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Emerging Contaminants Monitoring

Where do we start?



water
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Watercare's Recycled Water Journey

- Need to increase diversity of potable water source
- CI project pledging to more sustainable approach
- Reuse plant source Mangere treated wastewater (pre-UV)
- 500m³/d reuse water for construction use
- 22m³/d of drinking water for testing and demonstration with intent of direct potable water

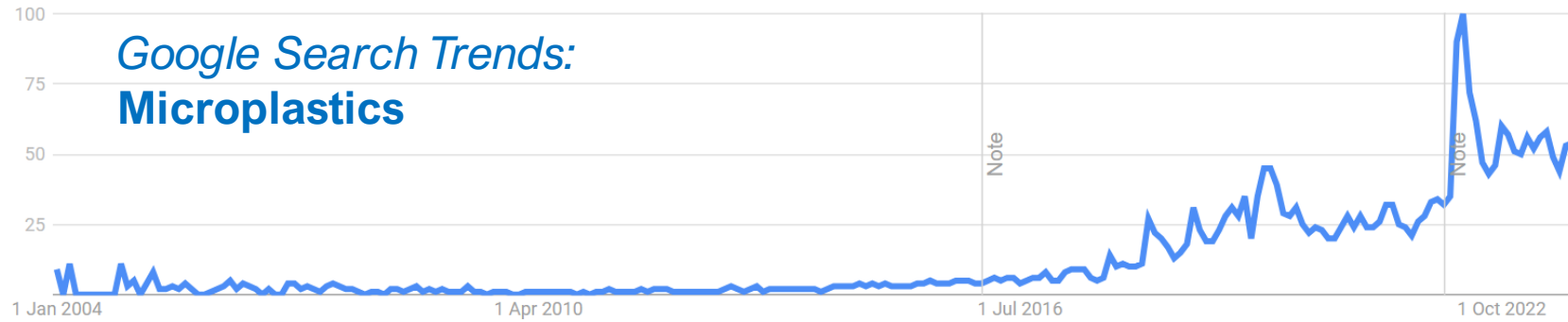


Watercare's Recycled Water Journey



Objective	Remove particles and organisms >microns (silt, floc, bacteria, protozoa)	Remove particles >mol weight (salt, virus, organic compounds)	Break down DNA and organics through strong oxidation	Quench peroxide and remove micropollutants	Virus control	
Pathogen						Total LRV
Bacteria	4	1.5	>4		4	13.5
Virus	0	1.5	4		4	9.5
Protozoa	4	1.5	>4		0	8.5

Emerging Contaminants



- Perhaps more aptly, **contaminants of emerging concern (CECs)**?
- Plenty of speculation, but the water industry needs evidence.

Developing a CEC Monitoring Programme: A Step-By-Step Guide

What are CECs?
How many are out there?

1. Develop a Long list

2. Classify the Long List

3. Develop an Initial Indicator CECs Shortlist

4. Sample for the long list

5. Refine the Indicator CECs Shortlist

6. Develop the Monitoring Programme

7. Use the Indicators as Indicators!

Step 1: Develop a long list



Step 2: Classify the Long List

CEC Name – From the long list

CEC Class – e.g. DBPs, EDs, PuPs, pesticides

Chemical Group – Specific groups within broader classes e.g. Bisphenols

Key source areas - How is it used/produced? How could it get into the catchment?

Links to further information - Useful for future investigations

Comments - Is it referred to by another name? Are there relevant guideline values?

Step 3: Develop an Initial Indicator CECs Shortlist

NEED TO CONSIDER

Relevance of potential sources:
Is it a relevant indicator in your context?

Ability to test / analyse:
Some may be simple, some may be impractical

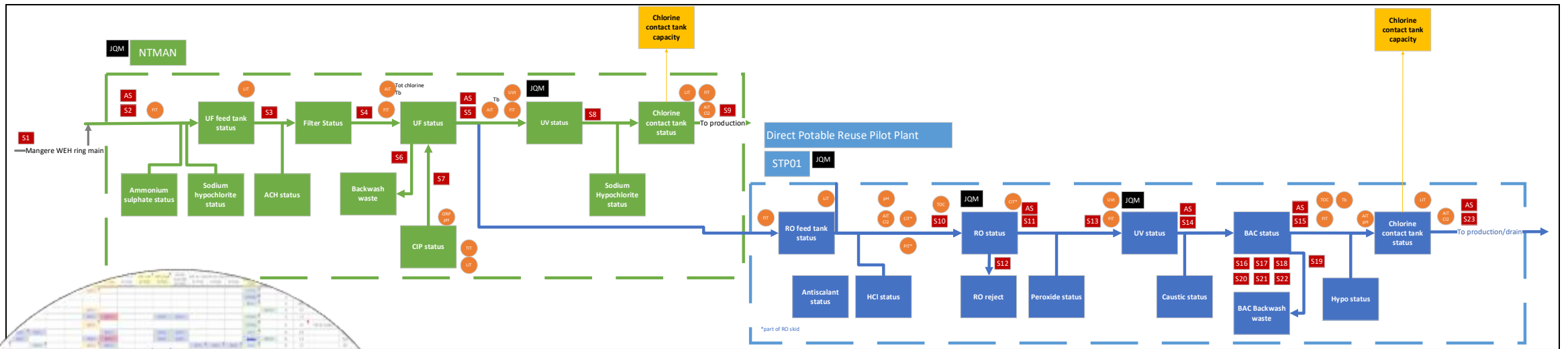
Risk profile: High risk CECs may be worthy of inclusion alongside common indicators

Treatment effectiveness:
Comes into consideration of risk profile

Watercare's pilot study CEC monitoring program will use **indicator compounds**

- Common approach in drinking water supply (e.g. THMs for DBPs)
- No widely accepted approach in NZ using indicators for all CEC classes

Step 4: Sample for the Long List



Step 5: Refine the shortlist



Initial shortlist

The results from Watercare's long list sampling will inform revisions of the initial indicator shortlist

Remove irrelevant indicators

Consider adding and removing indicators from the initial list as part of this refinement.

Add unexpected indicators

Be careful when removing – consider reasons why – shouldn't be just because it was not found in long list sampling.

Revised shortlist

Step 6: Develop the CEC Monitoring Programme

IMPORTANT CONSIDERATIONS



Cost of sampling and the available budget for monitoring CECs



Required frequency of sampling



Event-based sampling



Additional sampling based on indicator "hits"



Pilot plant process performance assessments

Ongoing CEC monitoring programme:
Based on the final indicator list

Step 7: Use the Indicators as Indicators!

The trap: “we’ve made this list of compounds for CEC monitoring, so those are the only ones we need to worry about”

- If you find elevated concentrations of a particular CEC, this should trigger investigation into the potential presence of other similar CECs. Consider:
 - Similar sources
 - Similar chemical structures
- The classified CEC list can help with this.



Final Recommendations

1

Consideration of CECs is particularly important for recycled water investigations, but they are also **relevant in all aspects of the water cycle.**

2

Approaches used elsewhere are great BUT it is critical to **consider your context:**

- Local catchment risks
- End use requirements
- Existing and future regulatory frameworks

3

By definition, emerging contaminants will always be an “emerging” field, so let’s **collaborate and share our knowledge** to support each other in finding evidence and managing the risks, together.

Acknowledgements

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