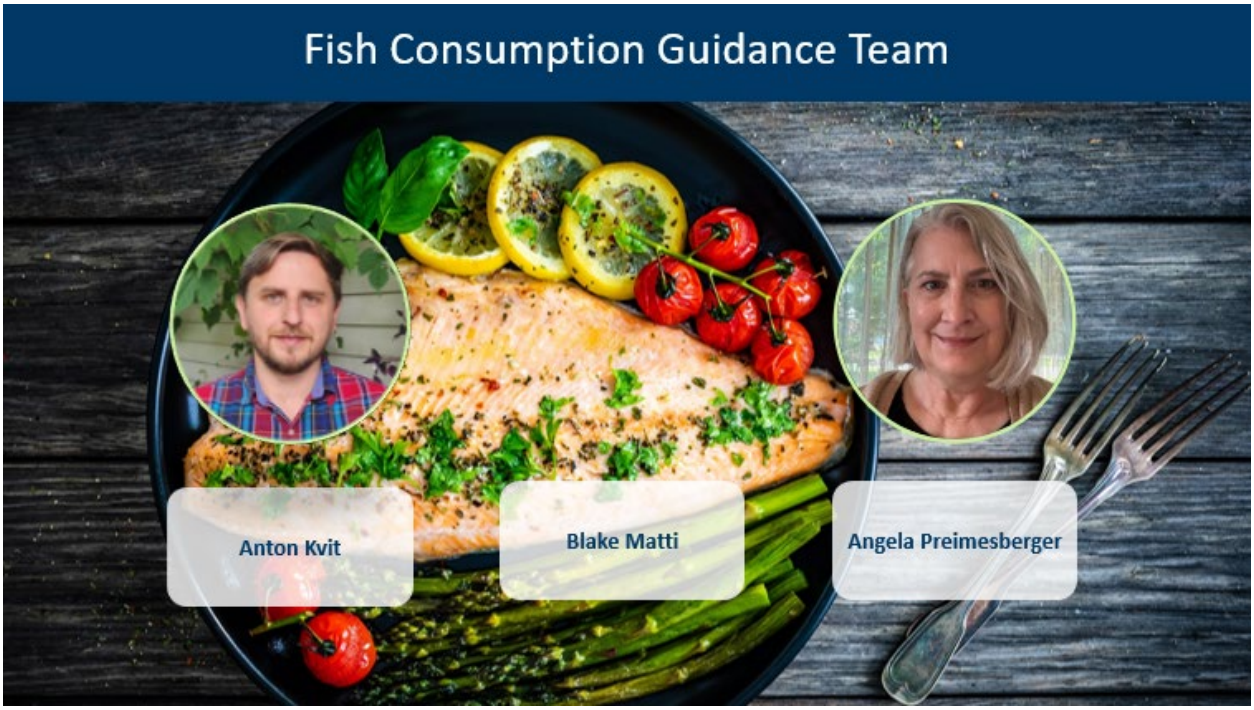
Slide 10: Health Risk Limits Team

Slide Text and Image Description

Headshots of Contaminants of Health Risk Limits team members from left to right:

- Katie Fallace
- Chris Schaupp
- Nancy Rice (missing headshot)

Slide 11: Fish Consumption Guidance Team

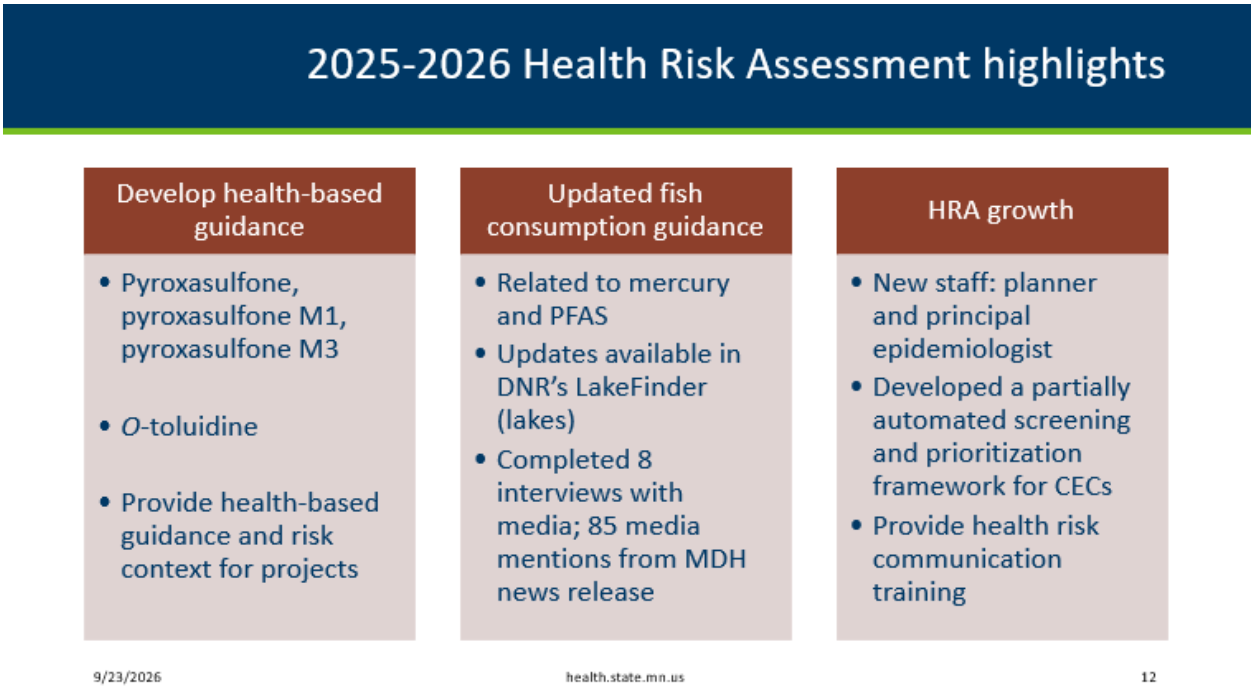


Slide Text and Image Description

Headshots of Fish Consumption Guidance Team members from left to right:

- Anton Kvit
- Blake Matti (missing headshot)
- Angela Preimesberger

Slide 12: 2025-2026 Health Risk Assessment Highlights



Slide Text and Image Description

Three text boxes from left to right:

1. Develop health-based guidance
    - Pyroxasulfone, pyroxasulfone M1, pyroxasulfone M3
    - O-toluidine
    - Provide health-based guidance and risk context for projects
2. Updated fish consumption guidance
    - Related to mercury and PFAS
    - Updates available in DNR's LakeFinder (lakes)
    - Completed 8 interviews with media; 85 media mentions from MDH news release
3. HRA growth:
    - New staff: planner and principal epidemiologist
    - Developed a partially automated screening and prioritization framework for CECs

- Provide health risk communication training

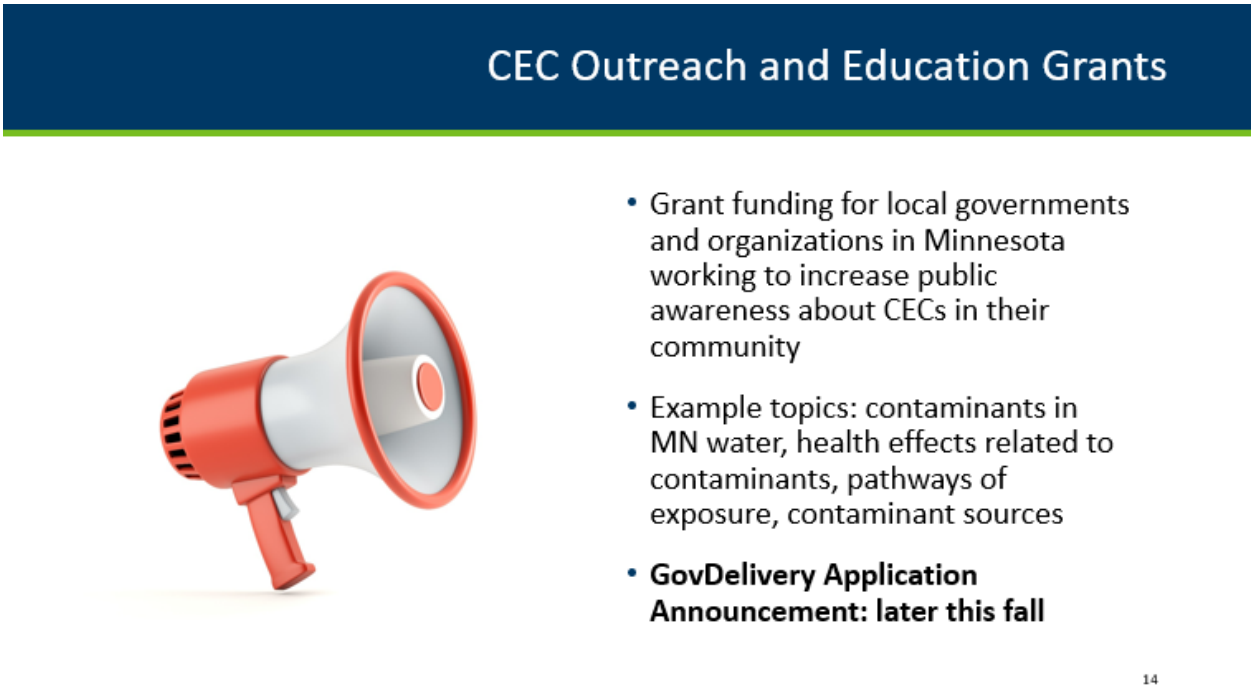
Slide 13: 2026 Clean Water Fund Performance Report

Slide Text and Image Description

Image: screenshot of the Minnesota Clean Water Performance Report page on a computer screen.

2026 Clean Water Fund Performance Report (https://www.pca.state.mn.us/sites/default/files/lrp-f-2sy26.pdf)

Slide 14: CEC Outreach and Education Grants



Slide Text and Image Description

Photograph: an orange and white loudspeaker

Text:

- Grant funding for local governments and organizations in Minnesota working to increase public awareness about CECs in their community
- Example topics: contaminants in MN water, health effects related to contaminants, pathways of exposure, contaminant sources
- GovDelivery Application Announcement: later this fall

Slide 15: CEC Contaminant Reviews and Activities

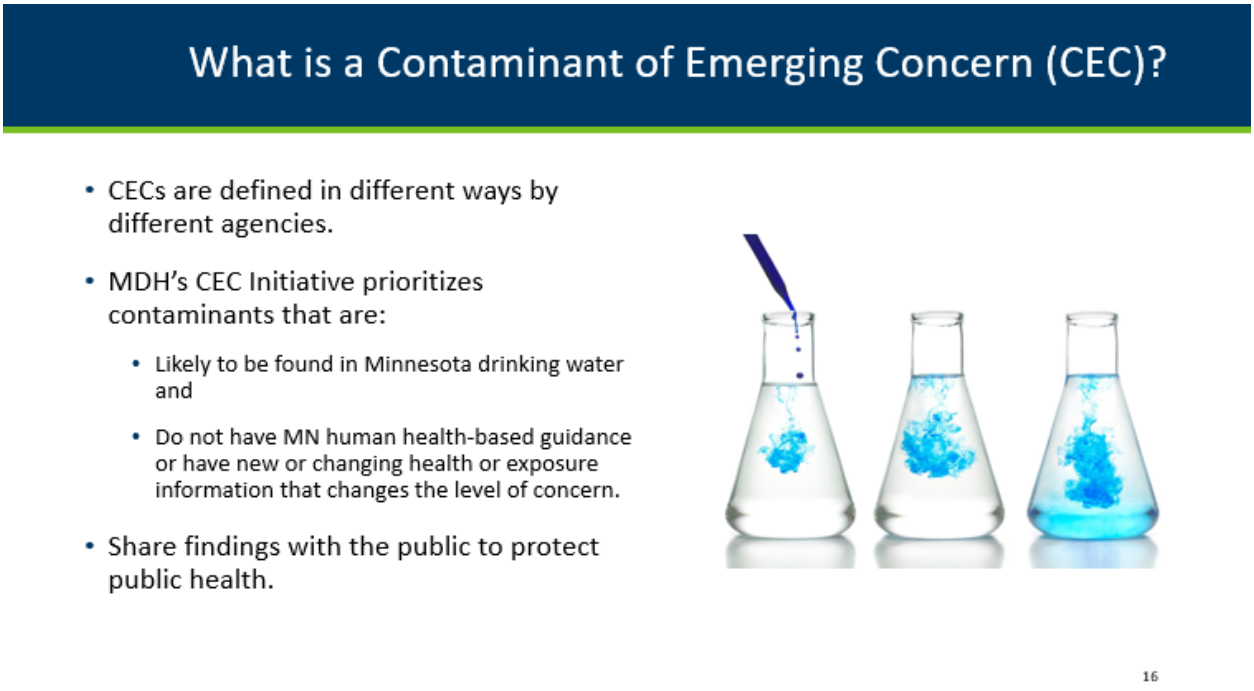
Slide Text and Image Description

Image: photograph of a woman wearing an orange knit hat and blue puffy coat staring out at autumn trees and the tree reflections in a body of water.

Text:

Alex Bogdan | Toxicologist

Slide 16: What is a Contaminant of Emerging Concern (CEC)?



Slide Text and Image Description

Photograph: three glass beakers with increasing amounts of blue dye in them from left to right.

Text:

- CECs are defined in different ways by different agencies.
- MDH's CEC Initiative prioritizes contaminants that are:
    - Likely to be found in Minnesota drinking water and
    - Do not have MN human health-based guidance or have new or changing health or exposure information that changes the level of concern.
- Share findings with the public to protect public health.

Slide 17: HRA Develops Health-Based Guidance

Slide Text and Image Description

Photograph: a girl drinking water from a glass with a straw and giving a thumbs-up.

Text:

Health-based guidance

Concentration of a contaminant(s) in water that is likely to pose little or no health risk to people who drink the water, including sensitive and highly exposed populations.

Slide 18: General HRA Full Review Workflow

Slide Text and Image Description

Graphic from left to right:

- Review announced (purple raised hand icon)
- Interim Review (blue magnifying glass icon)
    - Literature search
    - Data synthesis
- Peer review (green icon of a group of individuals having a conversation)
- Final review (blue icon of a checklist)
    - Supporting docs
    - Additivity
- Peer review (green icon of a group of individuals having a conversation)
- Finalization and communication (green icon of a checkmark)

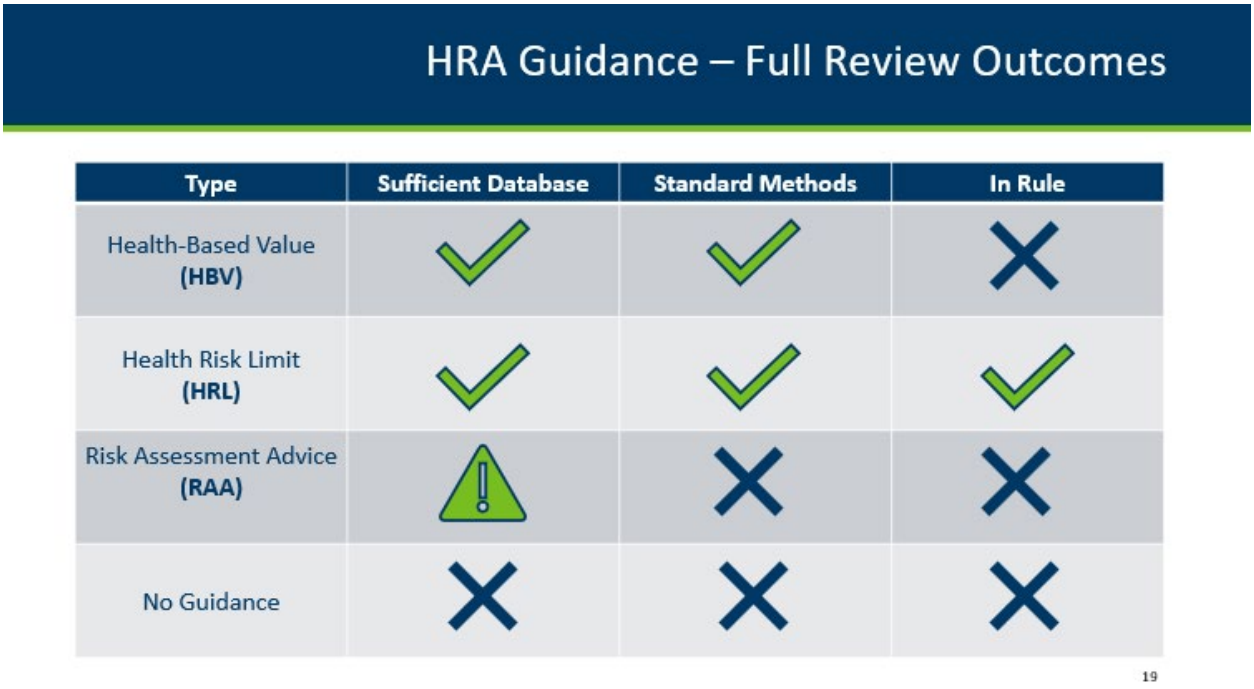
Summary

To create health-based guidance, HRA employs a robust multi-stage, multi-round chemical review process. First, a chemical review is announced by posting to our website and sending a notification to our GovDelivery email list. Anyone can sign up for the email list to stay informed on CEC reviews and other activities. One toxicologist serves as the primary reviewer for a chemical. This person will become the subject matter expert for this chemical.

During the interim review round, the primary reviewer does a deep-dive into the scientific literature and gathers, collates, and analyzes the available toxicological data to determine potential critical studies. Each chemical is also assigned a toxicologist to serve as the secondary reviewer. The secondary reviewer serves in support of the primary reviewer by checking their work. Together, the primary and secondary reviewers identify outstanding questions and key points for later discussion. After the primary and secondary interim reviews, it goes to the rest of the toxicologists in the unit to review as a team. After the team review, a meeting is held with everyone to discuss identified issues, raise new ones, agree upon the critical study and endpoint, calculate a reference dose, and make other relevant decisions. In this way, most or all of the toxicologists in the unit will get to see and contribute to a chemical review.After the Team Meeting, the chemical moves from interim review to final review. While the process in final review is the same as interim review with primary, secondary, and team reviewers, the content is different. During final review, supporting documentation is created and chemical risk additivity is assessed. Additivity is a risk assessment principal that states that chemicals with similar toxicological effects must all be considered when determining the total health risk; for example, if there are three chemicals targeting the liver detected in a drinking water sample, the cumulative risk for all chemicals must be considered rather than taking them one-by-one.

After the final review is complete, everything is finalized and communicated to the public. Appropriate documents are posted to the CEC website and the GovDelivery email list is notified.

Slide 19: HRA Guidance—Full Review Outcomes



Slide Text and Image Description

Type	Sufficient Database	Standard Methods	In Rule
Health-Based Value (HBV)	Yes	Yes	No
Health Risk Limit (HRL)	Yes	Yes	Yes
Risk Assessment Advice (RAA)	Limited data/requires alternative methods		No
No Guidance	No	No	No

Summary

There are several potential outcomes to a chemical review. The goal of every chemical review is to create health-based guidance. There are several types of guidance that HRA creates.

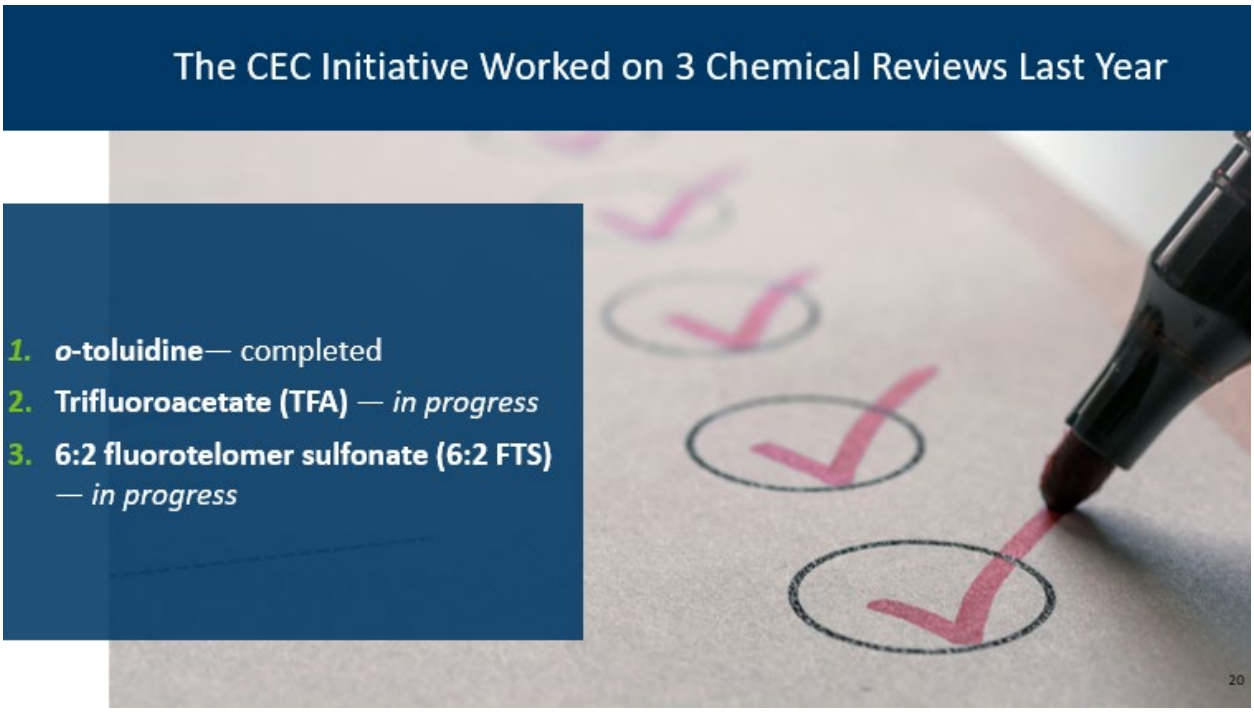
The first is called a health-based value (HBV). HBVs are created when a chemical has a sufficiently extensive toxicological database to allow HRA toxicologists to generate a high-confidence assessment of human health risk. To create HBVs, HRA uses a standardized risk assessment methodology that is promulgated in state rule. However, the HBV values themselves are not promulgated.

Health risk limits (HRL) are very similar to HBVs and have the same requirements for database sufficiency and methodology. The main difference is that HRLs have been promulgated into rule, a process that HRA undertakes every few years. Many HRLs were first derived as HBVs. To be eligible for promulgation into a HRL, the chemical must have been detected in Minnesota groundwater. Because of this, not all HBVs will be promulgated into HRLs, although HBVs may become eligible if those chemicals are detected in Minnesota groundwater at a later date.

The last type of guidance that HRA regularly develops is Risk Assessment Advice (RAA). RAAs differ from HBVs and HRLs in two key ways. First, the toxicological database for that contaminant may not have been sufficient to derive an HBV. Second, RAAs often do not use the standard risk assessment methodology that HBVs and HRLs do. There may be several reasons why the standard methodology would not work for a given contaminant. RAAs can be either quantitative, where a numerical risk value is created, or qualitative, where a narrative description of potential human health risk is presented. RAAs are not eligible to be put into rule.

Finally, there may be occasions where a contaminant simply does not have enough data to derive any kind of guidance. In these rare instances, HRA will not create guidance for it.

Slide 20: The CEC Initiative Worked on 3 Chemical Reviews Last Year



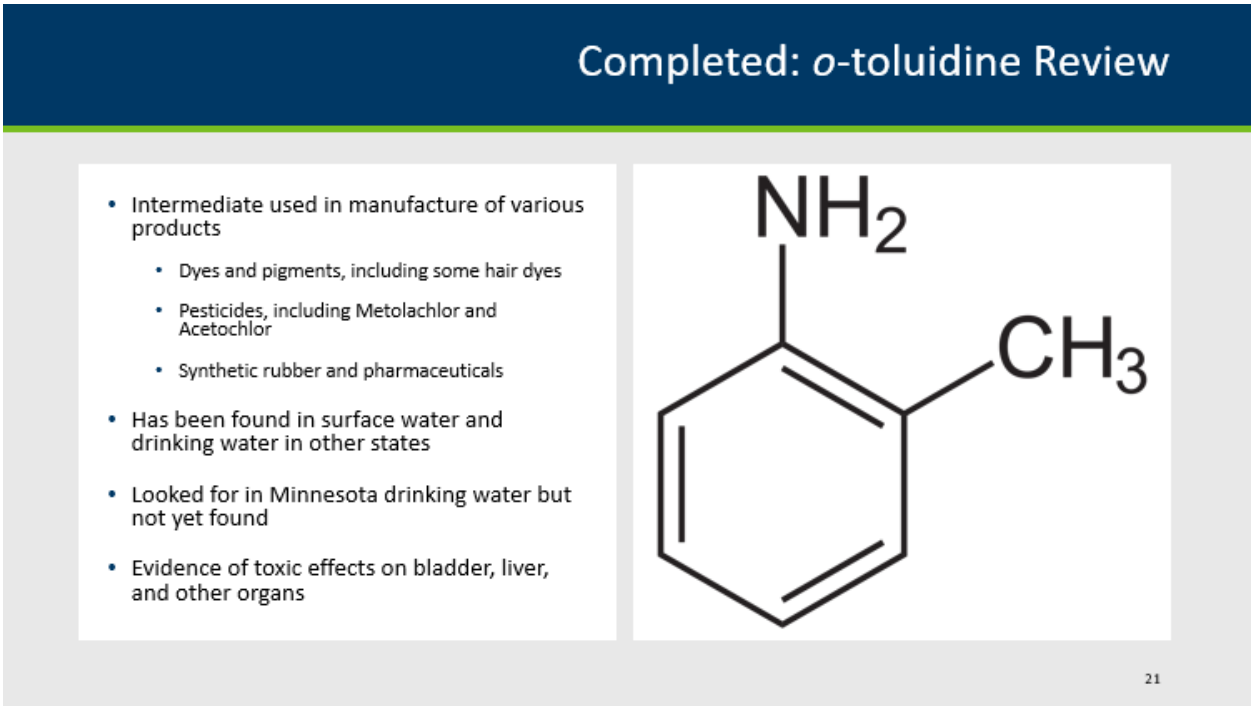
Slide Text and Image Description

1. *o*-toluidine—completed
2. Trifluoroacetate (TFA)—*in progress*
3. 6:2 fluorotelomer sulfonate (6:2 FTS)—*in progress*

Summary

The fiscal year runs from July-June at MDH.

Slide 21: Completed: o-toluidine Review



Slide Text and Image Description

Image: o-toluidine chemical structure

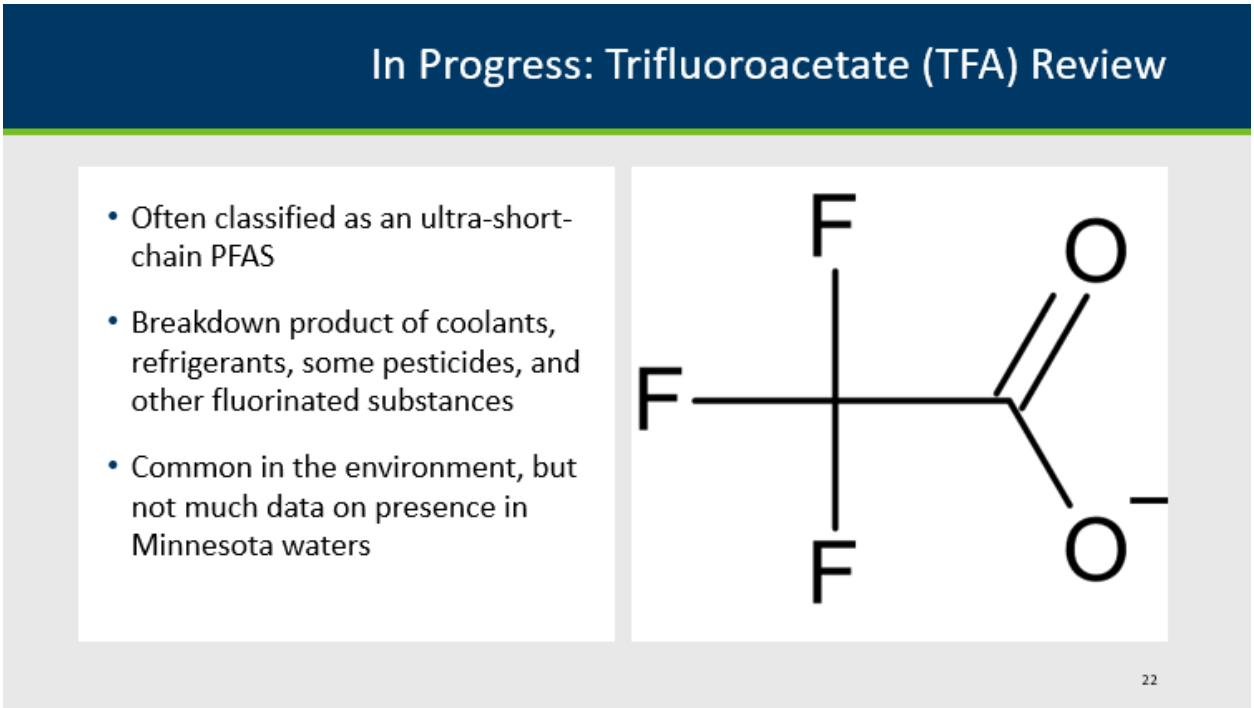
Text:

- Intermediate used in manufacture of various products
- Dyes and pigments, including some hair dyes
- Pesticides, including Metolachlor and Acetochlor
- Synthetic rubber and pharmaceuticals
- Has been found in surface water and drinking water in other states
- Looked for in Minnesota drinking water but not yet found
- Evidence of toxic effects on bladder, liver, and other organs

Summary

The o-toluidine guidance are HBVs for short-term, subchronic, and chronic durations as well as cancer.

Slide 22: In Progress: Trifluoroacetate (TFA) Review



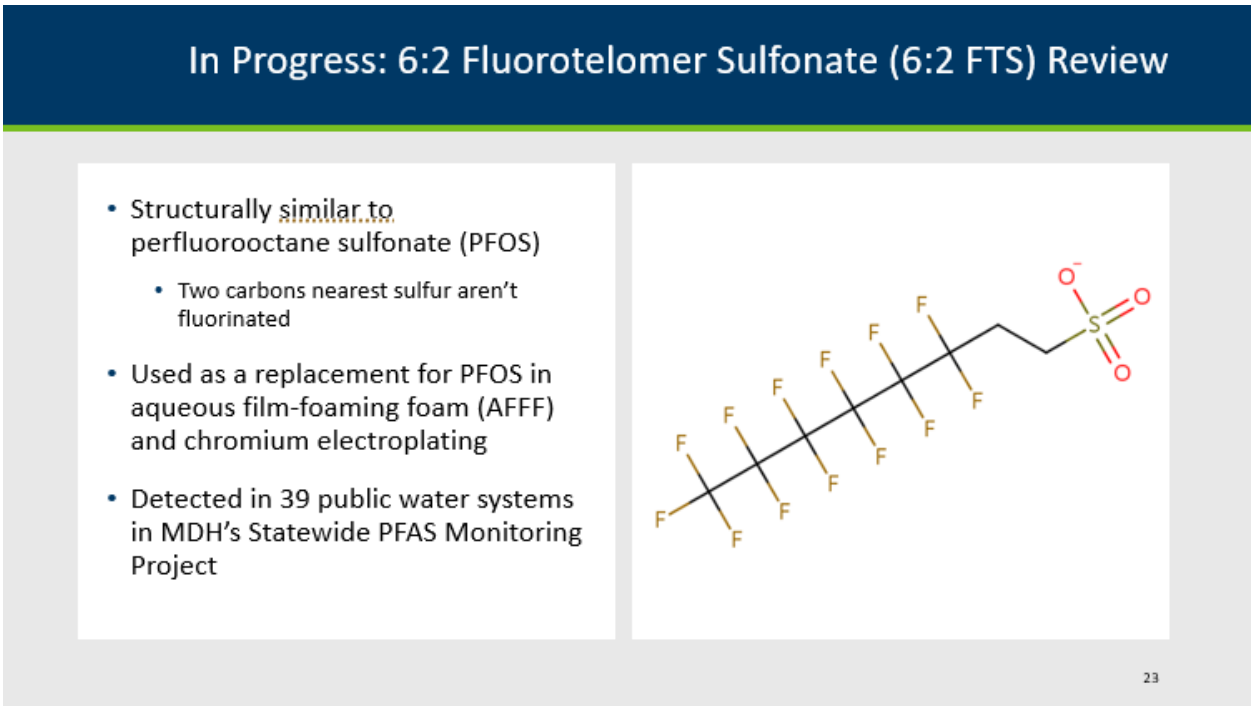
Slide Text and Image Description

Image: TFA chemical structure

Text:

- Often classified as an ultra-short-chain PFAS
- Breakdown product of coolants, refrigerants, some pesticides, and other fluorinated substances
- Common in the environment, but not much data on presence in Minnesota waters

Slide 23: In Progress: 6:2 Fluorotelomer Sulfonate (6:2 FTS) Review



Slide Text and Image Description

Image: 6:2 FTS chemical structure

Text:

- Structurally similar to perfluorooctane sulfonate (PFOS)
    - Two carbons nearest sulfur aren't fluorinated
- Used as a replacement for PFOS in aqueous film-foaming foam (AFFF) and chromium electroplating
- Detected in 39 public water systems in MDH's Statewide PFAS Monitoring Project

Slide 24: We published an article to educate clinicians on PFAS

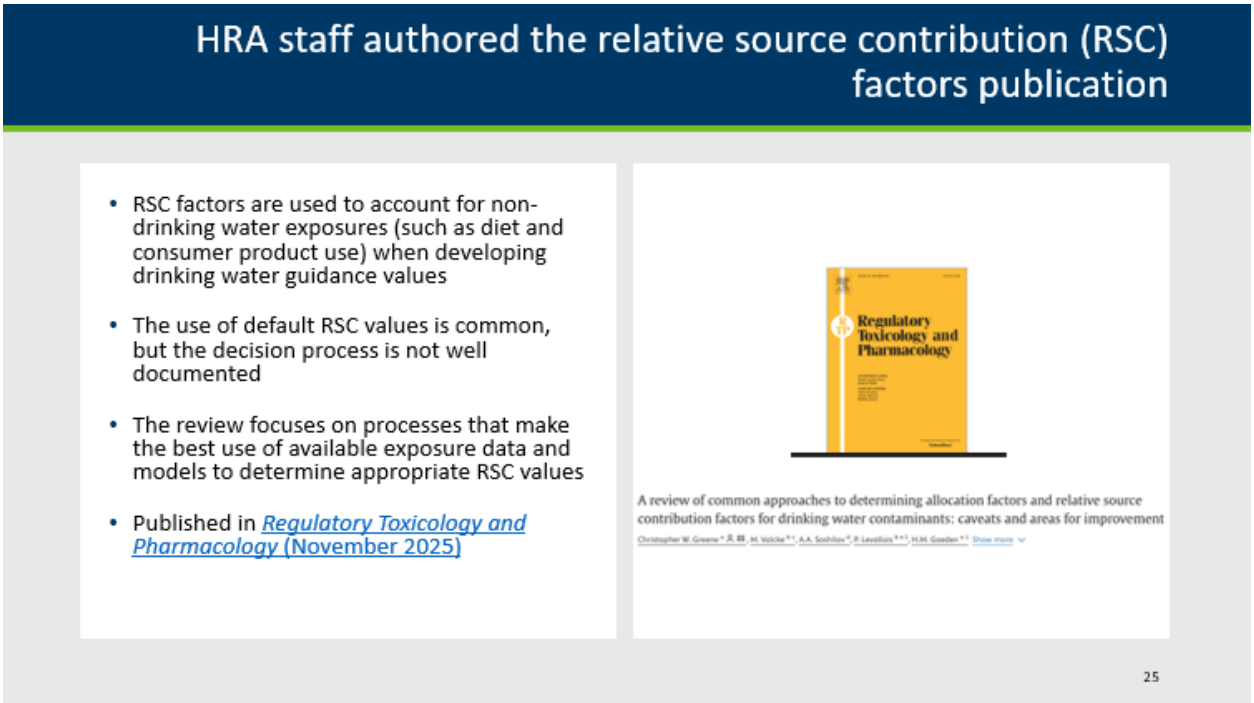
Slide Text and Image Description

Image: Minnesota Physician publication title: Forever Chemicals; What Physicians Need to Know by Alexander Bogdan, PhD, and Mohamed Mohamed, MD

Text:

- Many healthcare providers are still unfamiliar with PFAS
- Collaborated with occupational and environmental health MDs to write a "PFAS 101" article
    - Aim: introduce healthcare providers to PFAS topics such as potential health risks, Minnesota government actions, and tips for communicating with patients about PFAS
- Published in the medical journal Minnesota Physician

Slide 25: HRA staff authored the relative source contribution (RSC) factors publication



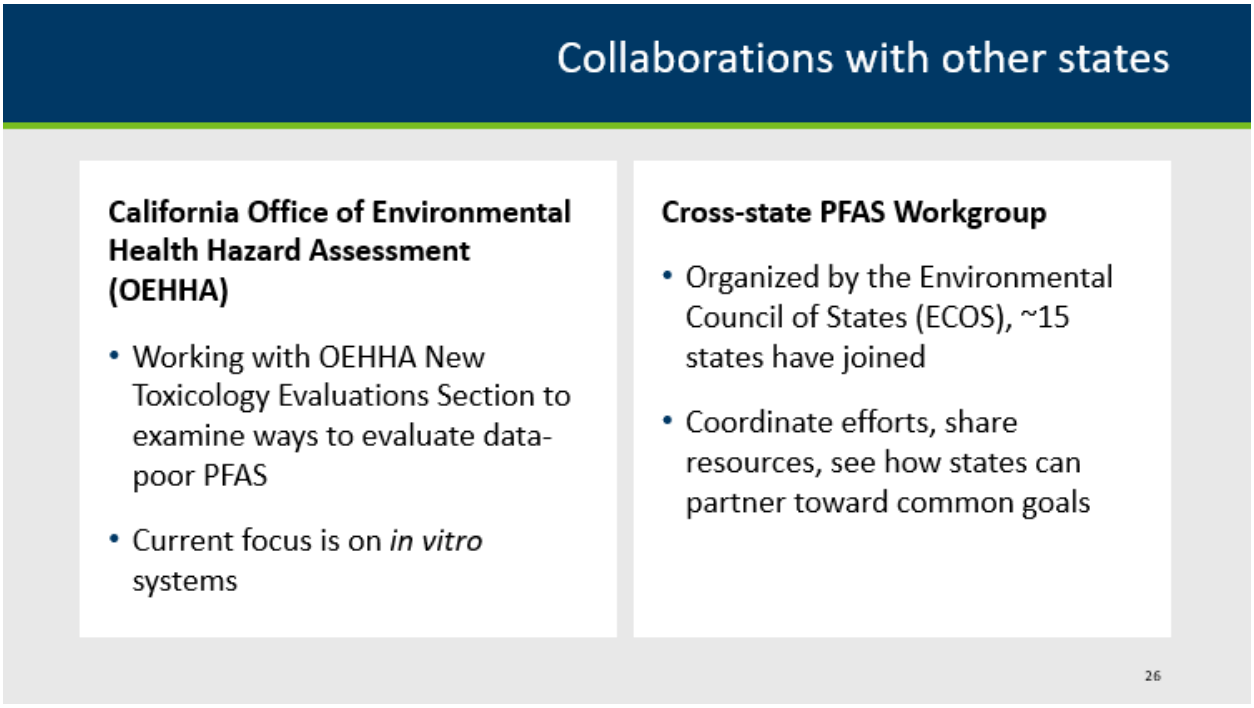
Slide Text and Image Description

Image: a yellow journal titled Regulatory Toxicology and Pharmacology accompanied by the publication title: “A review of common approaches to determining allocation factors and relative source contribution factors for drinking water contaminants: caveats and areas for improvement” by Christopher W. Greene, M. Valcke, A.A. Soshilov, P. Levallois, and H.M. Goeden.

Text:

- RSC factors are used to account for non-drinking water exposures (such as diet and consumer product use) when developing drinking water guidance values
- The use of default RSC values is common, but the decision process is not well documented
- The review focuses on processes that make the best use of available exposure data and models to determine appropriate RSC values
- Published in *Regulatory Toxicology and Pharmacology* (https://www.sciencedirect.com/science/article/abs/pii/S0273230025001163?via%3Dihub)

Slide 26: Collaborations with other states



Slide Text and Image Description

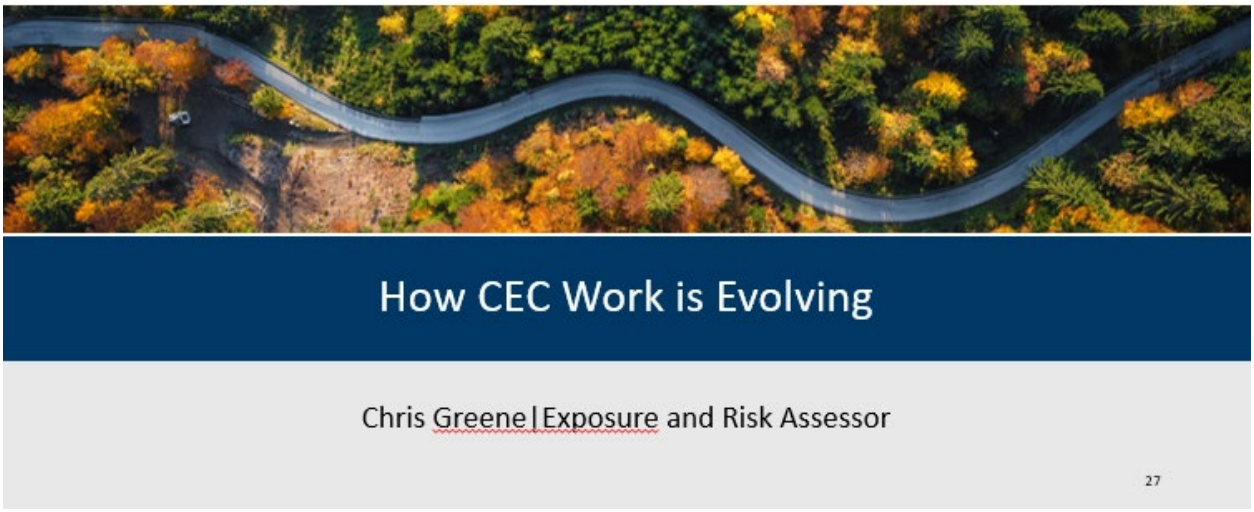
California Office of Environmental Health Hazard Assessment (OEHHA)

- Working with OEHHA New Toxicology Evaluations Section to examine ways to evaluate data-poor PFAS
- Current focus is on in vitro systems

Cross-state PFAS Workgroup

- Organized by the Environmental Council of States (ECOS), ~15 states have joined
- Coordinate efforts, share resources, see how states can partner toward common goals

Slide 27: How CEC Work is Evolving



Slide Text and Image Description

Image: a photograph of birds-eye view of a winding road surrounded by trees that are in varying states of changing colors in autumn.

Text:

Chris Greene|Exposure and Risk Assessor

Slide 28: HRA Develops Health-based guidance

Slide Text and Image Description

Photograph: a girl drinking water from a glass with a straw and giving a thumbs-up.

Text:

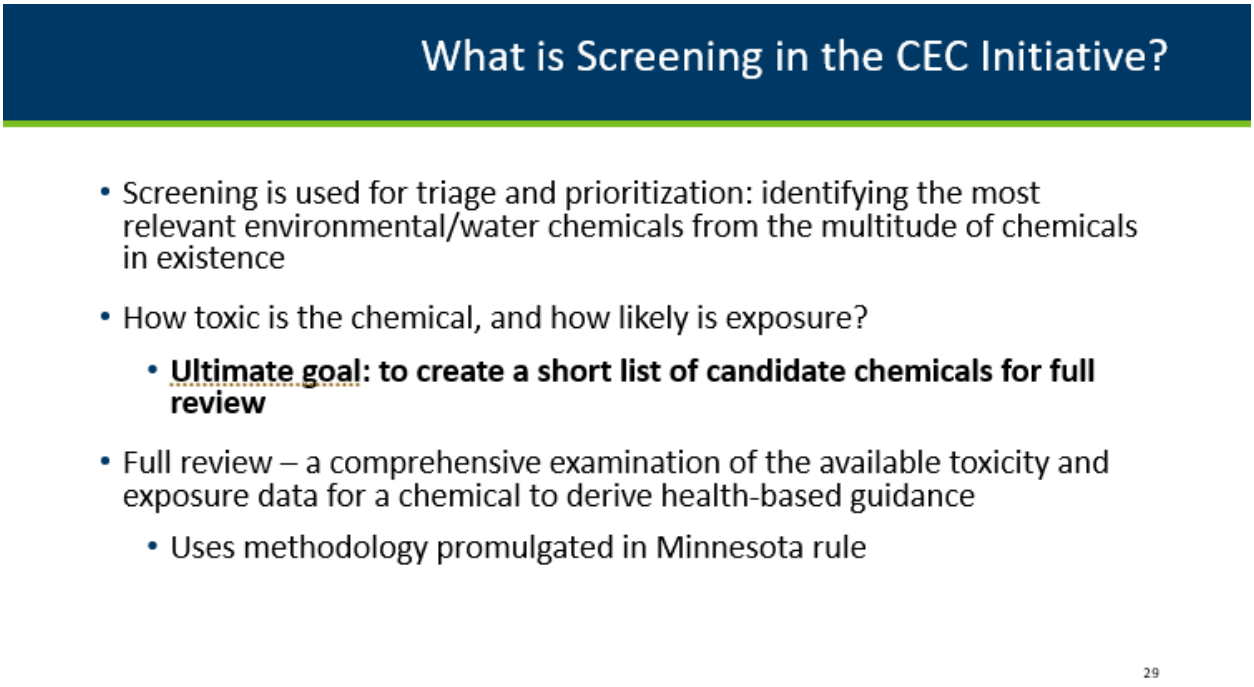
Health-based guidance

- Which chemicals need guidance the most?
- How do we identify and prioritize the chemicals?

Summary

We identify and prioritize chemicals through a screening process that continues to evolve over time.

Slide 29: What is Screening in the CEC Initiative?



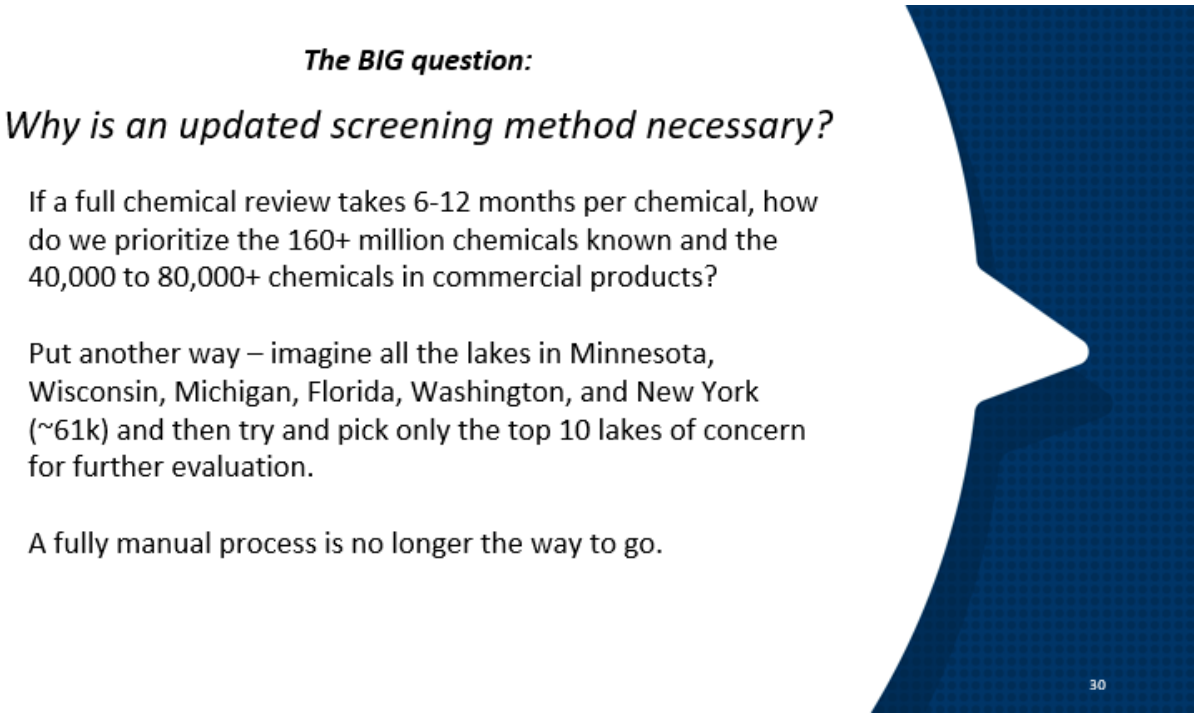
Slide Text and Image Description

- Screening is used for triage and prioritization: identifying the most relevant environmental/water chemicals from the multitude of chemicals in existence
- How toxic is the chemical, and how likely is exposure?
    - **Ultimate goal: to create a short list of candidate chemicals for full review**
- Full review – a comprehensive examination of the available toxicity and exposure data for a chemical to derive health-based guidance
- Uses methodology promulgated in Minnesota rule

Summary

The screening process is used to produce a short list of high-priority chemicals for which drinking water guidance values will be developed.

Slide 30: The BIG question: Why is an updated screening method necessary?



Slide Text and Image Description

If a full chemical review takes 6-12 months per chemical, how do we prioritize the 160+ million chemicals known and the 40,000 to 80,000+ chemicals in commercial products?

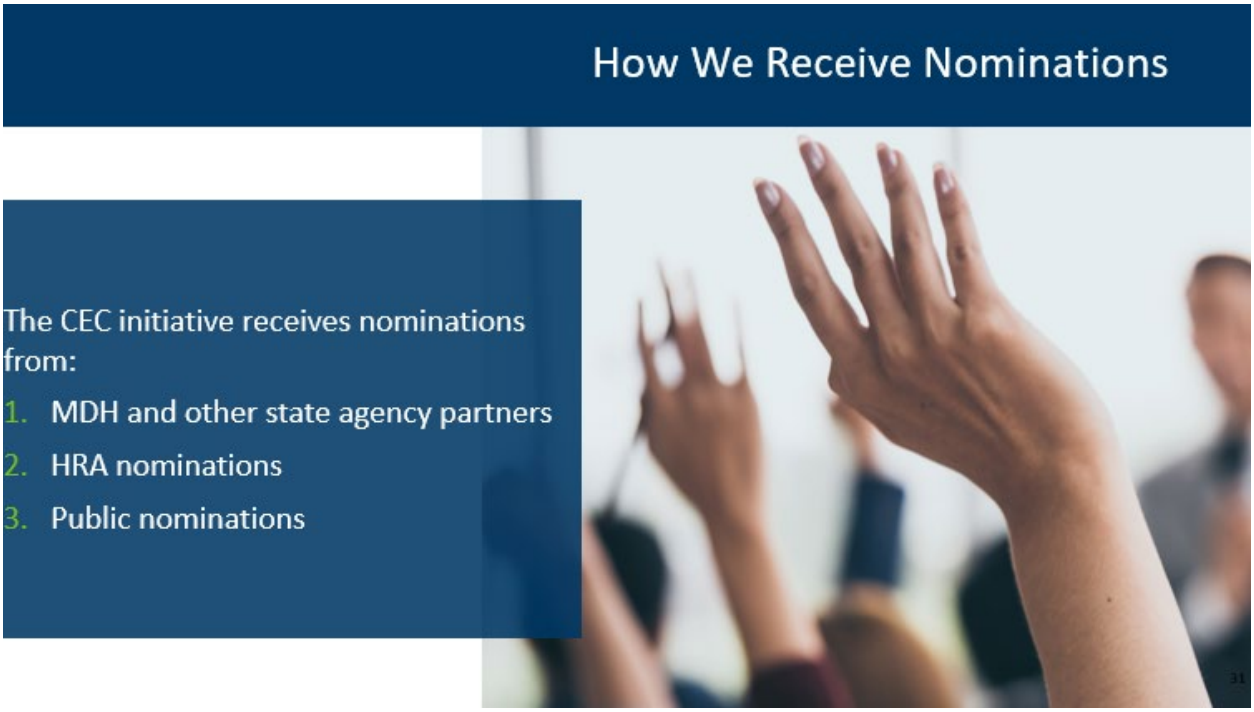
Put another way – imagine all the lakes in Minnesota, Wisconsin, Michigan, Florida, Washington, and New York (~61k) and then try and pick only the top 10 lakes of concern for further evaluation.

A fully manual process is no longer the way to go.

Summary

There are far too many chemicals in the world for us to spend hours evaluating each one. So, we are looking at ways to automate the process.

Slide 31: How We Receive Nominations



Slide Text and Image Description

Photograph: raised hands

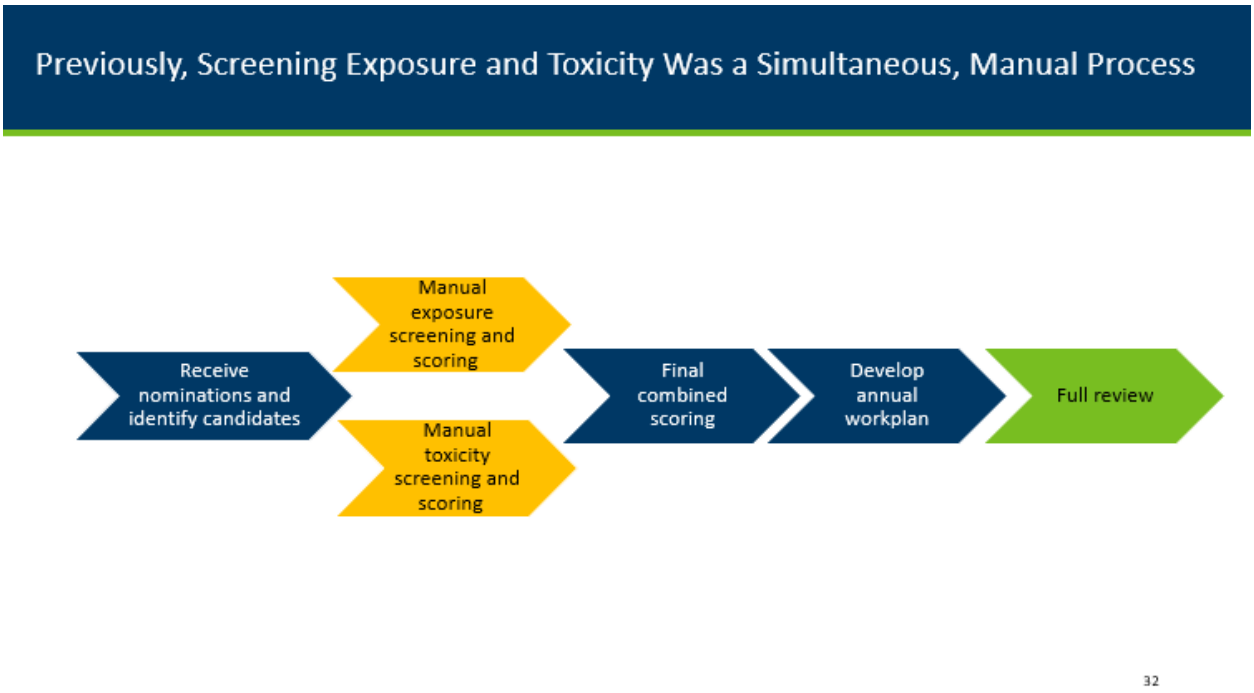
The CEC initiative receives nominations from:

1. MDH and other state agency partners
2. HRA nominations
3. Public nominations

Summary

Anyone can nominate a chemical to the CEC program. Nominations typically come from state agencies and from the public.

Slide 32: Previously, Screening Exposure and Toxicity was a Simultaneous, Manual Process



Slide Text and Image Description

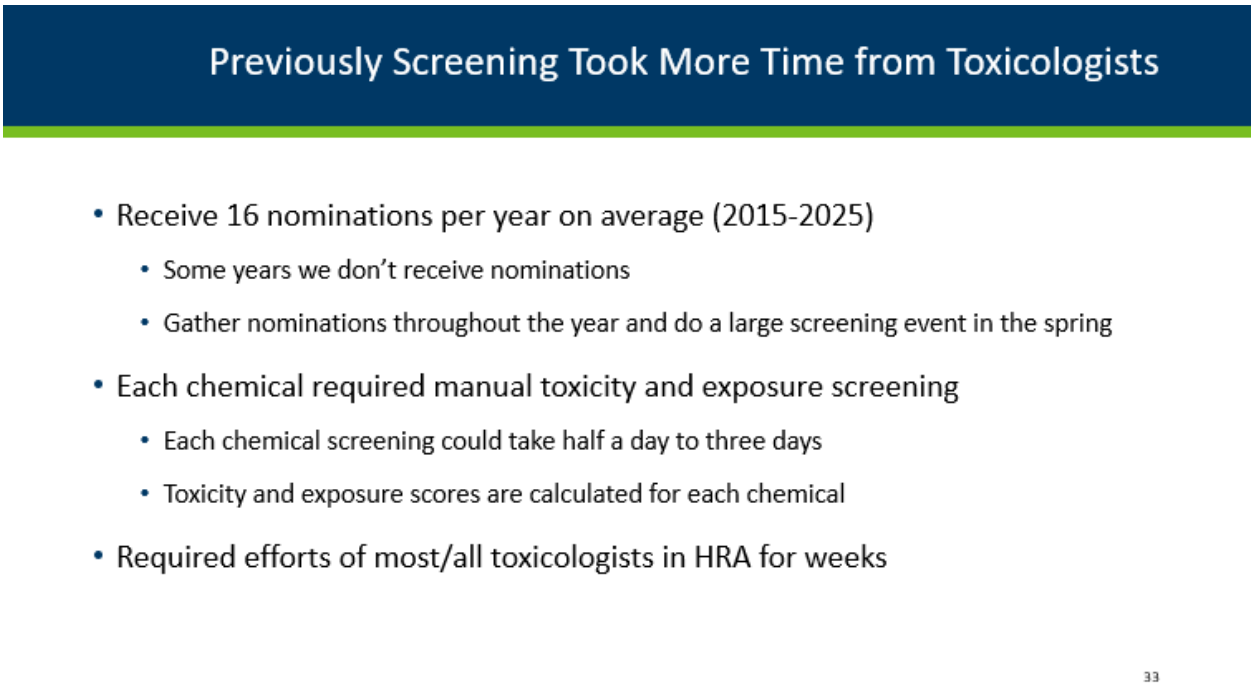
Image: a flow chart from left to right that describes the exposure and toxicity screening process used until recent modifications were made.

1. Receive nominations and identify candidates
2. Manual exposure screening and scoring AND manual toxicity screening and scoring (occur simultaneously)
3. Final combined scoring
4. Develop annual workplan
5. Full review

Summary

Nominated chemicals go through a screening process that, until recently, evaluated toxicity and exposure in parallel.

Slide 33: Previously Screening Took More Time from Toxicologists



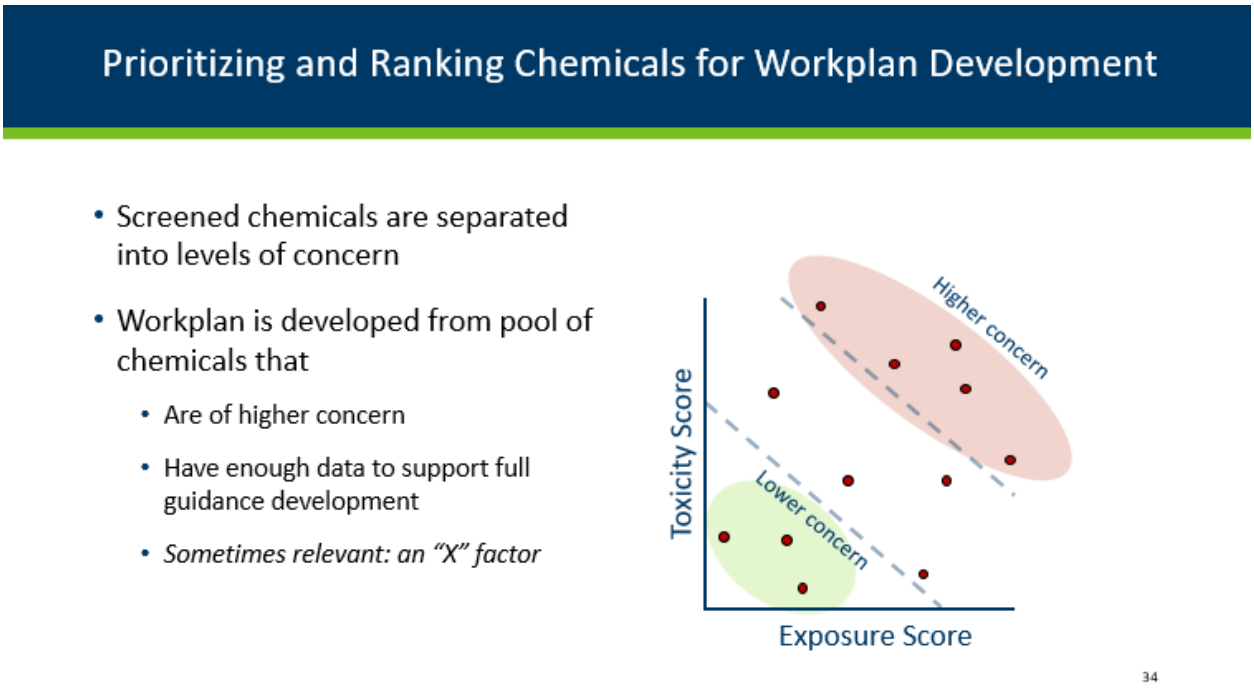
Slide Text and Image Description

- Receive 16 nominations per year on average (2015-2025)
    - Some years we don't receive nominations
    - Gather nominations throughout the year and do a large screening event in the spring
- Each chemical required manual toxicity and exposure screening
    - Each chemical screening could take half a day to three days
    - Toxicity and exposure scores are calculated for each chemical
- Required efforts of most/all toxicologists in HRA for weeks

Summary

The current screening process for nominated chemicals typically takes weeks to process a relatively small set of chemicals.

Slide 34: Prioritizing and Ranking Chemicals for Workplan Development



Slide Text and Image Description

Image: a scatter plot (Toxicity Score on the y-axis vs. exposure score on the x-axis), with the lower left quadrant highlighted in green (lower concern), and the upper right quadrant highlighted in red (higher concern)

Text:

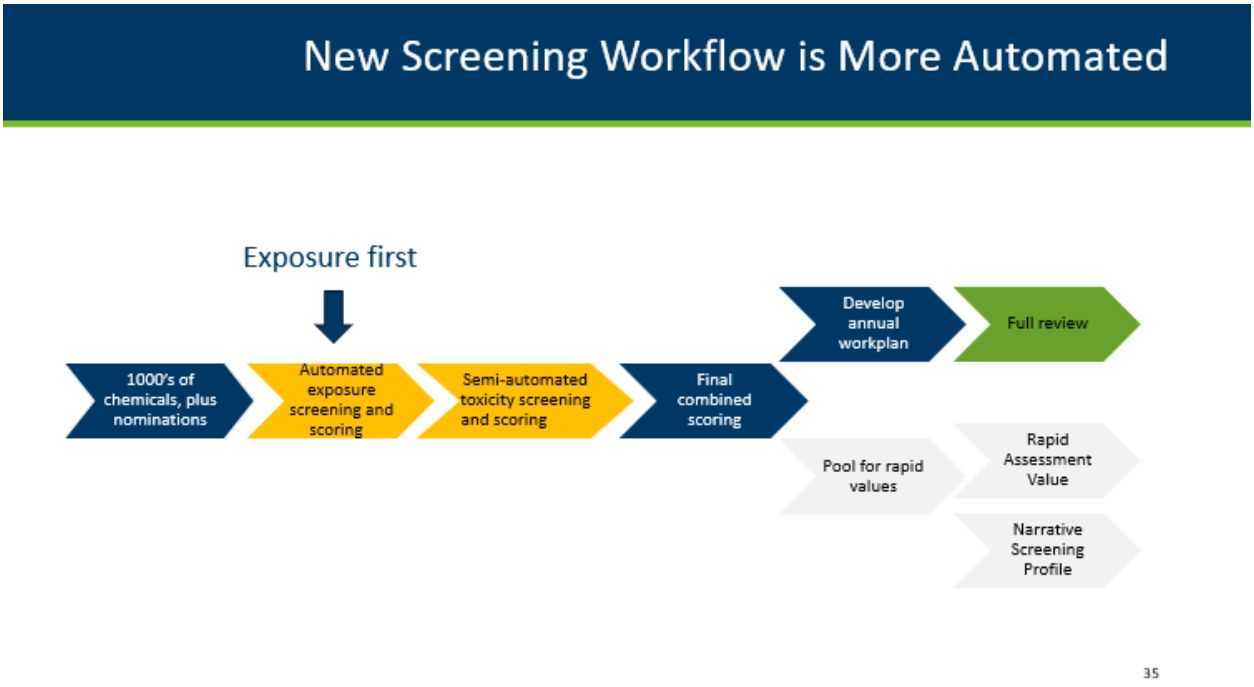
- Screened chemicals are separated into levels of concern
- Workplan is developed from pool of chemicals that
    - Are of higher concern
    - Have enough data to support full guidance development
    - Sometimes relevant: an "X" factor

Summary

Chemicals that have high scores for both exposure and toxicity are the most likely to be selected for full review. Other factors, such as availability of toxicity data, may affect the final selection. We also strive to

strike a balance between classes of chemicals (e.g., PFAS, pesticides, disinfection byproducts) so that one class does not dominate the list of selected chemicals.

Slide 35: New Screening Workflow is More Automated



Slide Text and Image Description

Image: new screening workflow process chart, showing how the workflow progresses from left to right:

1. 1000s of chemicals, plus nominations
2. Automated exposure screening and scoring
3. Semi-automated toxicity screening and scoring
4. Final combined scoring branches off to:
    a. Develop annual workplan and do a full review OR
    b. Pool for rapid values, rapid assessment value, narrative screening profile (this branch is off-topic for today's presentation.)

Summary

The addition of automated processes enables us to be more proactive in identifying chemicals of potential interest. Whereas the previous process did exposure and toxicity evaluations in parallel, the new process looks at exposure first, followed by toxicity screening, scoring, and development of a work plan. The new process is also designed to evaluate thousands of chemicals in a short time period.

Slide 36: How Do We Assess Potential Exposure to Contaminants in Drinking Water?

Slide Text and Image Description

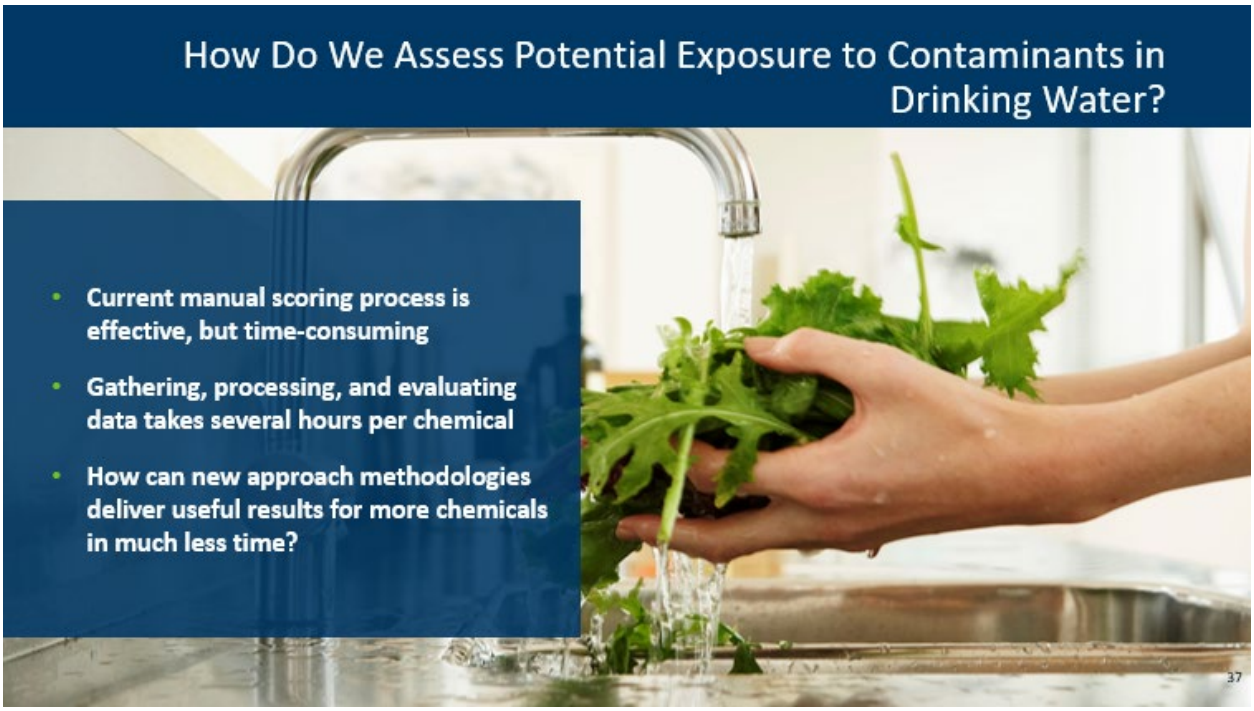
Image: greens being rinsed under the faucet

- Collect chemical-specific data from a curated set of data sources relating to occurrence, chemical properties, or use
- Data is categorized by level of concern for drinking water exposure (high, medium, or low)
- Scores are assigned to data based on high, medium, or low classification and the data's impact
- Overall exposure score is a synthesis of individual scores

Summary

There is little or no modeling involved in the exposure scoring process– just analysis of existing data. There are about 56 individual pieces of information that may contribute to a chemical's exposure score, but for most chemicals the picture is incomplete.

Slide 37: How Do We Assess Potential Exposure to Contaminants in Drinking Water?



Slide Text and Image Description

Image: greens being rinsed under the faucet

- Current manual scoring process is effective, but time-consuming
- Gathering, processing, and evaluating data takes several hours per chemical
- How can new approach methodologies deliver useful results for more chemicals in much less time?

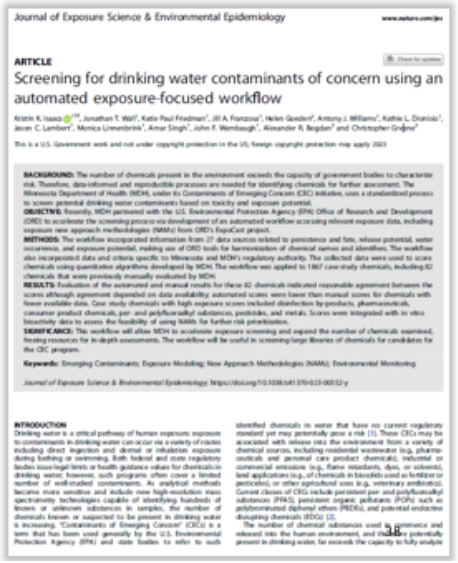
Summary

We are looking at new ways to quickly and accurately evaluate hundreds or thousands of chemicals in a short period of time.

Slide 38: Exposure Scoring: the Automated Workflow

Exposure Scoring: the Automated Workflow

- In 2021, HRA partnered with EPA Office of Research Development (ORD) to automate much of the exposure screening process
- 1,867 chemicals were processed and scored
- 82 of these chemicals had already been scored by MDH, allowing us to identify differences between the two processes
- Revised and improved version is under development by HRA and ULRI (successor to EPA/ORD) but may take until 2028
- CEC team made use of the draft automated workflow to prioritize chemicals



Journal of Exposure Science & Environmental Epidemiology

ARTICLE

Screening for drinking water contaminants of concern using an automated exposure-focused workflow

Slide Text and Image Description

Image: Screenshot of “Screening for Drinking water contaminants of concern using an automated exposure-focused workflow” from the *Journal of Exposure Science and Environmental Epidemiology*

Text:

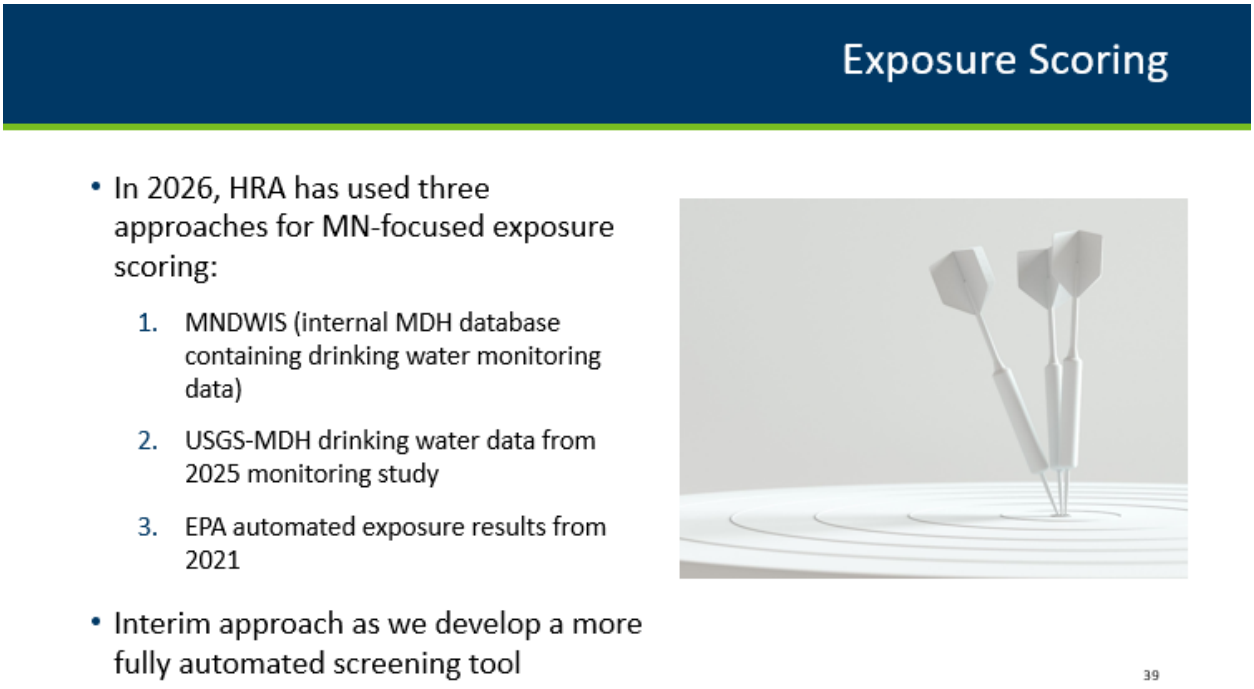
- In 2021, HRA partnered with EPA Office of Research Development (ORD) to automate much of the exposure screening process
- 1,867 chemicals were processed and scored
- 82 of these chemicals had already been scored by MDH, allowing us to identify differences between the two processes
- Revised and improved version is under development by HRA and ULRI (successor to EPA/ORD) but may take until 2028
- CEC team made use of the draft automated workflow to prioritize chemicals

Summary

Working with EPA, we developed an “automated workflow” to assign exposure scores to 1,867 chemicals. The automated workflow agreed reasonably well (but not perfectly) with the results from the

older, manual process. We are currently working on an improved automated workflow, but in the meantime we have used the existing automated workflow to prioritize chemicals.

Slide 39: Exposure scoring



Slide Text and Image Description

- Image: grayscale photograph of three darts in the middle of a bulls-eye.
- In 2026, HRA has used three approaches for MN-focused exposure scoring:
    1. MNDWIS (internal MDH database containing drinking water monitoring data)
    2. USGS-MDH drinking water data from 2025 monitoring study
    3. EPA automated exposure results from 2021
- Interim approach as we develop a more fully automated screening tool

Summary

For development of this year's CEC workplan, we used existing drinking water monitoring data and the MDH-EPA automated exposure workflow to identify chemicals with likely or confirmed presence in drinking water.

Slide 40: Toxicity Scoring

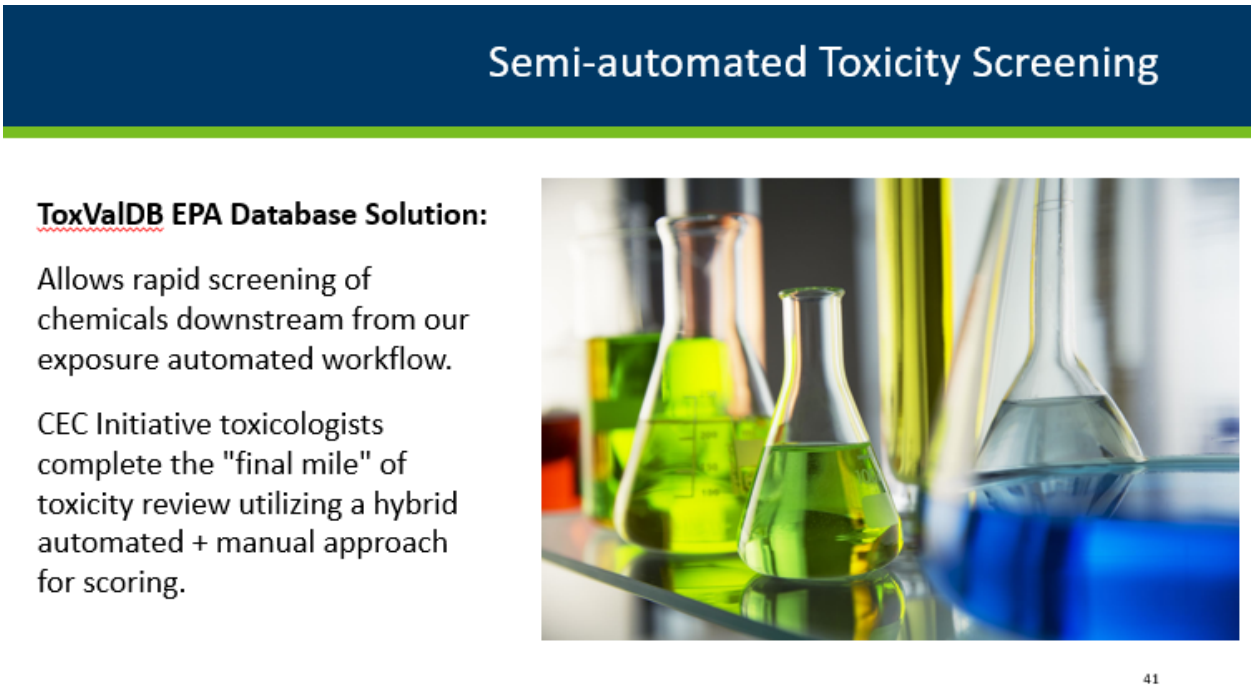
Slide Text and Image Description

Image: photograph of glasses, a pen, a magnifying glass, and calculator on top of paperwork with bar charts.

Text:

Benjamin Blair| Research Scientist

Slide 41: Semi-automated Toxicity Screening



Slide Text and Image Description

Image: beakers with vary colors and amounts of liquid in them.

Text:

ToxValDB EPA Database Solution:

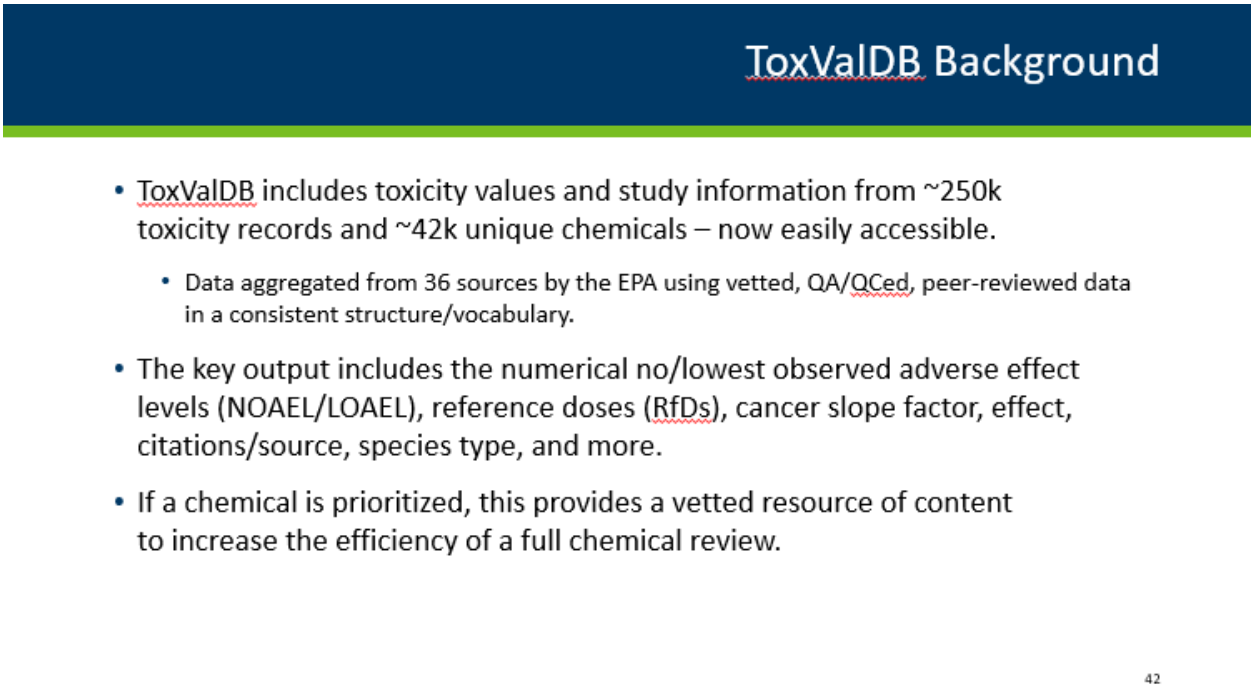
Allows rapid screening of chemicals downstream from our exposure automated workflow.

CEC Initiative toxicologists complete the "final mile" of toxicity review utilizing a hybrid automated + manual approach for scoring.

Summary

ToxValDB can be used in conjunction with the automated exposure screening or with nominated chemicals. The output is useful, but the “final mile” of expert review is needed for decision making.

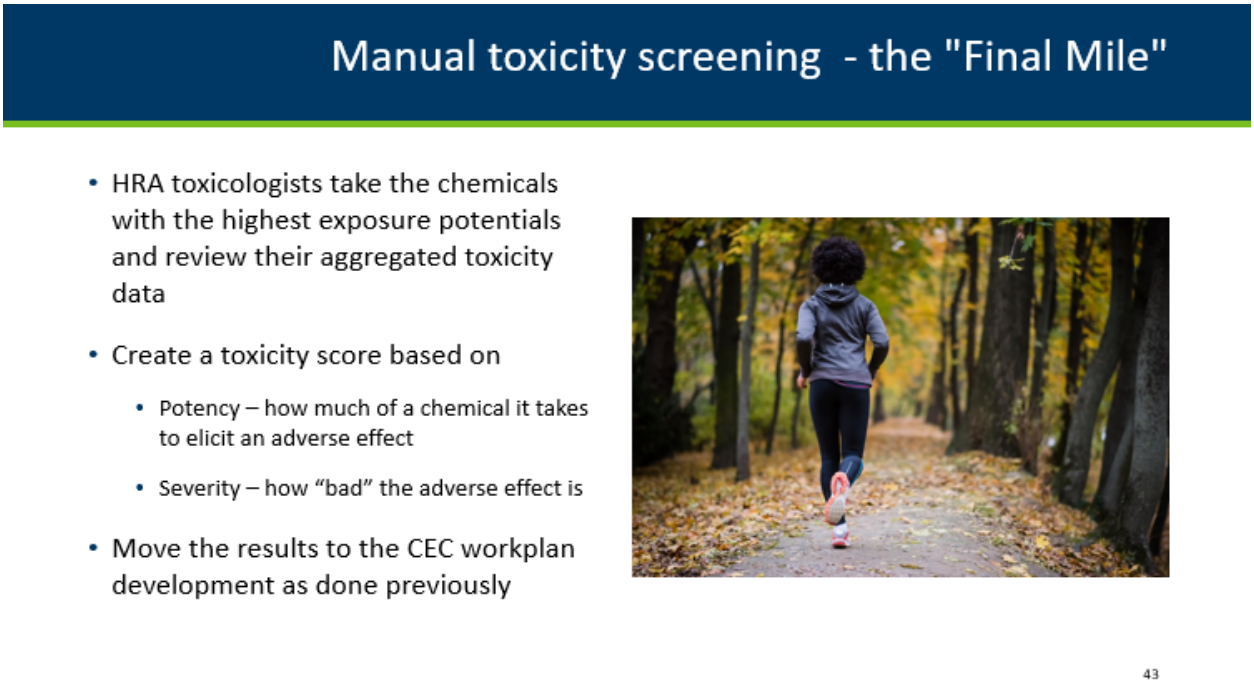
Slide 42: ToxValDB Background



Slide Text and Image Description

- ToxValDB includes toxicity values and study information from ~250k toxicity records and ~42k unique chemicals – now easily accessible.
    - Data aggregated from 36 sources by the EPA using vetted, QA/QCed, peer-reviewed data in a consistent structure/vocabulary.
- The key output includes the numerical no/lowest observed adverse effect levels (NOAEL/LOAEL), reference doses (RfDs), cancer slope factor, effect, citations/source, species type, and more.
- If a chemical is prioritized, this provides a vetted resource of content to increase the efficiency of a full chemical review.

Slide 43: Manual toxicity screening—the “Final Mile”



Slide Text and Image Description

Image: photograph of woman running on a path surrounded by autumn leaves and trees.

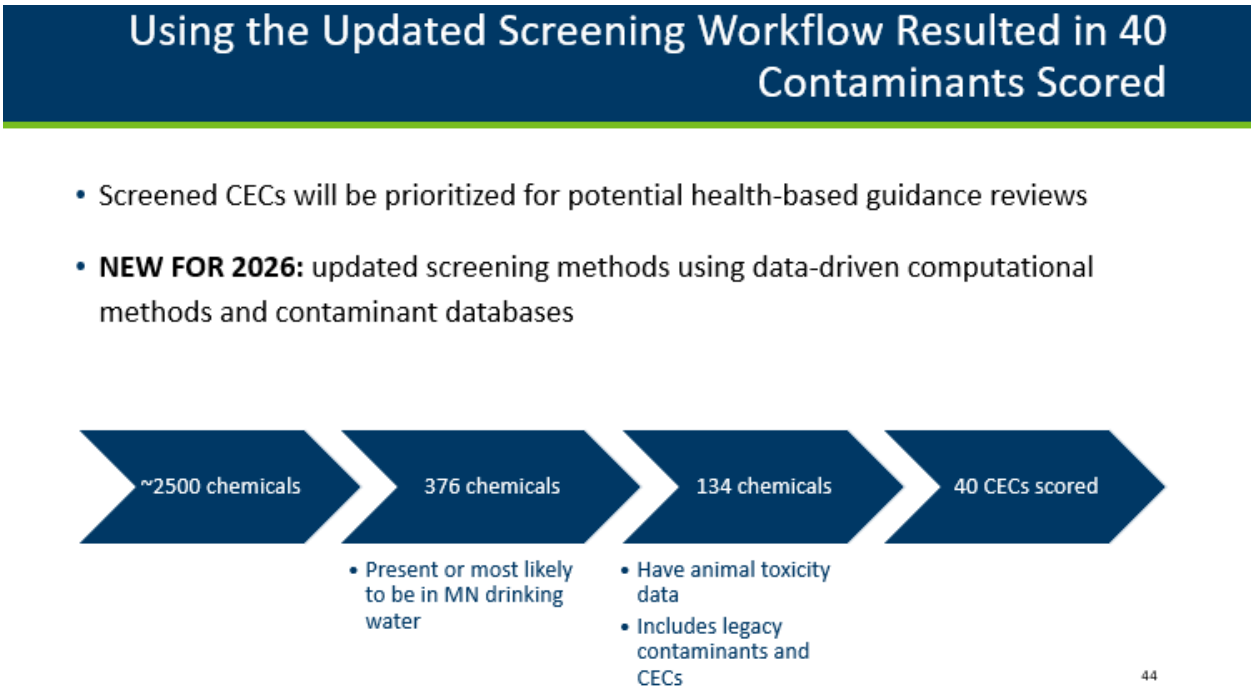
Text:

- HRA toxicologists take the chemicals with the highest exposure potentials and review their aggregated toxicity data
- Create a toxicity score based on
    - Potency – how much of a chemical it takes to elicit an adverse effect
    - Severity – how “bad” the adverse effect is
- Move the results to the CEC workplan development as done previously

Summary

Our goal is to find the chemicals of great concern to public health based on exposure and toxicity. We can automatically calculate the potency found in studies but manual scoring of the severity is needed.

Slide 44: Using the Updated Screening Workflow Resulted in 40 Contaminants Scored



Slide Text and Image Description

- Screened CECs will be prioritized for potential health-based guidance reviews
- **NEW FOR 2026:** updated screening methods using data-driven computational methods and contaminant databases

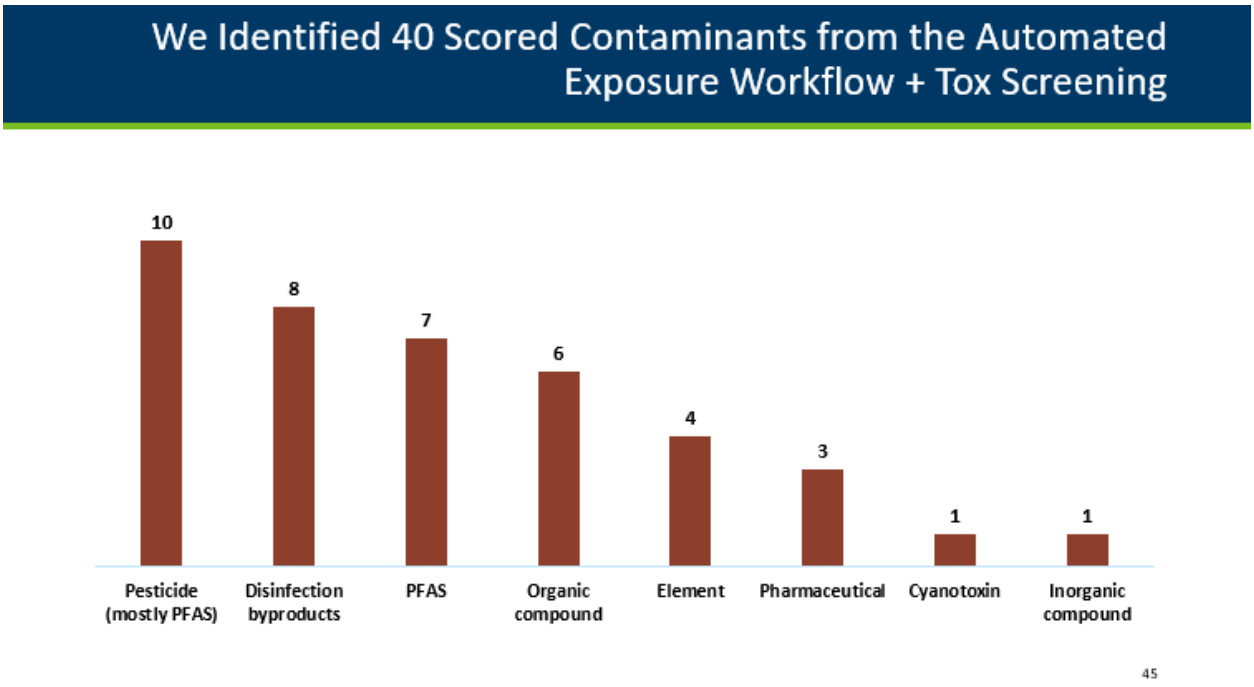
Image: flowchart from left to right:

1. ~2500 chemicals
2. 376 chemicals
    a. Present or most likely to be in MN drinking water
3. 134 chemicals
    a. Have animal toxicity data
    b. Includes legacy contaminants and CECs
4. 40 CECs scored

Summary

In the automated exposure screening we started with approximately 2,500 chemicals. We then focused on a list of 376 chemicals that are most likely to be found in water in Minnesota. From there, we were able to identify 134 high exposure chemicals that had in vivo (animal) data for review. We removed the chemicals that already had been reviewed and have some form of guidance from the list and removed the chemicals that are a better fit for our other sub-unit the Health Risk Limit (HRL) team. We identified the top 40 from exposure to move into the semi-automated process “final mile” for further review and scoring.

Slide 45: We Identified 40 Scored Contaminants from the Automated Exposure Workflow and Tox Screening



Slide Text and Image Description

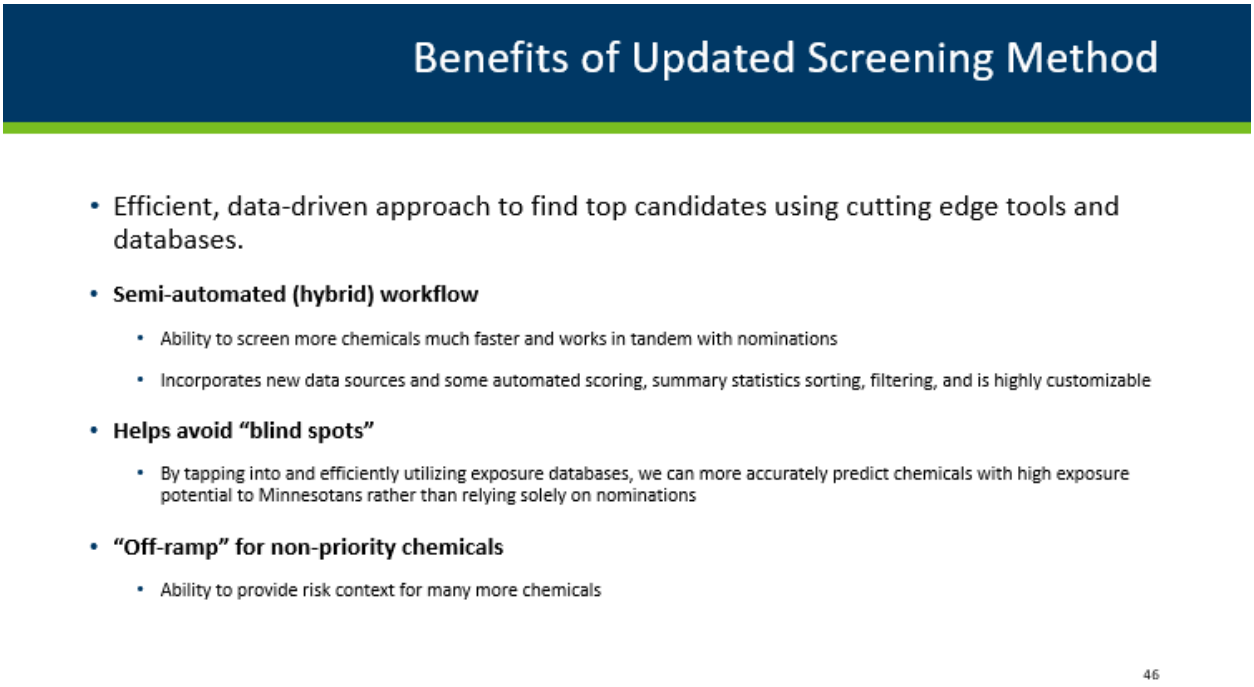
Image: Bar graph of scored contaminants identified from left to right featuring contaminant counts.

1. Pesticide (mostly PFAS)—10
2. Disinfection byproducts—8
3. PFAS—7
4. Organic compound—6
5. Element—4
6. Pharmaceutical—3
7. Cyanotoxin—1
8. Inorganic compound—1

Summary

This figure shows the count of chemicals by class from the top 40 selected from the exposure and toxicity data availability list.

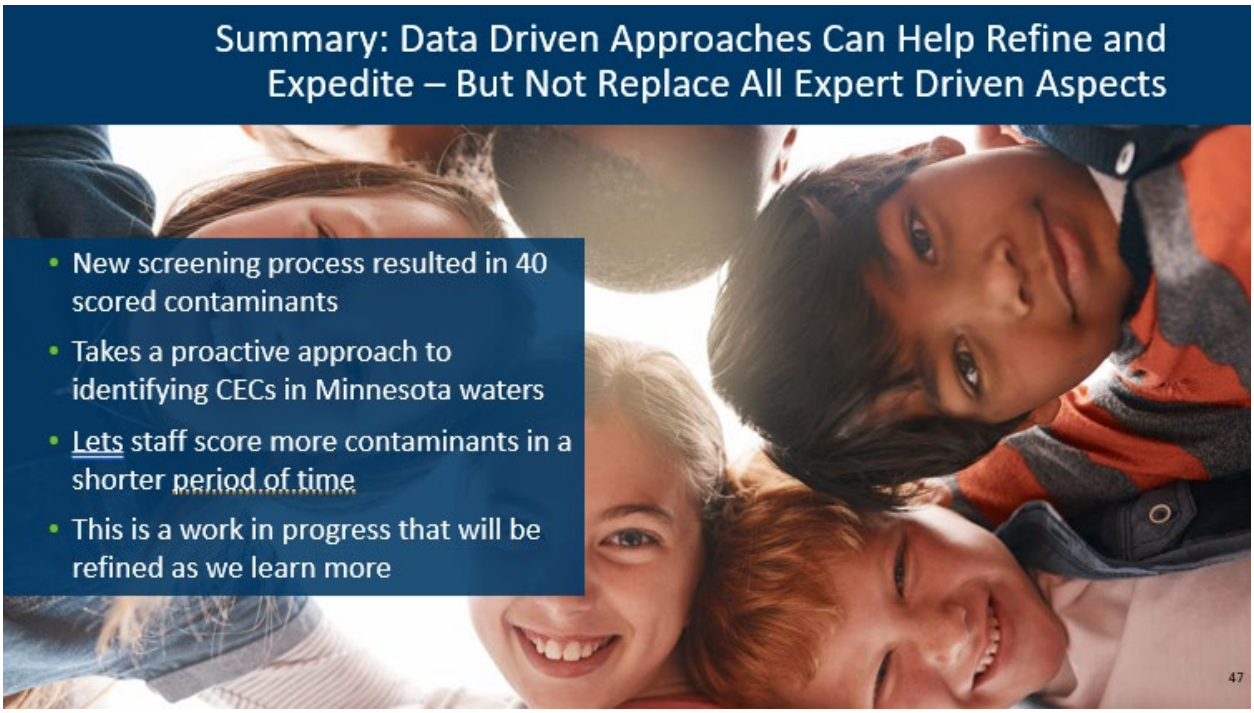
Slide 46: Benefits of updated screening method



Slide Text and Image Description

- Efficient, data-driven approach to find top candidates using cutting edge tools and databases.
- **Semi-automated (hybrid) workflow**
    - Ability to screen more chemicals much faster and works in tandem with nominations
    - Incorporates new data sources and some automated scoring, summary statistics sorting, filtering, and is highly customizable
- **Helps avoid "blind spots"**
    - By tapping into and efficiently utilizing exposure databases, we can more accurately predict chemicals with high exposure potential to Minnesotans rather than relying solely on nominations
- **"Off-ramp" for non-priority chemicals**
    - Ability to provide risk context for many more chemicals

Slide 47: Data Driven Approaches Can Help Refine and Expedite—But Not Replace All Expert Driven Aspects



Slide Text and Image Description

Image: A group of six smiling children.

Text:

- New screening process resulted in 40 scored contaminants
- Takes a proactive approach to identifying CECs in Minnesota waters
- Lets staff score more contaminants in a shorter period of time
- This is a work in progress that will be refined as we learn more

Slide 48: CEC Workplan

Slide Text and Image Description

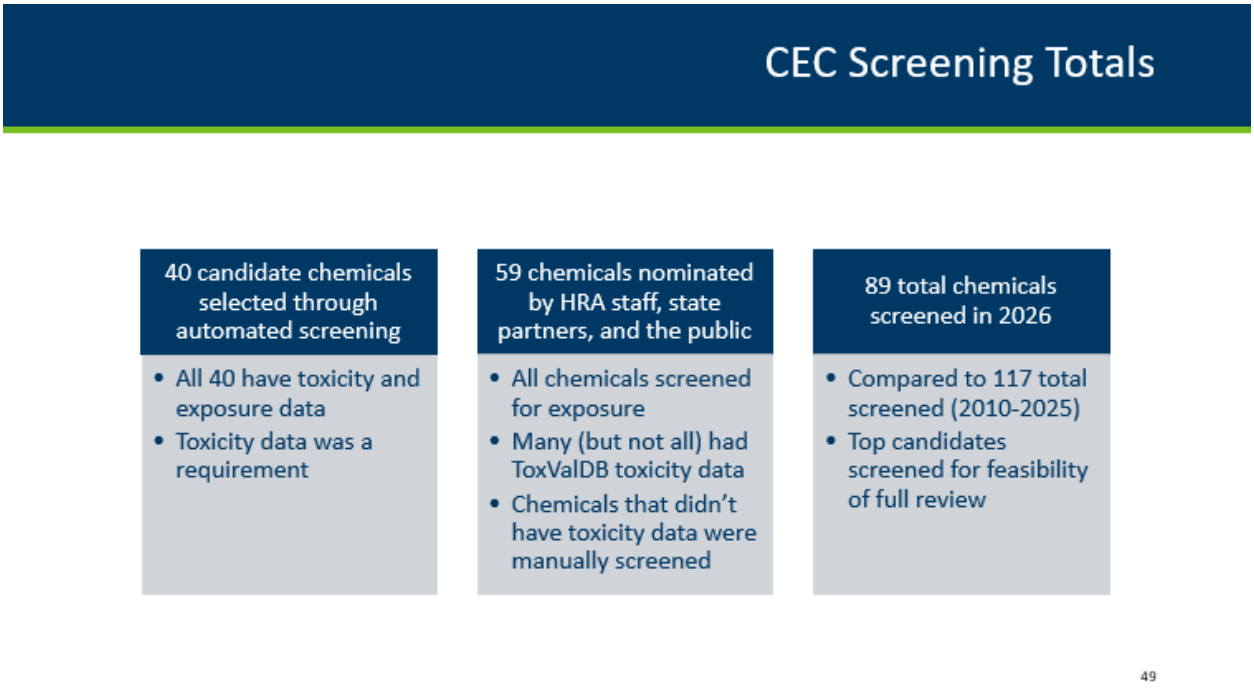
Image: photograph of multi-colored post-it notes on a wall

Text:

CEC Workplan

Lindsay Wilson|Toxicologist

Slide 49: CEC Screening Totals

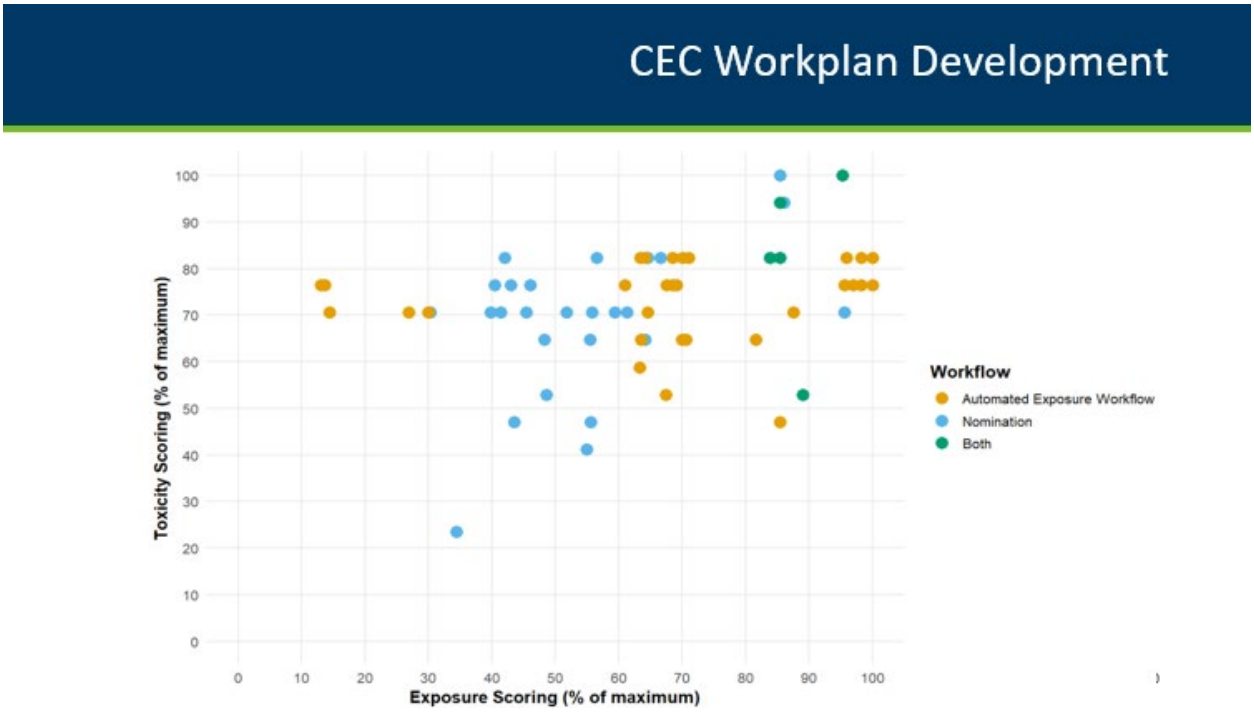


Slide Text and Image Description

Image: three text boxes with the following information:

1. 40 Candidate chemicals selected through automated screening
    a. All 40 have toxicity and exposure data
    b. Toxicity data was a requirement
2. 59 chemicals nominated by HRA staff, state partners, and the public
    a. All chemicals screened for exposure
    b. Many (but not all) had ToxValDB toxicity data
    c. Chemicals that didn't have toxicity data were manually screened
3. 89 total chemicals screened in 2026
    a. Compared to 117 total screened (2010-2025)
    b. Top candidates screened for feasibility of full review

Slide 50: CEC Workplan Development



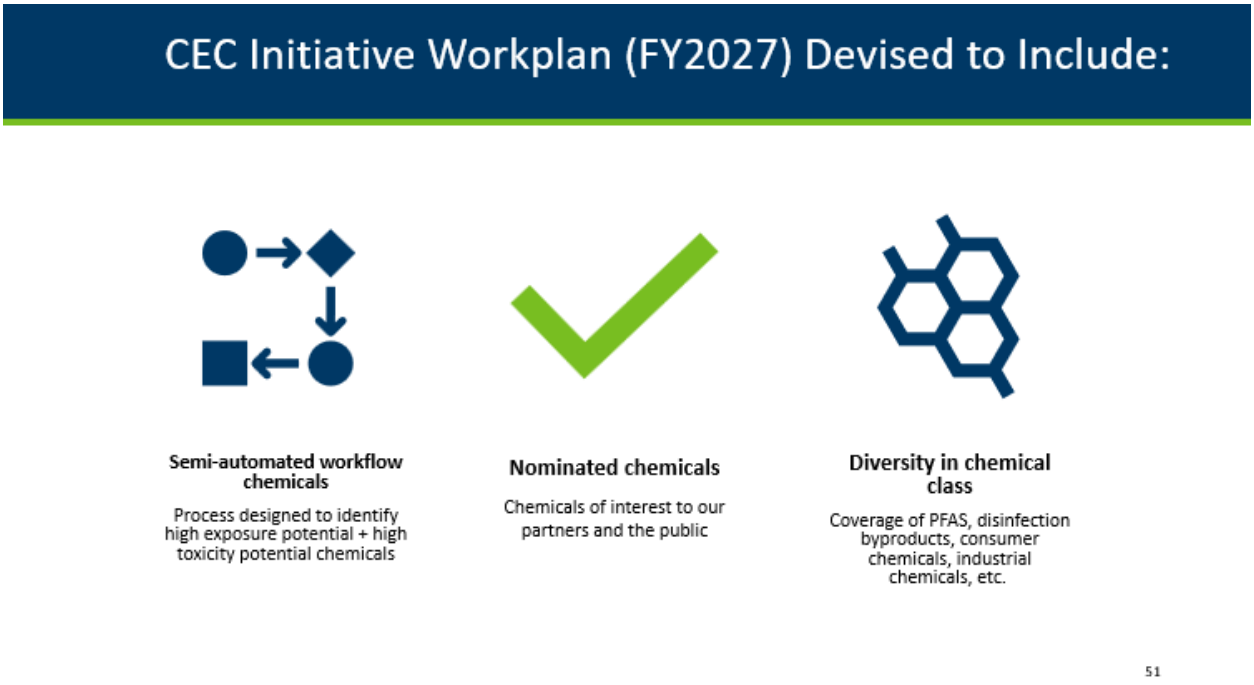
Slide Text and Image Description

Image: scatterplot of toxicity scoring (% of maximum) on the y-axis versus exposure scoring (% of maximum) on the x-axis. The scatterplot shows dots representing chemicals in the following colors: automated exposure workflow (yellow), nomination (blue), and both (green). The workflow dots appear mostly within 40%-100% of the toxicity scoring y-axis and range from 10%-100% on exposure scoring along the x-axis.

Summary

This figure shows significant overlap in toxicity and exposure scores for chemicals identified through the semi-automated workflow and through nomination. The chemicals identified through the semi-automated workflow generally trend higher in both exposure and toxicity scores.

Slide 51: CEC Initiative Workplan (FY 2027) Devised to Include:



Slide Text and Image Description

Images: Icons from left to right: a blue workflow (Semi-automated workflow chemicals), a green checkmark (Nominated chemicals), and blue chemical structure (Diversity in chemical class).

Text:

1. **Semi-automated workflow chemicals**—process designed to identify high exposure potential and high toxicity potential chemicals
2. **Nominated chemicals**—chemicals of interest to our partners and the public
3. **Diversity in chemical class**—coverage of PFAS, disinfection byproducts, consumer chemicals, industrial chemicals, etc.

Slide 52: CEC Workplan (FY 2027)

Chemical	Nomination source	Chemical Class/Use
6PPD	MPCA	Tire antidegradant
6PPD-Q	MPCA	6PPD transformation product
Bromate	Workflow	Disinfection byproduct
Chlorodibromomethane	Workflow	Disinfection byproduct
Glutaraldehyde	Public	Biocide (data center-related)
Molybdenum/molybdate	Workflow/Public	Metal/anticorrosion (data center-related)
Perfluoroheptanoic acid (PFHpA)	Workflow/MPCA	PFAS
Perfluorohexane sulfonate (PFHxS)	Workflow/MPCA	PFAS
Sulfluramid (N-EtFOSA)	MPCA	PFAS (pesticide)
Triphenyl phosphate (TPhP)	MPCA	Flame retardant

52

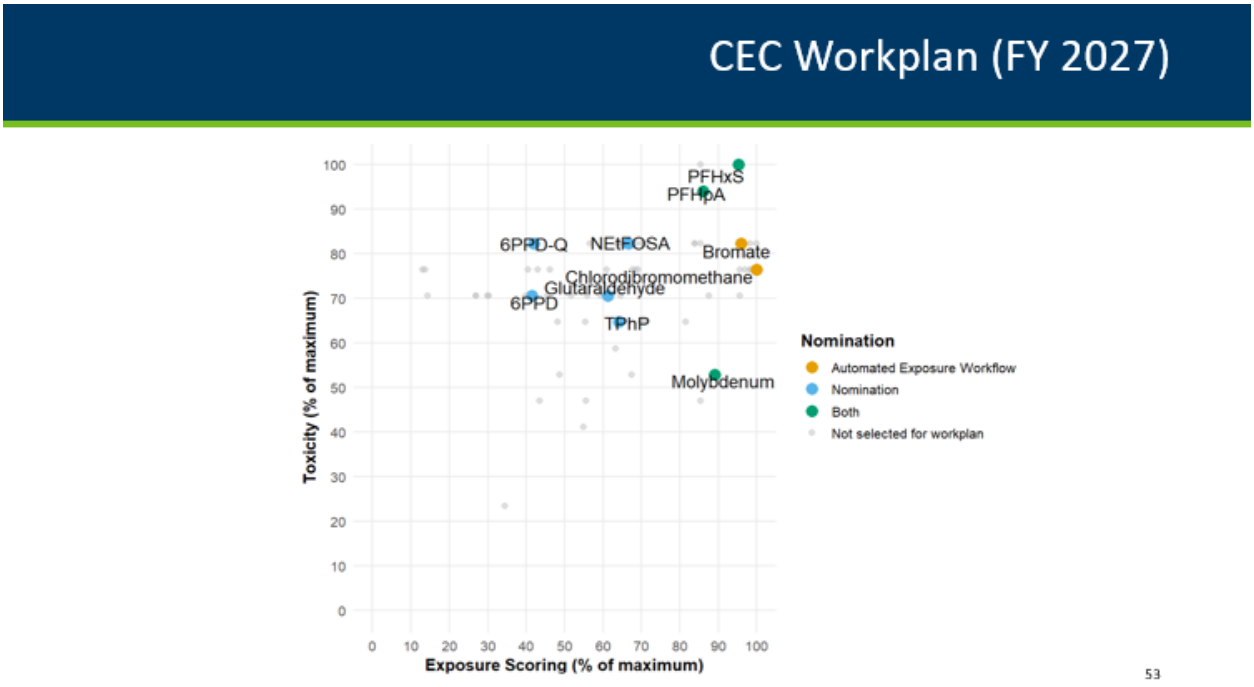
Slide Text and Image Description

Chemical	Nomination source	Chemical class/use
6PPD	MPCA	Tire antidegradant
6PPD-Q	MPCA	6PPD transformation product
Bromate	Workflow	Disinfection byproduct
Chlorodibromomethane	Workflow	Disinfection byproduct
Glutaraldehyde	Public	Biocide (data center-related)
Molybdenum/molybdate	Workflow/Public	Metal/anticorrosion (data center-related)
Perfluoroheptanoic acid (PFHpA)	Workflow/MPCA	PFAS
Perfluorohexane sulfonate (PFHxS)	Workflow/MPCA	PFAS
Sulfuramid (NEtFOSA)	MPCA	PFAS (pesticide)
Triphenyl phosphate (TPhP)	MPCA	Flame retardant

Summary

Chemicals are listed alphabetically, not in the order of priority.

Slide 53: CEC Workplan (FY 2027)



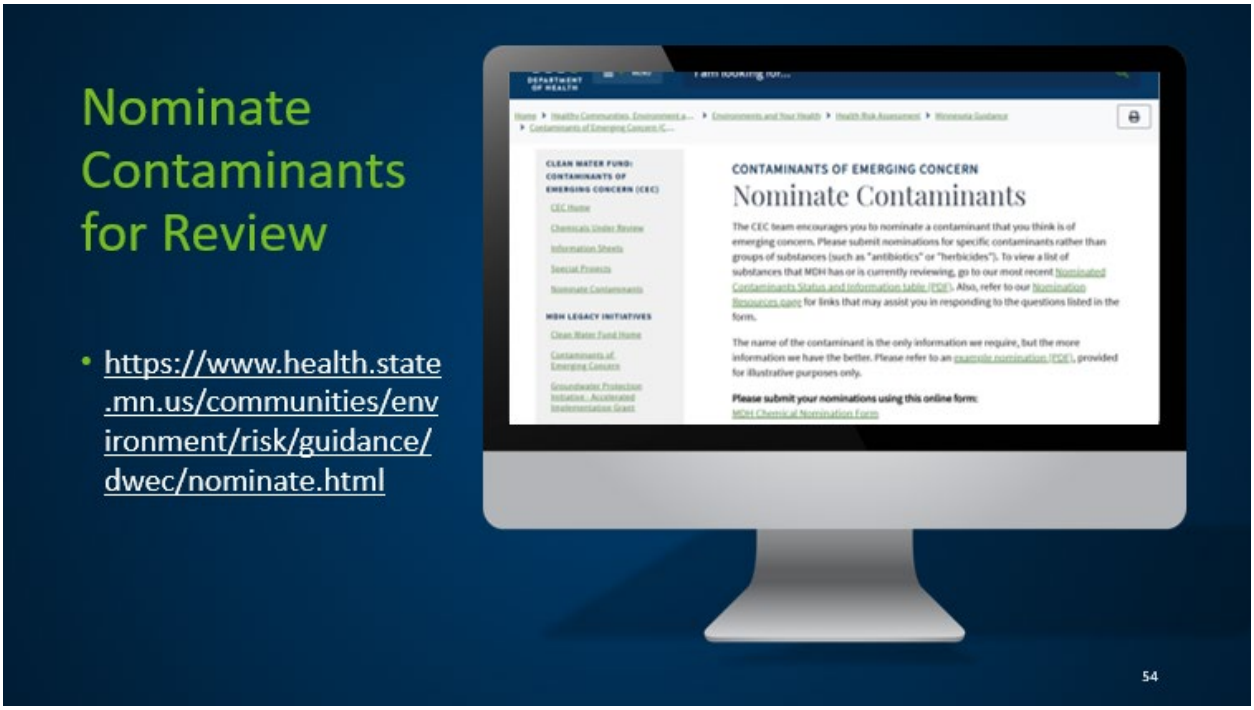
Slide Text and Image Description

Image: Scatterplot of Toxicity (% of maximum) on the y-axis versus exposure score (% of maximum) on the x-axis. The scatterplot shows dots representing chemicals in the following colors: Yellow (automated exposure workflow), blue (nomination), green (both), and gray (not selected for workplan). Most of the dots are located in the upper right quadrant of the scatterplot.

Summary

This figure was included to show the spread of toxicity and exposure scores for the workplan chemicals relative to each other and to the candidate chemicals not selected for the workplan.

Slide 54: Nominate Contaminants for Review



Slide Text and Image Description

Image: Screenshot of Contaminants of Emerging Concern Nominate Contaminants webpage on a computer monitor.

Text:

Contaminants of Emerging Concern Nominate Contaminants webpage (https://www.health.state.mn.us/communities/environment/risk/guidance/dwec/nominate.html).

Slide 55: Questions and Discussion

Slide Text and Image Description

Image: multicolored question marks on a blue background.

Summary

Question: How much is the screening process taking into account occurrence and exposure frequency?

Answer: *Occurrence data is one of the most important elements of the exposure score. When there is data on the chemical's presence in finished drinking water, or source water, or even just surface water or groundwater, it tends to drive the score. If it's found in drinking water, it gets a higher score in that section of the process than if it's just found in surface water, for example, or just found in wastewater, or perhaps not found in water at all.*

The highest score a chemical can get for any one of the individual bits of data that are collected during screening is for presence in Minnesota drinking water above 1 microgram per liter. If it's less than 1 microgram per liter, it also gets a high score, but not quite as high.

As for the detection frequency, that is addressed using a score adjustment that's done near the end of the scoring process, where there are ranges of detection frequencies in surface water, or groundwater, or drinking water. If it's above a certain detection frequency, it gets a slight bump to the exposure score. The water data are central to the process. However, we did take care to design the process in such a way that if there is no monitoring data on the chemical, that doesn't prevent it from potentially making the list.

Looking at the workplan list, not all of these chemicals have been detected in Minnesota in drinking water. Several of them have, but some have not. The process is designed to make it possible for a chemical to make it to the workplan list even without a drinking water detection.

Question: What is the estimate of how many Minnesotans are drinking private well water that is over the HRL for nitrogen?

Answer: *Nitrogen is part of our legacy contaminant program and not the CEC Initiative. We don't have that information. However, there is an MDH private well nitrate risk dashboard that shows by county how many wells have been tested that have elevated nitrate in their systems. If you have further questions about that, please email or call us and we can connect you with the right person who can answer your nitrate questions.*

Question: Does the department envision an upcoming closing date of comments on any of the open comment opportunities?

Answer: *We do accept nominations year-round. We don't have official comment periods, but anytime that someone is concerned about one of the chemicals we are reviewing, you can feel free to contact us anytime. And we listen. . But again, there's no official comment period unless we're taking it through rulemaking.*

We also encourage people to sign up to receive our GovDelivery emails. This is a great way to learn about which reviews we're starting. Anytime we start a review, an announcement goes out to subscribers. That's a great way also to get back in touch with us if there are comments or feedback you have about chemicals.

Question: You are letting us know about the processes you are using. Please show us measurable results. How is water now safer?

Answer: *This is a new process. We can't speak to the workplan yet because this is what we'll be working on. When it comes to who we've helped, think about PFAS. We were one of the first states to have health-based guidance values for PFAS. And we had them years before EPA had an MCL. So we had health protective values going way back to when we first discovered PFAS and it was difficult back then because there wasn't as much data out there. If you think about PFAS and all of the places that it has been detected in Minnesota: in public water systems and, in private wells. We've had, in that context, a really big influence on the number of people that we've helped. As far as this new workplan, once we get the guidance values developed and out, we might have more information. If I'm not answering your question fully, we'd be happy to chat with you one-on-one.*

Question: When you assign a chemical a high-priority score, how often does it already have a certified analytical method for drinking water? Or has it ever been a challenge for lab method development?

Answer: *We don't look explicitly at the certified analytical methods as part of our process. It is an issue in several ways. For example, we were looking at cyclic siloxanes, which are very challenging. They didn't make our final list, but they're really interesting. The analytical methods are tricky. I'm sure you can*

imagine something with silicone is a very complex analytical chemistry question. That is not a key criteria we'd look at for chemical reviews.

There's also cases where the analytical methods do not allow for sufficient detection limits. PFAS is a great example. The levels we can find that are harmful to health are often below those analytical methods, which is a real challenge. If you're an analytical chemist, keep it up. The better the analytical chemistry gets, the better our understanding of all this can be.

Question: How does the automated portion of your process work for prioritizing chemicals based on ecotoxicity or risk to aquatic life?

Answer: *We're interested in a chemical if it's an ecotoxicant, but that's not going to be the basis of a prioritization decision. Our mandate really is to protect human health. So the types of data that we use to really impact our prioritization scores are things that are more relevant to humans—mouse models, rat models, things like that.*

Question: When it comes to understanding exposure to CECs, how much consideration is made for those exposed to private drinking water from private wells?

Answer: *Private well data, when we have it for a CEC, is treated the same way that any other form of drinking water would be treated in terms of the assessment of exposures and determining an exposure score. For private wells, our process is not as effective as it could be due to a lack of data. This is true for many contaminants, even some of the legacy contaminants that are known to be highly common around the state. When there is data, we make use of it in the screening process, just as if it were groundwater from a community water supply.*

Question: Is there a data vetting process for the various monitoring campaigns providing data or a minimum certification/ accreditation check?

Answer: *We don't do any vetting ourselves, but rather rely on quality assurance measures implemented by the agency or group generating the data. During exposure screening, we use a curated collection of data sets that are considered trustworthy because they come from known, long-established databases. Major sources include the Minnesota Drinking Water Information System (MNDWIS), which gets much of its data from the MDH Public Health Laboratory or from commercial labs, and the EPA-USGS Water Quality Portal, which includes data from many sources and is vetted by the contributing agencies.*

Slide 56: Thank you!

Slide Text and Image Description

Image: Minnesota Department of Health Logo

Text:

Health.risk@state.mn.us

651-201-4899

GovDelivery: Groundwater Rules, Guidance, and Chemical Review Sign-up webpage (https://public.govdelivery.com/accounts/MNMDH/subscriber/new?topic_id=MNMDH_39)

Minnesota Department of Health
Health Risk Assessment
health.risk@state.mn.us
www.health.state.mn.us

9/2/2026